

Background Information

ENVIRONMENT & CONSERVATION

a walk in the woods —

my children dancing

atop the big rock

Painting by Anna Macrae
Haiku by Michael Dylan Welch



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my children dancing
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Background Information

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Environmental Setting

The Sammamish Plateau is the distinguishing topographic feature in the City, rising from about 50 feet at the Lake Sammamish shoreline to about 500 feet above Lake Sammamish. There are numerous wetlands, streams, and lakes, including Pine Lake and Beaver Lake. The streams flow in a predominantly western direction from the lake and wetland headwaters over the plateau and then flow down the steep erosive slopes through ravines ultimately discharging to Lake Sammamish.

Air Quality

Air quality is generally assessed in terms of concentrations of airborne pollutants being higher or lower than ambient air quality standards set to protect human health and welfare. To measure existing air quality, the Washington State Department of Ecology and PSCAA maintain a network of monitoring stations throughout the Puget Sound region.

As required by the 1970 Clean Air Act, the U.S. EPA initially identified six *criteria air pollutants* that are pervasive in urban environments and for which state and federal health-based ambient

See Volume I, *Environment and Conservation Element Goal EC.6 on page 67 and supporting policies.*

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air quality standards have been established. The U.S. EPA calls these pollutants criteria air pollutants because the agency has regulated them by developing specific public health- and welfare-based criteria as the basis for setting permissible levels. Ozone, CO, PM, nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and lead are the six criteria air pollutants originally identified by U.S. EPA. Since then, subsets of PM have been identified for which permissible levels have been established. These include PM₁₀ (matter that is less than or equal to 10 microns in diameter) and PM_{2.5} (matter that is less than or equal to 2.5 microns in diameter).

The Clean Air Act established National Ambient Air Quality Standards (NAAQS) to protect the public health and welfare from air pollution. Areas of the U.S. that do not meet the NAAQS for any pollutant are designated by the U.S. EPA as *nonattainment areas*. Areas that were once designated nonattainment but are now achieving the NAAQS are termed *maintenance areas*. Areas that have air pollution levels below the NAAQS are termed *attainment areas*. In nonattainment areas, states must develop plans to reduce emissions and bring the area back into attainment of the NAAQS.

An area remains a nonattainment area for that particular pollutant until concentrations are in compliance with the NAAQS. Only after measured concentrations have fallen below the NAAQS can the state apply for redesignation to attainment, and it must then submit a 10-year plan for continuing to meet and maintain air quality standards that follow the Clean Air Act. During this 10-year period, the area is designated as a maintenance area. The Puget Sound region, including all of King County, is currently classified as a maintenance area for CO and ozone.

See Volume I, Environment and Conservation Element Goal EC.3 on page 48 and Goal EC.4 on page 52 and supporting policies.

Wetlands

Wetlands are transitional areas between aquatic and terrestrial habitats and are identified based upon three parameters: hydrology, soils and vegetation. Wetlands are formally identified and delineated according to the methods in the 1987 *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987). In the Puget Sound region, additional methodology in the United States Army Corps of Engineers (USACE) *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (USACE, 2010) must also be used. These methodologies are updated and clarified from time to time in revised manuals that are subsequently adopted by the Washington Department of Ecology (WDOE) pursuant to RCW 90.58.380 and WAC 173-22-035, as amended.

Consistent with state and federal wetland definitions, the City of Sammamish's definition of wetlands (SMC 21A.15.1415) includes 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 do not include those artificial wetlands intentionally created from nonwetland sites including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds and landscape amenities, or those wetlands created after July 1, 1990 that were unintentionally created as a result of the construction of a road, street or highway. Wetlands may include those artificial wetlands intentionally created from non-wetland areas to mitigate the conversion of wetlands. Some regulated wetlands are saturated with surface and/or ground water year round; however, wetlands can also include areas that are only seasonally wet.

Wetlands provide many important ecosystem functions. Wetlands can act as the guardians of our water quality by retaining water, providing time for filtration and settling of suspended solids, trapping sediments, and by biochemically converting otherwise harmful chemicals into less harmful ones. Wetlands can also provide valuable natural stormwater run-off mediation, flood-prevention, and groundwater recharge by absorbing water during storm events and then gradually releasing water during drier periods. This can help to maintain stream flows in summer dry periods, which is important for the survival of animals, plants and other organisms that live in or near a stream. Wetland vegetation can also help to stabilize our shorelines reducing erosion that can otherwise be caused by wave action.

Wetland ecosystems can provide essential habitat for a variety of aquatic and terrestrial plant and animal species. More than one-third of the United States' threatened and endangered species live only in wetlands, and nearly half use wetlands at some point in their lives. Many other animals and plants depend on wetlands for survival. For example, wetlands that surround open water can provide key habitat for fish spawning nurseries. In addition, many of the U.S. breeding bird populations including ducks, geese, woodpeckers, hawks, wading birds and many song-birds feed, nest and raise their young in wetlands. In part because of the wildlife habitat that they provide and the unique plant communities that they support, wetlands are also valued for their potential aesthetic and environmental education attributes.

EC.6

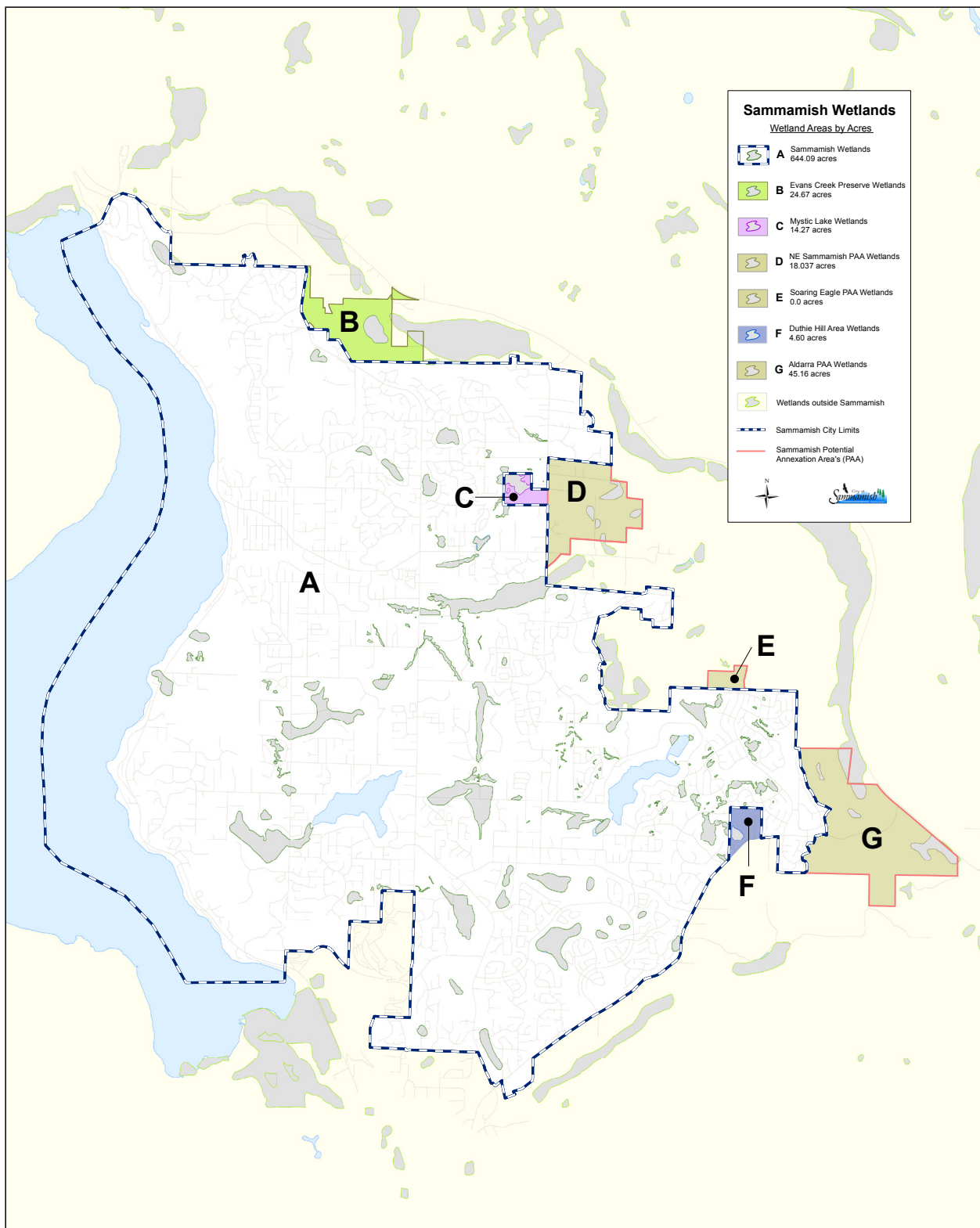
There are approximately 550 acres of wetlands mapped in the City of Sammamish, see Background Figure EC-1. However, there are more unmapped wetland areas known to be present. These wetland areas include a wide range of habitat conditions and wetland functions. Many wetland areas in Sammamish have been degraded to some extent through deforestation, filling, drainage, agriculture, and/or through removal or clearing of surrounding buffer areas. However, many high quality wetland areas remain in Sammamish and provide highly valued functions.

Among the highest quality wetlands in and immediately surrounding Sammamish are twelve large wetlands that contain a bog ecosystem. Bogs are a unique type of wetland that generally form, over a period of 1,000's of years, in depressions created through glacial forces. Bogs are dominated by Sphagnum mosses on the ground layer, have unique acidic water chemistry, and have low levels of dissolved oxygen with few to no buffering chemicals in the water. These factors create an environment where the rate of production of organic material exceeds the rate of decomposition. Because of this, bogs typically accumulate peat mats comprised of un-decomposed moss (peat) that can be several feet thick. This unique environment allows these wetlands to be super-sinks for nutrients. In fact, bogs and other peatlands that are actively accumulating organic matter are carbon sinks and have been identified globally to be one of the major storehouses of the world's carbon - exceeding that of forests. This very specialized environment supports very unique plant types, many of which do not grow naturally elsewhere. Because they are home to some of the rarest and most unusual wetland-dependent flora and fauna, many scientists believe that bogs and other peat-based wetlands play a key role in conserving global biodiversity.

Stormwater is one of the greatest threats to bogs as it can shift the water chemistry and can bring nutrients and oxygen into the system, all of which can contribute to the decomposition of the peat mat, causing the bog to break down in a relatively rapid timeframe when compared to how long it took for the mat to form. Bogs are essentially irreplaceable natural resources because no mechanisms have yet been found that can re-create bog conditions in a time range that humans would be around to see. Once a bog is gone, it is gone. Accordingly, bogs are Category 1 wetlands due to their rare, sensitive and irreplaceable nature and are one of the most protected wetland types for all jurisdictions that protect wetlands at the local, state and federal levels.

As with most jurisdictions in Western Washington, the City of Sammamish rates wetlands utilizing a wetland rating system that

Background Figure EC-1
 Sammamish Wetlands



Wetland boundaries shown on this map are approximate, and an individual wetland delineation study, followed by a survey and a city review for accuracy would be needed to determine where exact wetland boundaries are on any individual property. In addition, it should be noted that there are more known wetlands in the City than shown on this map.

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was developed by the WDOE. The rating system categorizes wetlands as either Category I, II, III or IV wetlands, with Category I wetlands providing the most valuable wetland functions that have been scientifically shown to need the most protection. Wetlands needing the most protection have wider buffering requirements and sometimes have impervious surface limitations or other restrictions aimed at protecting the watershed surrounding the wetland.

The City of Sammamish adopted Environmentally Critical Areas Regulations that are described in Chapter 21A.50 in the Sammamish Municipal Code (SMC). Development standards for wetlands are found in SMC 21A.50.290. Among other requirements, these standards include a requirement to establish a buffer from the delineated wetland edge with the required buffer width based on the wetland category as determined utilizing the WDOE wetland rating form, and as also based on the habitat score from the WDOE rating form, and other wetland habitat attributes. Required buffer widths range from 50-feet to 215-feet with a 215-foot buffer required beyond the boundaries of Category I wetlands that include a bog ecosystem or a natural heritage wetland. The SMC also includes wetland regulatory provisions in 21A.50.322 that are tied to a mapped Wetland management area – Special district overlay, which ties added protection requirements including, but not limited to, restrictions on the allowed quantity of impervious surface area in mapped overlay areas in the basins surrounding some of Sammamish’s highest value and most sensitive wetland systems such as those that include bog ecosystems (see Background Figure EC–2, Special Overlays and Districts).

The city’s regulations in SMC 21A.50 also include a number of flexibilities and allowances for existing and proposed development that can allow wetland or buffer alteration when applicable criteria are met, such as when there is an existing legally-established development that is being modestly expanded or when impacts are unavoidable and minimized, and mitigation is provided that supports equivalent or greater biological functions most commonly on-site or within the same sub-basin as the impact.

See Volume I, Environment
and Conservation Element
Goal EC.5 on page 54
and supporting policies.

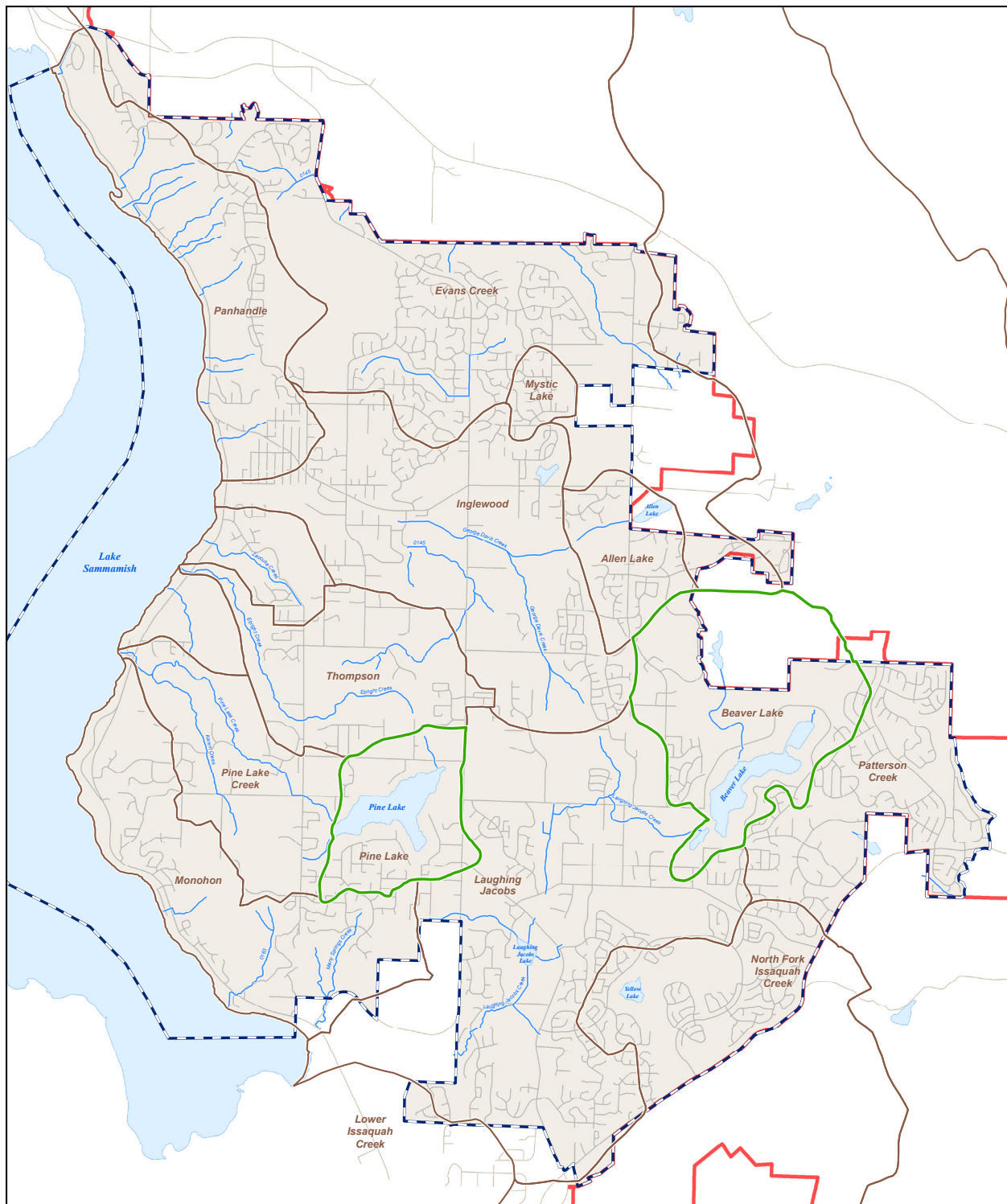
Streams

The City is predominantly located within the Cedar River Basin with some area within the Snoqualmie River Basin. Within these river basins are a number of sub-basins that include numerous streams (see Background Figure EC–3, City of Sammamish Drainage Subbasin Delineation). While all of the city’s streams provide habitat for a variety of terrestrial and aquatic plant and animal species, some streams in the city also provide important habitat to

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Background Figure EC-3
 City of Sammamish Drainage Subbasin Delineation



Pine and Beaver Lake Drainage Sub-basins	Sammamish City Limits
Drainage Sub-basins	Urban Growth Boundary
Streams	Streets - Public

Drainage Sub-basins

The information included on this map has been compiled from a variety of sources and is subject to change without notice.
 Produced by the City of Sammamish 2015. No warranties of any sort, including but not limited to accuracy, fitness or merchantability, accompany this product.
DrainageSubBasinsEC-4.mxd Revision Date: 10-20-2015

salmonids. The lower reaches of a few of the city's streams have been the subject of community efforts to restore habitat for kokanee salmon. Kokanee salmon are native to the Lake Sammamish and Lake Washington watersheds but have experienced a dramatic population decline and now spawn in limited numbers in only a few streams that feed into Lake Sammamish. Causes of this fish population decline are reported to include altered stormwater flows, past hatchery practices, predation, fishing, passage barriers, and lake temperature and dissolved oxygen levels. Along with watershed residents, other local jurisdictions, agencies and NGOs, the City of Sammamish participates in the Lake Sammamish Kokanee Work Group, which was formed in 2007 to identify the causes of kokanee decline and develop and implement actions to address these issues.

Sammamish defines regulated streams in SMC 21A.15.1240 to include areas in the city where surface waters produce a defined channel or bed, not including irrigation ditches, canals, storm or storm water runoff conveyance devices or other entirely artificial watercourses, unless they are used by salmonids or are used to convey streams naturally occurring prior to construction of such watercourses. For the purpose of this definition, a defined channel or bed is an area that demonstrates clear evidence of the passage of water and includes, but is not limited to, bedrock channels, gravel beds, sand and silt beds, and defined-channel swales. The channel or bed need not contain water year-round. For the purpose of defining the following categories of streams, normal rainfall is rainfall that is at or near the mean of the accumulated annual rainfall record, based upon the water year for King County as recorded at the Seattle-Tacoma International Airport.

Sammamish streams are classified according to criteria described in SMC 21A.15.1240(1) as either Type S, Type F, Type Np or Type Ns streams. In summary, Type S streams have been inventoried as shorelines of the state. No Type S streams are located within Sammamish presently (as of January, 2015), but may be included in future annexation areas. Type F streams are, or have the potential to be, used by salmonids, or are streams that have been identified as being of special significance. Streams of special significance are those perennial reaches designated by the City based on historic fish presence and/or the probability of restoration and include streams locally known as George Davis Creek, Ebright Creek, Pine Lake Creek and Laughing Jacobs Creek. Type Np streams are perennial during a year of normal rainfall and do not have the potential to be used by salmonids. Type Ns streams are seasonal or ephemeral during a year of normal rainfall and do not have the potential to be used by salmonids.

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Development standards for streams are found in SMC 21A.50.330. Among other requirements, these standards include a requirement to establish a buffer from the stream's ordinary high water mark or from the top of the bank if the ordinary high water mark cannot be identified. The buffer width required is based on the stream's classification. A 150-foot buffer is required beyond Type S and Type F streams. A 75-foot buffer is required beyond Type Np streams, and a 50-foot buffer is required beyond Type Ns streams.

The city's regulations in SMC 21A.50 also include a number of flexibilities and allowances for existing and proposed development that can allow stream or buffer alteration when applicable criteria are met, such as when there is an existing legally-established development that is being modestly expanded or when impacts are unavoidable and minimized, and mitigation is provided that supports equivalent or greater biological functions most commonly on-site or within the same stream sub-basin as the impact.

Lakes

See Volume I, Environment and Conservation Element Policy EC.5.29–Policy EC.5.39 on page 60.

Lakes are defined in SMC 21A.15.664 to include an open body of surface water not including streams or rivers, that is 20 acres or greater in total area. There are three lakes in the City of Sammamish: Lake Sammamish, Pine Lake, and Beaver Lake. There are also wetlands, in and immediately surrounding Sammamish, that are characterized by large open-water areas that are locally referred to as lakes including Laughing Jacobs Lake, Yellow Lake, Allen Lake and Mystic Lake (see Background Figure EC-3, City of Sammamish Drainage Subbasin Delineation).

Sammamish's three lakes, Lake Sammamish, Pine Lake, and Beaver Lake, are regulated under the city's Shoreline Master Program (SMP), which fulfills the requirements of the Washington State Shoreline Management Act and associated guidelines. The SMP balances local needs, interests and character with the general public's interests in protecting key shoreline environments and important resources. The shoreline jurisdiction includes lands extending landward 200 feet from the subject lake's ordinary high water mark and includes associated floodplain areas and wetlands that meet specified criteria described in SMC 25.02.010(80) and 25.05.010.

As part of the city's SMP, shorelines have been assigned an environment designation of Shoreline Residential (SR) or Urban Conservancy (UC). Shoreline areas with an UC environment designation have more restrictive regulatory requirements and protections than shorelines with a SR environment designation. Among other requirements, the City's SMP describes required

shoreline setbacks that range from 45 to 50 feet for residential structures depending on the lake and shoreline environment designation. The SMP also includes requirements and incentives to restore a vegetation enhancement area, which is defined as the 15-foot wide portion of the shoreline setback that is immediately landward of the lake’s ordinary high water mark. For Pine Lake and Beaver Lake, there are added requirements in the SMP to retain 85% of the significant trees within the shoreline jurisdiction.

In addition to Critical Area regulations and Shoreline Master Program regulations, the City protects water quality and quantity through Sammamish Municipal Code Title 13, Surface Water Management. The City’s adopted Stormwater Management Comprehensive Plan (2001) identifies local stormwater quantity and quality problems and methods to address identified issues.

Flood Hazard Areas

WAC 365-190 defines flood hazard areas as:

“Frequently flooded areas are lands in the floodplain subject to a one percent or greater chance of flooding in any given year. These areas include, but are not limited to, streams, rivers, lakes, coastal areas, wetlands, and the like.”

The WAC guidelines note that: “Floodplains and other areas subject to flooding perform important hydrologic functions and may present a risk to persons and property. Classifications of frequently flooded areas should include, at a minimum, the 100-year floodplain designations of the Federal Emergency Management Agency and the National Flood Insurance Program.”

The only floodplain areas in the City of Sammamish are small areas along Lake Sammamish and near SR 202 at the northern city boundary.

Regulations for flood hazard protection are found in SMC 15.10, Flood Damage Protection.

Groundwater

The large majority of the City is within the East Lake Sammamish Basin with westward flows towards, and into Lake Sammamish. The City also includes portions of the Evans Basin to the northeast, Patterson Creek Basin to the east, and Issaquah Creek Basin to the south. Within each basin are sub-basins.

See Volume I, Environment and Conservation Element Goal EC.2 on page 47 and supporting policies.

See Volume I, Environment and Conservation Element Policy EC.5.58–Policy EC.5.66 on page 65.

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Groundwater is rainwater that has filtered into the ground and stays below the surface in zones called aquifers. The amount of groundwater available and the amount of water available to recharge ground water is affected by precipitation, land use, population growth and water reuse. With population growth there is an increase in the number of residential and commercial buildings, roads and parking lots that are impervious surfaces which decrease or prohibit groundwater recharge. There is also an increase demand for water. Ground water withdrawals from aquifer, when combined with an increase in impervious surface area in a recharge zone, can lead to a diminished groundwater supply for drinking water purposes. Because ground and surface water are interconnected, surface water features such as lake levels and the base flow of creeks are impacted by groundwater levels. Please see Background Figure EC-4 for a map of areas where groundwater is susceptible to contamination due to surficial geology, potential for infiltration and depth to groundwater. Areas of low, medium and high susceptibility are shown on this map.

In order to protect water quality where groundwater supplies the public water system, the Sammamish Plateau Water and Sewer District Water Comprehensive Plan has identified wellhead protection areas in the City of Sammamish (see Background Figure EC-5, excerpted from the Sammamish Plateau Water and Sewer District Water Comprehensive Plan "Figure 5-1 Wellhead Protection Areas").

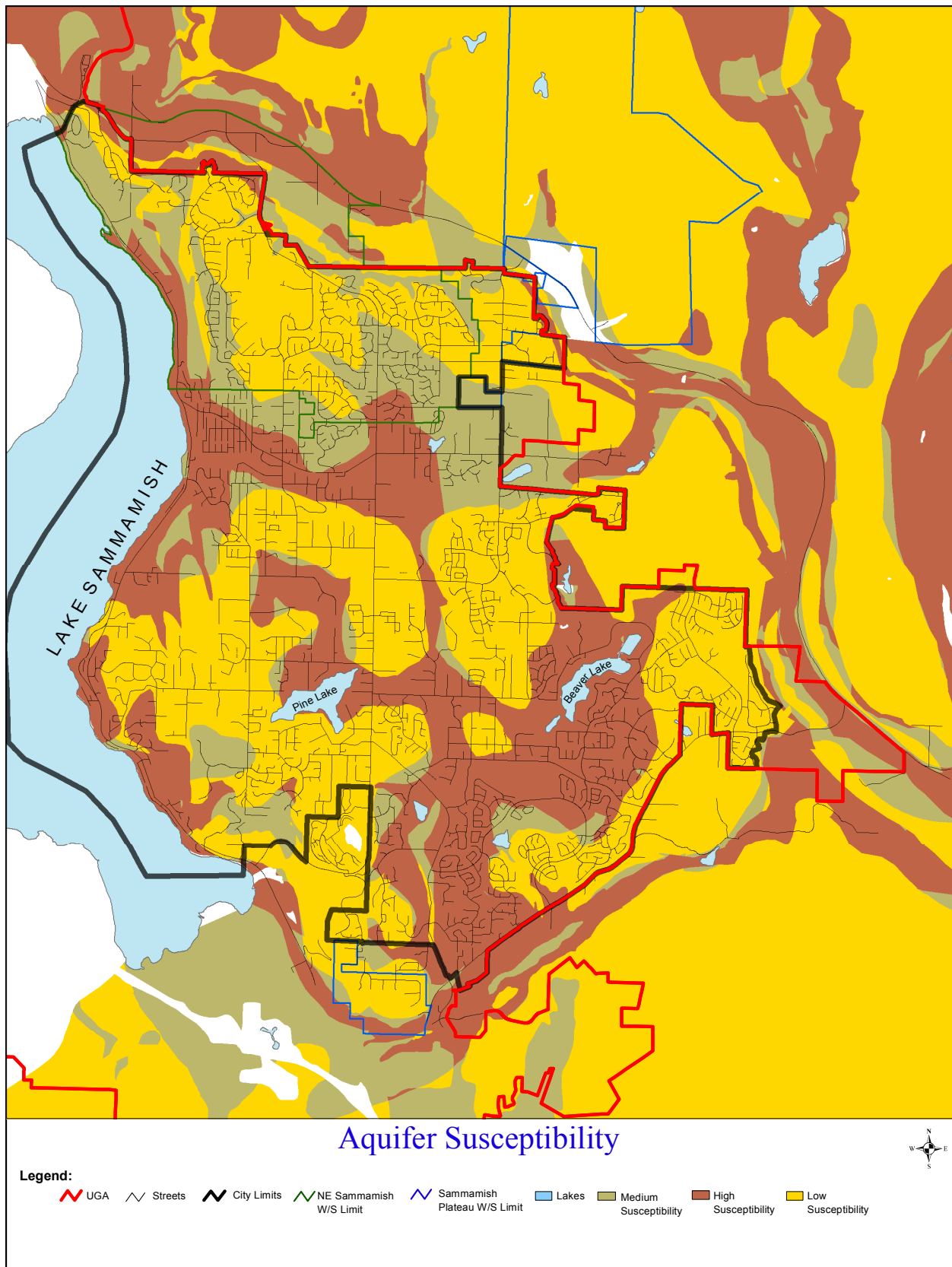
Methods to retain recharge are to maintain portions of residential areas in their natural state or permit the planting of vegetation in these areas. Stormwater facilities can be constructed to promote recharge of groundwater provided that the stormwater is first adequately treated so as not to contaminate ground water. The State of Washington is also currently investigating ways to treat and reuse wastewater.

Maintaining groundwater quality is also a major concern particularly in recharge areas. Contaminants sources could include: failing septic systems, untreated stormwater, leaking underground storage tanks, quarries, agricultural chemicals, hazardous materials spills, etc.

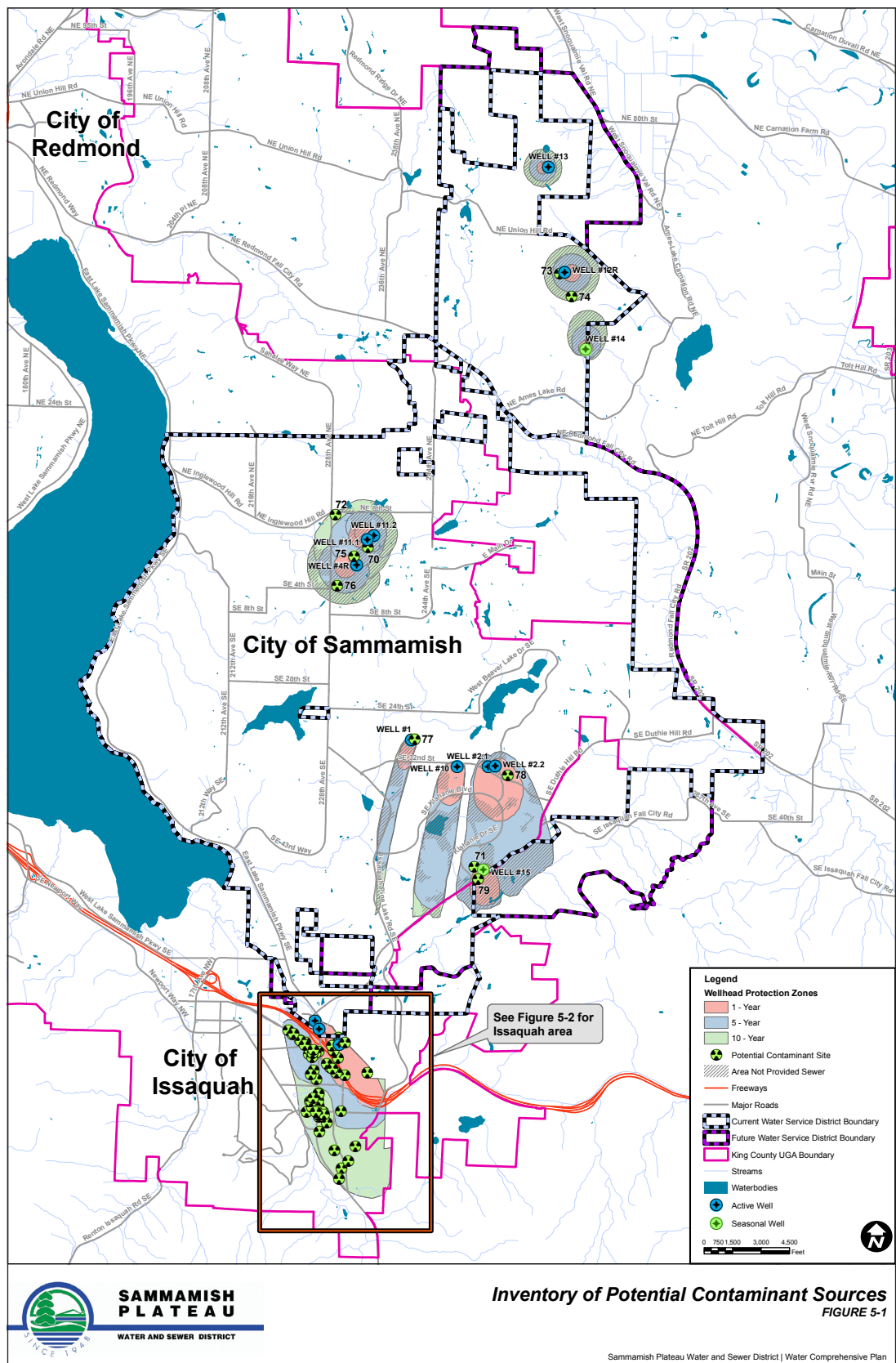
The City is in two Groundwater Management Planning Areas, Issaquah Creek Valley and Redmond-Bear Creek Valley. The majority of the City is within the Issaquah Creek Valley Planning Area, briefly summarized below.

Within the Issaquah Creek Valley Planning Area, areas with the highest infiltration potential are east of the City of Issaquah on the uplands between the East and North Forks of Issaquah Creek.

Background Figure EC-4
Aquifer Susceptibility



Background Figure EC-5
 Wellhead Protection Areas



For the lower Issaquah Valley area (including Sammamish), in particular the eastern plateau areas of the management area, Grand Ridge and Lake Tradition, do not overlie valley aquifers, but may provide up to 30% of the direct recharge to the lower Issaquah Valley ground water system. Measures such as recharging ground water with surface water facilities and homeowner education materials are being used in this area.

Aquifers are considered to be vulnerable where the soil is permeable, where the ground water depth is shallow, and where a potential contamination source is present. Given the location of wells and nearby development, the lower Issaquah Creek Valley is a vulnerable aquifer system. Even with the potential for contamination, water quality in the lower Valley has been found to be generally excellent; management strategies will be needed to protect the area. The upper Issaquah Creek Valley System (in the southern part of the Groundwater Management Planning Area) has been affected by contamination from the Cedar Hills Landfill and Queen City Farms Industrial Waste site.

Through its critical areas regulations, the City has identified critical aquifer recharge areas as:

...those areas in the City of Sammamish with a critical recharging effect on aquifers used for potable water as defined by WAC 365-190-030(2). CARAs have prevailing geologic conditions associated with infiltration rates that create a high potential for contamination of groundwater resources or contribute significantly to the replenishment of groundwater. (SMC 21A.15.253)

Development in designated critical aquifer recharge areas is addressed in the City’s Environmentally Critical Areas regulations, SMC 21A.50.

Geologically Hazardous Areas

Erosion Hazard

Soil erosion is a process in which individual soil particles are detached and moved by natural agents such as wind, rainsplash, frost action, or surface water flows. Erosion poses a potential public health and safety hazard to the extent that bodies of water are contaminated with sediment. In addition, erosion can directly and indirectly damage private property as well as valuable habitat and natural areas. The U.S. Department of Agriculture,

See Volume I, Environment and Conservation Element Goal EC.2 on page 47 and supporting policies.

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Soil Conservation Service has identified certain soils as being susceptible to erosion if disturbed. Such soils occur throughout the City with the largest concentration of those on steeper slopes occurring in the western part of the City. Identification of areas subject to moderate or severe erosion hazard support environmental and development regulations since they affect grading and receiving water body quality.

The City of Sammamish has a number of resources that are susceptible to impacts from erosion and sedimentation. The western side of the City is bounded by Lake Sammamish, an important resource for recreation and wildlife habitat. It is vulnerable to increases in phosphorus, which causes algae to grow. With excessive algal growth, the lake surface can become "scummy," oxygen becomes depleted as algae decays, and the lake loses recreational appeal and value as wildlife habitat. This process is called eutrophication.

There are steep bluffs along the western edge of the Sammamish plateau. Excessive water flowing down these bluffs can form gullies and ravines where soils are highly erosive, which results in downstream sedimentation, and can initiate processes of soil wasting. Many of these slopes have been designated as an "Erosion Hazard Near Sensitive Water Body Overlay," see Background Figure EC-2 on page EC.9, Special Overlays and Districts.

The impacts of erosion and sedimentation generally include:

- Nutrient loading from phosphorus and nitrogen, which are attached to soil particles and transported to lakes and streams, causing a change in the water pH, algal blooms, and oxygen depletion, which leads to eutrophication and fish kills.
- Eroded soil particles decrease the viability of macro-invertebrates and food-chain organisms, impair the feeding ability of aquatic animals; they also clog gill passages of fish and reduce photosynthesis.
- Sediment-clogged gravel diminishes fish spawning and can smother eggs or young fry.
- Natural, nutrient-rich topsoils erode, making re-establishment of vegetation difficult without applying soil amendments and fertilizers.
- Silt fills culverts and storm drains, decreasing capacities and increasing flooding and maintenance frequency.
- Detention facilities fill rapidly with sediment, decreasing storage capacity and increasing flooding.

- Sediment clogs infiltration devices, causing failure.
- Shallow areas in lakes form rapidly, resulting in growth of aquatic plants and reduced usability.
- Water treatment for domestic uses becomes more difficult and costly.
- Turbid water replaces aesthetically pleasing, clear, clean water in streams and lakes.

Development in designated erosion hazard areas is addressed in the City's Environmentally Critical Areas regulations, SMC 21A.50.

Landslide Hazards

Landslides, seismically sensitive soil materials, and geologic events pose substantial hazards to public health and safety. Such areas have limited suitability for siting of commercial, residential and industrial structures.

Many slopes with Sammamish are either naturally unstable or become unstable when disturbed. Areas subject to landslides are mostly along the western slopes of the City. The identification of areas susceptible to landslides support environmental and development regulations; they affect foundation design and housing density.

Unconsolidated soil materials with slopes greater than 15 percent that are underlain with impermeable geologic materials, and/or which have seeps are especially subject to slippage of the unconsolidated soil material. Areas which have experienced movement in the past or which are unstable as a result of rapid stream incision, stream bank erosion, or undercutting by wave action, are also susceptible to landslides. Landslides in such areas can result in enormous public and private costs, severe threats to human health and safety, and severe natural resource and environmental damage. Disturbance in such areas should generally be avoided.

Recent geologic mapping of King County (Booth and Wisner, 2006) identifies the City as being underlain primarily by glacially derived or glacially overridden soils. Steep slopes, found where the highlands descend to Lake Sammamish and within natural drainages such as ravines, are typically comprised of looser alluvial soils or recessional outwash overlying denser glacial soils, such as glacial till or advance outwash. The most common landslides occur where there is a veneer of looser soils overlying the denser soils on steeply inclined hillsides. These types of areas are included in the

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City's Environmentally Critical Area definition of landslide hazard areas as well as other types of areas that are potentially subject to risk of landslides due to geologic, topographic and hydrologic conditions.

Development in designated landslide hazard areas is addressed in the City's Environmentally Critical Areas regulations, SMC 21A.50.

Seismic Hazards

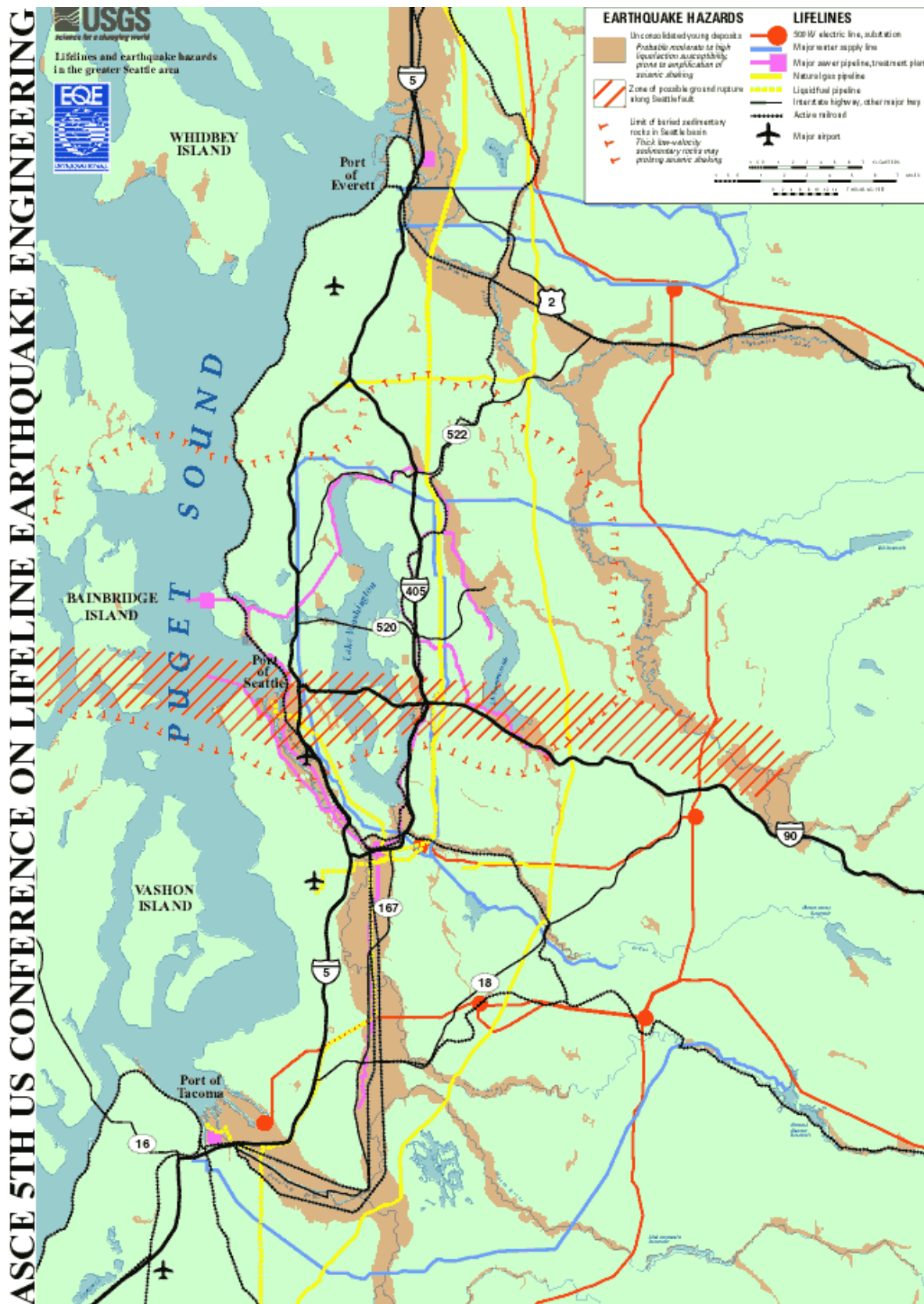
Seismic hazards include areas subject to "severe risk of earthquake induced ground shaking, slope failure, settlement, soil liquefaction or surface faulting" (WAC 365-190). King County maps seismic hazard areas as "those areas in King County subject to sever risk of earthquake damage as a result of soil liquefaction in areas by cohesion-less soils of low density and usually in association with a shallow groundwater table or of other seismically induced settlement." Identified seismic hazard areas in Sammamish are located along Lake Sammamish and near SR 202. Identified seismic hazard areas in Sammamish are located along Lake Sammamish and near SR 202, see Background Figure EC-6.

US Geological Survey Maps of the Seattle Fault indicate it trends east-west across the southern portion of the City of Sammamish. Critical infrastructure including I-90 and I-405, and pipelines could be severely impacted by earthquakes along the Seattle Fault.

Most of the City of Sammamish is within the area of detailed study on the Liquefaction Susceptibility Map of King County, Washington. The detailed map area is based on 1:24,000-scale geologic mapping; and quantitative engineering analysis was utilized to characterize the risk of liquefaction. The analytical methods have been validated by reports of liquefaction during previous earthquakes in the Puget Sound region. More recent and improved engineering analytical methods were used for the detailed map area, as compared to previously published maps.

Another important document is the 2008 U.S. Geological Survey (USGS) National Seismic Hazard Maps (Peterson et al. 2008). These maps provide several different probabilities of earthquake ground motions, which are used in seismic provisions of building codes, insurance rate structures, risk assessments, and other public policy. The abstract and web site states, "The national seismic maps represent our assessment of the 'best available science' in earthquake hazards estimation for the United States." (Peterson et al. 2008) The following engineering manuals are routinely updated to address potential seismic ground motions for the design

Background Figure EC-6
Seismic Hazards



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of buildings and other structures. They provide engineering design values based on the 2008 USGS National Seismic Hazard Maps probabilistic and deterministic ground motion parameters for designing structures.

- 2009 NEHRP Recommended Seismic Provisions for New Buildings and Other;
- Structures, FEMA P-750 (“2009 NEHRP Provisions”);
- 2010 Minimum Design Loads for Buildings and Other Structures, ASCE 7-10;
- (“2010 ASCE-7 Standard”); and
- 2012 International Building Code.

These three similar manuals represent the best available engineering for seismic design of structures. The 2006 Geologic Map of King County is another BAS document. (Booth & Wisner 2006). It shows detailed soil types and the zone of the Seattle Fault. The purpose of the map is for more general geology uses, but it appears to be consistent with 2004 Liquefaction Susceptibility Map in terms of the location of soil types susceptible to liquefaction and the location of peat deposits.

Development in designated seismic hazard areas is addressed in the City’s Environmentally Critical Areas regulations, SMC 21A.50.

Urban Forest

The purpose of the Urban Forest Management Plan (UFMP) is to provide a policy guide for managing, enhancing, and growing trees in the City of Sammamish over the next twenty (20) years. The plan includes long-range goals and objectives to promote resilience, species diversity, and sustainable canopy cover.

Complete information about the City of Sammamish Urban Forest Plan can be found at this link:

<http://www.sammamish.us>