

CITY OF BURIEN SHORELINE MASTER PROGRAM UPDATE

SHORELINE INVENTORY

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1 INTRODUCTION

This report is intended to provide baseline information on the existing conditions within the City of Burien's (City's) shoreline jurisdiction (Figure 1) to provide a basis for the update of the City's Shoreline Master Program (SMP). It includes information on existing environmental conditions and land use practices, as well as current proposals for restoration activities and recommendations for other actions such as conservation and restoration. The information in this report is primarily presented in tabular and graphical formats, and is intended to support the Inventory map folio. Narrative is limited to a description of the Inventory process, summary language, and descriptive information that will be useful for subsequent stages of the SMP update but is not easily put into tabular or graphical format.

1.1 STUDY AREA BOUNDARY

The City of Burien is located in south central King County, south of the City of Seattle, north of the City of Normandy Park, and west of the City of SeaTac. Although there are a number of waterbodies, including streams, lakes, and marine shorelines, within the City limits only two of these are regulated under the State Shoreline Management Act (SMA). The first is the approximately five-mile stretch of Puget Sound marine shoreline between the north and south City limits. The second is Lake Burien, which is entirely located within the City limits and includes approximately 1.1 miles of shoreline (Figure 1).

Under revisions to the SMA, shoreline jurisdictions have discretion regarding the lateral extent of shoreline zone from the ordinary high water (OHW) mark. The standard shoreline jurisdictional overlay is 200 horizontal feet landward of the OHW mark and the extent of any wetlands with overlap or connection to the 200-foot overlay. In addition, a jurisdiction has the option to include the locally adopted buffers for these wetlands. This analysis will include the wetlands areas and not consider the associated buffers for discussion purposes.

1.2 METHODOLOGY

The scope of this Inventory was defined according to the provisions in Washington Administrative Code (WAC) 173-26-201(3)(c). Existing information and data from a number of sources were reviewed as part of this Inventory (Bibliography [Section 7]; Appendix A). The City of Burien provided detailed Geographic Information System (GIS) layers, basin plans, WRIA documents, and relevant consultant reports. This included information requested from Washington Department of Fish and Wildlife (WDFW) on Priority Habitats and Species (PHS), including endangered species, during the City's 2003 Critical Areas update and more recently in January 2008.

In addition, Washington State Department of Ecology (Ecology) water quality data and the U.S. Fish and Wildlife (USFWS) National Wetlands Inventory (NWI) were also reviewed. Updated cultural and archeological data were also reviewed and requested as part of the next steps of SMP update.

1.3 REPORT ORGANIZATION

This report is organized to correlate with the required analysis (WAC 173-26-201(3)(c)) and is intended to review large scale information, and scale down sequentially to smaller reaches, which are summarized at the end of the document. This approach is fairly rigorous and ensures consistency between SMPs in adjacent jurisdictions.

1.4 INVENTORY REACHES

The City's shorelines were divided into lineal reaches according to land use (e.g., zoning and existing land use) and environmental characteristics (e.g., drainages, substrates and drift cells) (Figures 2-4). The marine shoreline was divided into four reaches, whereas Lake Burien was kept as a single reach based on the consistent use and environment around its perimeter (Table 1; Figure 1).

Table 1. Shoreline Inventory reaches in the City of Burien.

Location	Reach	Description	Approximate Length (ft)	Approximate Length (mi)
Marine	M1	Primarily residential marine shoreline extending south from City limit to the north edge of Seahurst Park.	6,001	1.14
Marine	M2	Seahurst Park and primarily undeveloped shoreline south to the point at which consistent shoreline residential development begins again. Corresponds to a line projected west from SW 149 th Street to intersection with the shoreline.	6,382	1.21
Marine	M3	Consistent residential development extending south to the tip of Three Tree Point.	9,246	1.75
Marine	M4	Consistent residential development from the tip of Three Tree Point to the southern City limit.	7,597	1.44
		<i>Marine Subtotal</i>	29,226	5.54
Lake Burien	LB	Entire perimeter of Lake Burien	6,172	1.67
		Total Jurisdictional Shoreline	35,399	7.21

2 LAND USE AND ALTERED CONDITIONS

The City of Burien is located along Puget Sound, in King County, south of Seattle. Following European settlement of Puget Sound in 1851, George Oulett became the first landowner of Burien's coast and inland in 1864. Settlement of that land that is now Burien was followed by development, including timber and railroad industries. Almost all the land that is currently developed had been built upon by the 1970s (City of Burien 2004). Burien became an incorporated City in 1993. The current City limits are shown in Figure 1.

2.1 HISTORIC LAND USE AND WATERSHED CONDITIONS

Prior to the 1850s, the lowlands of Puget Sound included a network of sloughs, islands, beaver ponds, and estuaries. Land use was limited to native peoples fishing, hunting and food gathering. The only evidence of forest clearing by Native Americans was maintenance of gardens and camas fields. Shellfish and salmon were their primary food sources (Kerwin and Nelson 2000).

Post-European settlement, land use in Burien consisted primarily of timber-based industry. Further development occurred with the coming of the railroad at the turn of the 20th century. Additional settlement occurred with the construction of a north-south road (to become Ambaum Boulevard) connecting Burien to the City of White Center in 1909. Over the years, development and urbanization has led to modification of the shorelines. By 1930, the land around Lake Burien and along the northern marine waterfront had been purchased by Jay C. Allen and developed into a large estate called Glennallen; the 400+-acre estate was later broken up and sold off. Development of the marine shoreline north of Salmon Creek occurred primarily throughout the 1950s and 1960s. The southern marine waterfront was not developed extensively due to the steep slopes along the shoreline. By the 1970s, development peaked; that is, most of the land that is presently developed was developed by that time (City of Burien 2004).

Existing land use within the entire City of Burien is presented in Table 2. The current Comprehensive Plan (City of Burien 2006) states that land use and development in the shoreline areas will be compatible with the SMP, and that adherence to shoreline designations "will ensure that sensitive habitat, ecological systems, and other shoreline resources are protected" (Comprehensive Plan Policy EV 1.2; City of Burien 2006).

Table 2. Existing land use in the City of Burien.

Land Use Category	Acres	Percent of Gross Area
Single Family	2301.04	58.36%
High Density MFR	214.27	5.43%
Low Density MFR	37.79	0.96%
Commercial	79.31	2.01%
Retail	156.47	3.97%
Industrial	24.09	0.61%
Institutional	135.84	3.45%
Office	67.70	1.72%
School	119.99	3.04%
Park	456.88	11.59%
Transportation	12.74	0.32%
Vacant	335.86	8.52%
Other	0.78	0.02%
Gross Area	3,942.76	100.00%

¹ Percentages may not total 100 percent due to rounding during GIS analysis.

Burien is located within the Nearshore Sub-watershed of Water Resource Inventory Area (WRIA) 9. Eighty (80) percent of the shoreline has been modified within the Nearshore Sub-watershed. Most shoreline modification measures (such as seawalls and bulkheads) were installed to protect residential development from erosion. However, these shoreline modifications have resulted in the alteration of nearshore habitat functions; examples include interruption of habitat-forming processes, destruction of habitat, and degradation of sediment and/or water quality. Within WRIA 9, there are only a minimal number of unaltered shorelines (Kerwin and Nelson 2000, Johannessen, MacLennan, and McBride 2005). Burien's shorelines include part or all of three marine drift cells (KI-5-1, KI-7-2, and KI-7-3) which historically included both erosion (e.g., feeder bluff) and accretion (e.g., beaches) shoreforms but have now become extensively modified (Figure 4A, Johannessen, MacLennan, and McBride 2005).

It is recognized that "Habitat Limiting Factors and Impacts" in both the freshwater and marine environments include urban and industrial land use practices (Kerwin and Nelson 2000). Specific to the Burien's shoreline reaches covered by the SMP (which do not include any freshwater tributaries), these urban and industrial land use practices include those described for the Nearshore Sub-watershed by Kerwin and Nelson (2000; below):

- Altering or destroying significant amounts of nearshore habitat;
- Interrupting critical habitat-forming processes;
- Fragmenting or destroying marine riparian corridors; and
- Contributing toxic chemicals and harmful organic compounds to nearshore waters and sediments.

2.2 EXISTING SHORELINE DESIGNATION

The City adopted King County's existing SMP at the time of incorporation (1993). The City currently uses King County SMP shoreline designations and regulations with revisions through September 1998. Only two designations are present within the City's shoreline jurisdiction: Urban and Conservancy Environments. Conservancy is limited to the area including Seahurst Park and the area approximately 1/4 mile south of it. Based on the King County SMP, the stated purposes of these two environments are as follows:

- **Urban Environment:** The purpose of designating the urban environment is to ensure optimum utilization of the shorelines of the state within urbanized areas by permitting intensive use and by managing development so that it enhances and maintains the shorelines of the state for a multiplicity of urban uses. The urban environment is designed to reflect a policy of increasing utilization and efficiency of urban areas, to promote a more intense level of use through redevelopment of areas now under-utilized and to encourage multiple use of the shorelines of the state if the major use is water dependent or water related while at the same time safeguarding the quality of the environment (KCC 12.16.010 9-98).
- **Conservancy Environment:** Conservancy areas are intended to maintain their existing character. This designation is designed to protect, conserve, and manage existing natural resources and valuable historic and cultural areas. The preferred uses are those nonconsumptive of the physical and biological resources of the area (KCC 25.24.010 9-98).

2.3 EXISTING LAND USE

Existing land uses along Burien's marine shoreline predominately consist of single family homes, undeveloped parcels and publicly-owned open space (Table 3; Figures 5A-5E). The privately-owned parcels along the marine shoreline are zoned uniformly for single family development. According to the map of existing land uses derived from King County Assessor data dated January 2008, there is one parcel near the southern city limits that is occupied by a commercial use and several parcels occupied by multifamily housing. All other privately-owned parcels are occupied by single family homes or are undeveloped. The undeveloped parcels generally have constraints upon development such as steep slopes.

A significant portion of Burien's marine shoreline is publicly-owned open space, the majority of which is the 152-acre Seahurst Park. To the south of Seahurst Park is a smaller public park, the 5-acre Eagle Landing Park.

The Lake Burien shoreline is likewise occupied almost entirely by single family development. The lone exception to this is at the northeast corner of the lake where the Ruth Dykeman Children's Center is located. The density of single family development along the Lake Burien shoreline is somewhat higher than that along the marine shoreline. However, it is still low density development.

Table 3. Existing land use observations by City of Burien shoreline reach.

Inventory Reach	Existing Land Use	Area (Acres)	Approximate Percent Coverage within the Reach¹
M1	Single Family	18.089	72.3%
	Vacant	5.854	23.4%
	Tracts/Other	0.919	3.7%
	Low Density MFR	0.137	0.55%
	Institutional	0.003	0.01%
	25.002		
M2	Park	22.384	78%
	Single Family	3.864	13.5%
	Vacant	2.467	8.6%
	28.715		
M3	Single Family	34.992	86.99%
	Vacant	4.686	11.65%
	Tracts/Other	0.388	0.96%
	Low Density MFR	0.160	0.40%
	40.226		
M4	Single Family	20.418	91.13%
	Low Density MFR	1.119	4.99%
	Vacant	0.593	2.65%
	Commercial	0.276	1.23%
	22.406		
LB	Single Family	25.185	87.44%
	School	2.394	8.31%
	Vacant	0.871	3.02%
	Tracts/Other	0.159	0.55%
	Low Density MFR	0.195	0.68%
	28.804		

¹ Percentages may not total 100 percent due to rounding during GIS.

2.4 ZONING DESIGNATIONS

The City's most current Zoning Map (2007; Figures 6A-6E) includes 18 zoning designations. However, only three zoning designations apply within the shoreline area. Two of these are residential single family. The third zoning designation is the Special Planning Area 2. The entire marine shoreline is zoned RS-12,000, which allows detached single family homes with a minimum lot size of 12,000 square feet. The majority of the Lake Burien shoreline is zoned RS-7,200, which allows detached single family homes with a minimum lot size of 7,200 square feet.

The northeast corner of Lake Burien is within the Special Planning Area 2, which applies to the Ruth Dykeman Children's Center. The purpose of the Special Planning Area 2 is to establish and preserve areas for the Center. The zoning regulations require that any development within the area be consistent with a City-approved Master Plan for the entire area.

2.5 IMPERVIOUS SURFACE

Most of the land area within Burien's shoreline jurisdiction is developed with detached single family homes. Undeveloped areas consist of some privately-owned parcels with significant constraints to development, such as steep slopes, and the publicly-owned open space of Seahurst and Eagle Landing parks. The developed area contains impervious surfaces typical of low density detached single family development.

2.6 ROADS AND BRIDGES

2.6.1 Roads

There are two roads designated as Collector Arterials that are partially located within Burien's shoreline jurisdiction. These are SW 172nd Street at the southern end of the marine shoreline, and a small portion of SW 152nd Street north of Lake Burien. In addition to these two roads are a number of local streets partially located within the shoreline jurisdiction. None of these roads has more than two lanes. In addition to public streets, there are many private driveways located within the shoreline jurisdiction.

2.6.2 Bridges

There are no bridges located within Burien's shoreline jurisdiction.

2.7 FLOOD CONTROL STRUCTURES

The outlet from Lake Burien is controlled by a concrete weir. The outlet channel conveys overflow from the lake in the southeasterly direction, and connects to the county storm water system located within SW 154th Street.

2.8 DOCKS, PIERS, AND OVERWATER STRUCTURES

The Lake Burien shoreline contains many private docks at a density of close to one per residence. The marine shoreline is less intensely developed with overwater structures, but there are some private docks and boat ramps.

2.9 STORM WATER AND SEWER OUTFALLS

The City of Burien is located within three major drainage basins: Salmon Creek, Miller Creek, and Puget Sound. Each of these drainage basins drains to Puget Sound. A 24-inch concrete pipeline, the Old Government Line, functions as a partial drainage bypass whereby the line runs to the south of Salmon Creek and used to discharge directly to the Sound. However, now it discharges through a damaged manhole at the beach due to the line being blocked by sediment. Other storm water discharges along the shorelines are shown as "storm pipes" on Figures 7A-7E. Catch basins within the shoreline jurisdictional area generally discharge directly to Puget Sound through a shoreline armoring structure. In very few instances they discharge to a stream (i.e., in Seahurst Park).

Land within Burien is mostly developed. Much of the older development did not provide detention or water quality treatment of runoff, resulting in bank erosion, poor fish habitat and poor water quality in some places.

2.10 OTHER UTILITIES

2.10.1 Water

Seattle Public Utilities supplies water for the several water districts that serve the City of Burien. The water districts that serve Burien's shoreline jurisdiction are Seattle Public Utilities, serving the northern portion of the marine shoreline; King County Water District #20, serving the central portion of the marine shoreline and the northwest portion of Lake Burien; Highline Water District, serving the southern portion of the marine shoreline; and King County Water District #49, serving the majority of Lake Burien.

Water infrastructure within the shoreline jurisdiction includes water mains of varying sizes and water services serving individual properties.

2.10.2 Sewer

Burien's shoreline jurisdiction is located within the Southwest Suburban Sewer District, which is divided into two subareas: the Miller Creek drainage basin and the Salmon Creek drainage basin. The Salmon Creek Wastewater Treatment Plant is located on Shorewood Drive north of Seahurst Park. The plant itself is located outside of the shoreline jurisdiction; however, its outfall discharges the treated effluent into Puget Sound.

2.11 CULVERTS

Drainage along the shoreline has been affected by varying degrees of development, and in some cases involves culverts. Seola Creek (which runs along the northern City limit) drains to the marine shoreline (Reach M1) through a culvert (Wild Fish Conservancy 2003). Additionally, there are some culverts associated with water draining from the small hatchery complex at the north end of Seahurst Park (Wild Fish Conservancy 2003). Along the residential shorelines in Burien, occasional small culverts (e.g., 12-inch pipe culverts) drain water from the properties onto the beaches (Wild Fish Conservancy 2003). The storm pipe culverts within the shoreline jurisdiction (marine reaches and on Lake Burien) are shown on Figures 7A-7E.

Along the marine shoreline of Seahurst Park (Reach M2), culverts have been installed beneath parking lots and road fill embankments, draining water through or under bulkheading (Wild Fish Conservancy 2003; Anchor 2002). Most of these modifications to drainage within Seahurst Park were made by the early 1970s by King County (Anchor 2002).

5-12

3 CRITICAL AREAS

This section describes Critical Areas already identified within the City of Burien as defined by the Washington State Growth Management Act (Revised Code of Washington [RCW] 36.70A). Those Critical Areas pertinent to the City's shorelines are: wetlands, aquifer recharge areas, Fish and Wildlife Habitat Conservation Areas, geologic hazard areas, and frequently flooded areas. For the purpose of Shoreline Inventory, areas that meet these criteria and are in any part in the identified shoreline jurisdiction area are included. Critical Areas presented below have been mapped where GIS data layers exist.

3.1 WETLANDS

The City's current Critical Areas map depicts five wetlands within the entire City's jurisdiction (based on wetland polygons from King County GIS data) (Figures 8A-8E). Of those, only one (Lake Burien) is within the shoreline jurisdiction (Figure 8E). A number of additional sources were reviewed to assess the presence of wetlands including the NWI, Ecology's Digital Coastal Atlas (DCA), and WDFW Priority Habitat and Species (PHS) Maps. The NWI and DCA wetland layer indicate that the marine shorelines in Burien are classified as "estuarine and marine wetlands" and "tidal aquatic beds," respectively. A wetland delineation prepared for the Seahurst Park South Seawall Project (Anchor 2005) also identified a wetland complex in Seahurst Park (Reach M2).

Although wetlands associated with shorelines of the state will be regulated under the SMP, not the Critical Areas Ordinance (CAO), the state requirement of equal or greater protections of Critical Areas under the SMP makes consideration of the existing CAO appropriate during the Inventory phase. According to the current Critical Areas map, Lake Burien has been designated as a Category 2 wetland. Estuarine aquatic bed wetlands associated with marine vegetation would likely be designated as Category 1 wetlands. Six of the seven wetlands identified within the vicinity of the Seahurst Park South Seawall Project were identified as regulated by the City and were designated as Category 3 wetlands (Anchor 2005).

As described in Section 1.1, a jurisdiction has the option to include the locally adopted buffers for these wetlands. The City has decided to include only the wetland areas in the SMP Update (i.e., it will not include the associated buffers); therefore, the wetland buffers are still regulated under the CAO. The City has adopted Ecology's wetland categories and definitions, as described under the CAO (Burien Municipal Code [BMC] Chapter 19.40.300 10-03). Buffer widths under the CAO for wetlands within the City of Burien are as follows:

- Category 1: 200 feet
- Category 2: 100 feet
- Category 3: 50 feet
- Category 4: 30 feet

3.2 AQUIFER RECHARGE AREAS

The City of Burien Critical Areas map (Figures 8A-8E) identifies seven aquifer recharge areas within the City limits. Of these, only one, the recharge area associated with Lake Burien, is located within the City's shoreline jurisdiction.

3.3 FISH AND WILDLIFE HABITAT CONSERVATION AREAS

Fish and Wildlife Habitat Conservation Areas in the City have been identified on Figures 9A-9E based on the WDFW PHS inventory (GIS layers). A current (January 2008) query of that database for this area identified two PHS polygons located within the City shoreline jurisdiction (Table 4). The two polygons encompass Urban Natural Open Spaces spanning areas within the shoreline jurisdiction, as well as areas upland of the shoreline. One polygon includes forested areas with deep ravines and small mammal and bird habitat, with potential fish habitat. The other polygon includes semi-forested parks providing habitat for more common animals. There were no PHS polygons associated with Lake Burien (Reach LB).

The PHS inventory did not include any record of salmonid usage in Burien. StreamNet and WDFW SalmonScape on-line mappers were also queried for information on fish usage in the shoreline jurisdiction. While StreamNet did not show any record of fish usage, SalmonScape indicated that salmonid usage is limited to the "potential presence" of coho salmon (*Oncorhynchus kisutch*) in Salmon Creek (Reach M1). The PHS inventory data and SalmonScape on-line mapper indicated that non-salmonid priority fish species using the shorelines include surf smelt (*Hypomesus pretiosus*) and Pacific sand lance (*Ammodytes hexapterus*). There is reported surf smelt spawning in all four marine, and reported Pacific sand lance spawning in Reaches M2, M3 and M4 (Table 4). Geoduck (*Panopea abrupta*) beds are also shown to exist along all four marine reaches (M1 through M4). There were no PHS species data or species data from other sources associated with Lake Burien (Reach LB).

Priority avian species usage in the shoreline jurisdiction includes a buffer along Reaches M2 and M3 for a bald eagle (*Haliaeetus leucocephalus*) nest that is located landward of Reach M2. Bald eagles (including those associated with this nest) as well as great blue heron (*Ardea herodias*) would be expected to be present in the Burien shoreline jurisdiction. There are no PHS polygons or points for regular habitat use by great blue heron (e.g., feeding territories, nests) within the shoreline jurisdiction, but they are likely to use at least these areas for transit.

While bald eagle are no longer listed as threatened under the Federal Endangered Species Act (ESA), bald eagles are still considered threatened by the State. The remaining species identified in the PHS data as potentially falling within the Burien shoreline jurisdiction have neither Federal nor State listing status.

Table 4. Documented Priority Habitats and Species within the City of Burien shoreline jurisdiction.

Inventory Reach	Species or Habitat Type	Type of Use ¹
M1	PHS polygon (I): Urban Natural Open Space (same as listed in M2 and M3)	Deep forested ravines, some with streams overlooking Puget Sound; small mammal and bird habitat; streams with likely fish use
	Coho salmon	Potential presence in Salmon Creek ²
	Surf smelt	Documented Spawning ³
	Geoduck	Presence
M2	PHS polygon (I): Urban Natural Open Space (same as listed in M1 and M3)	Deep forested ravines, some with streams overlooking Puget Sound; small mammal and bird habitat; streams with likely fish use
	PHS polygon (II): Urban Natural Open Space	Semi-forested parks; habitat for more common species
	Heritage buffer	Buffer around bald eagle nest for protection
	Surf smelt	Spawning, Documented Spawning ³
	Pacific sand lance	Spawning, Documented Spawning ³
	Geoduck	Presence
M3	PHS polygon (I): Urban Natural Open Space (same as listed in M1 and M2)	Deep forested ravines, some with streams overlooking Puget Sound; small mammal and bird habitat; streams with likely fish use
	Heritage buffer	Buffer around bald eagle nest for protection
	Surf smelt	Spawning, Documented Spawning ³
	Pacific sand lance	Spawning, Documented Spawning ³
	Geoduck	Presence
M4	Surf smelt	Documented Spawning ³
	Pacific sand lance	Spawning
	Geoduck	Presence
LB	None listed specifically for Lake Burien	N/A
All	Bald eagle, great blue heron	No PHS polygons or points (e.g., feeding territory, nests) in shoreline area, but use of shoreline habitat (presence at minimum) is known

¹ Species and habitat use based on WDFW PHS GIS data, unless specified with additional footnote.

² Salmonid species and/or habitat use based on WDFW PHS GIS data and SalmonScape on-line mapper.

³ Species and/or habitat use based on SalmonScape on-line mapper.

In addition to the PHS data, Ecology's DCA was reviewed. Although no eelgrass (*Zostera* sp.) or kelp (order Laminariales) beds were reported in the PHS data, the DCA shows eelgrass presence along all marine reaches. According to the DCA, Reaches M1, M2 and M3 contain patchy and continuous eelgrass along the lengths of shoreline, and Reach M4 contains patchy eelgrass along the shoreline. Additionally, the DCA shows patchy kelp present along the Reach M3 shoreline.

3.4 GEOLOGICALLY HAZARDOUS AREAS

The City defines geologically hazardous areas in its Municipal Code (BMC Chapter 19.10.190) as "areas that because of their susceptibility to erosion, sliding, earthquake or other geological events, are not suited to siting development due to public health and safety concerns. These areas include, but are not limited to erosion hazard areas, landslide hazard areas and seismic hazard areas."

Landslide and seismic hazard information is depicted on the Critical Areas map (Figures 8A-8E); these figures were compiled with GIS seismic layers from King County and 40 percent gradient map information from a contractor as a part of the CAO update in 2003.

"Landslide hazard areas" are defined by the BMC (Chapter 19.10.305) as "lands that are potentially subject to risk of mass movement due to a combination of factors, including historic failures, geologic, topographic and hydrologic features." Landslide hazard areas are shown on Figures 8A-8E as those lands with a slope greater than 40 percent. Within the shoreline jurisdiction, the entire lengths of the marine reaches (Reaches M1 through M4) are considered "landslide hazard."

"Seismic hazard areas" are defined by BMC (Chapter 19.10.480) as "lands subject to severe risk of earthquake damage as a result of seismically induced ground shaking, slope failure, settlement or soil liquefaction. These conditions occur in areas underlain by soft or loose soils." Seismic hazard areas are also depicted on Figures 8A-8E, and include portions of Reaches M3 and M4, including Three Tree Point and the shoreline to the southeast.

No landslide or seismic hazard areas are associated with Lake Burien (Reach LB).

3.5 FREQUENTLY FLOODED AREAS

The City's GIS data show frequently flooded areas in the City based on 100-year flood area designated by the Federal Emergency Management Agency (FEMA) and a City of Burien Flood Study (CHE 2007) (Figures 8A-8E). At this point, the 100-year flood plain data is most pertinent to shoreline jurisdiction, as the City has not yet adopted the flood study base flood elevation results (CHE 2007) to define the 100-year flood plain. Frequently flooded areas are described by reach in Table 5 (below) based on the FEMA data. The 100-year flood plain as defined by FEMA, as well as the base flood elevation (CHE 2007), extends along most of the marine shoreline (Figures 8A-8D). There is no flood plain associated with Lake Burien (Reach LB).

Table 5. Frequently flooded (100-year flood plain) areas by City of Burien shoreline reach.

Inventory Reach	Flooded Area in Shoreline Jurisdiction (ac)	Total Reach Area (ac)	Percent of Shoreline Area
M1	18.75	26.52	70.7%
M2	8.34	28.51	29.3%
M3	10.93	41.64	26.2%
M4	12.97	26.61	48%
LB	0	0	0%
Total	50.99	123.28	33.2%

4 DEGRADED AREAS AND POTENTIAL RESTORATION SITES

4.1 WATER QUALITY

Within the City shoreline area, the major source of available data for water quality is the State Water Quality Assessment, commonly referred to as the "303(d) list." Technically, the 303(d) list refers to a specific category of water quality (see below). In order to maintain compliance with the Federal Clean Water Act, Ecology evaluates water quality for state fresh and marine water bodies and publishes the information as a list every two to four years. The data also are available spatially through on-line mappers made available on the Ecology website. Prior to the current list (2002/4), the next most recent list was prepared in 1998. Ecology prepares the list by integrating data from its assessment activities with data collected by other agencies and organizations. For each parameter tested, applicable areas for each waterbody are assigned one of the following categories:

- **Category 5** Polluted waters with no existing Total Maximum Daily Load (TMDL), submitted to EPA for approval on 2002/4 list.
- **Category 4c** Impaired, already has a TMDL.
- **Category 4b** Impaired, has pollution control plan.
- **Category 4a** Impaired, non-pollutant.
- **Category 3** No data (catch all for parameters not in Categories 5, 4 [all], 2, or 1).
- **Category 2** Waters of concern (not impaired or known to be impaired).
- **Category 1** Meets tested standards.

The assessment for each area of each waterbody is not inclusive for all pollutants. A Category 1 listing for a particular parameter does not necessarily mean that area is clean of all other pollutants.

Based on the most recent Ecology water quality impairments list the Burien marine shoreline has impairment listings for two water quality parameters (Table 6). One of these parameters, fecal coliform, is a Category 5 listing and requires a pollution control plan (Total Maximum Daily Load or TMDL). There is also a Category 4c listing for Fish Habitat based on algal blooms (Frankenstein 2000).

The only parameter listed for Lake Burien is total phosphorus, which meets tested standards.

Table 6. Water quality data for City of Burien shorelines.

Category	Parameter	Listings ID#	Listed prior to 2002/4
5 (303[d])	Fecal coliform	15804	Yes
4c (polluted, no TMDL required)	Fish Habitat	21699	No
4b (polluted, no TMDL required)	-	-	-
4a (polluted, no TMDL required)	-	-	-
2 (waters of concern)	-	-	-
1 (meets tested standards)	Total Phosphorus	21572	No

4.2 RESTORATION OPPORTUNITIES

Specific restoration opportunities have been defined within Seahurst Park and described in the Seahurst Park Master Plan (Anchor 2002). The plan proposed to preserve all the existing undeveloped area, increase the natural habitat area and function through extensive restoration and land acquisitions. Per the Master Plan (Anchor 2002), sustaining and restoring the marine shoreline at Seahurst Park is based on four concepts: removing existing shoreline protection structures; modeling restored beach slopes and substrates after natural conditions; replenishing gravel and sand lost to erosion; and restoring and protecting the natural delivery paths of sediment to the beach. Restoration activities at Seahurst Park have been separated into two phases (south shoreline and north shoreline). South shoreline restoration activities included removal of the seawall and restoration of beaches in 2005, and restoration of native vegetation in the upper shoreline in 2006. Future activities include additional property acquisition, native plant maintenance, and restoration of the north shoreline (similar to restoration of the south shoreline).

Additional restoration opportunities exist at Eagle Landing Park. Since the land was acquired in 2002, the City has opened trails and performed reforestation work for the purposes of preserving salmon habitat and providing public water access. Future plans for the property include restoring native plants and on-going native plant maintenance.

An inventory and assessment of current and historic marine shoreforms in WRIAs 8 and 9 (Johannessen, MacLennan, and McBride 2005) identifies a number of specific restoration opportunities including one within City shorelines (see Section 10.4). Also recommended in that study are conservation and restoration priorities within and by drift cells within WRIA 8 and 9 to protect and reconnect sediment sources within the region. However, it is important to consider that the analyses are solely based on comparison of current and historic shoreline conditions and do not take into account biological or socioeconomic factors.

Other non-specific restoration opportunities along the marine reaches include bulkhead modification to reduce the effects of hardened vertical structures on sediment transport and nearshore habitat. These modifications include removal, beach reshaping, installing longshore woody debris, and restoring connection of the beach to sediment input systems, including streams and eroding bluffs.

Installing littoral nearshore vegetation, where appropriate can provide nearshore water quality protection functions to shallow intertidal areas. Stream systems in the City are constrained by ravines, typically hosting invasive vegetation. Restoring native riparian vegetation within these systems has export of salmonid prey benefits and improves upland habitat within the Shoreline Zone.

Burien has a many highly modified shoreline areas almost entirely consisting of privately-owned uplands. Citizen outreach to provide education resources regarding the effects of lawn care practices on water quality within the marine waters and Lake Burien have potential to improve citizen involvement in shorelines.

5 AREAS OF SPECIAL INTEREST

The WAC definition for Areas of Special Interest (173-26-201(3)(c)(iv)) is as follows:

Areas of special interest, such as priority habitats, developing or redeveloping harbors and waterfronts, previously identified toxic or hazardous material clean-up sites, dredged material disposal sites, or eroding shorelines, to be addressed through new master program provisions.

Priority Habitats within Burien shorelines are described by reach in Section 10. There are no known (documented) hazardous material clean-up sites or dredged disposal sites within the Shorelines of Burien.

One site of interest is the fish acclimation ponds associated with the Marine Occupational Center in Seahurst Park. The Center is a facility of the Highline School District.

6 PUBLIC ACCESS

Existing public access to Burien's shorelines is provided by publicly-owned open space. The 152-acre Seahurst Park and the 5-acre Eagle Landing Park both provide public access to Burien's marine shoreline.

The main entrance to Seahurst Park is accessed via SW Seahurst Park Drive. The park can also be accessed from several small trailheads at or near the perimeter of the park. An undeveloped right-of-way for SW 136th Street continues into the park. A dirt road that begins at 16th Avenue SW and Shorewood Drive at the northeastern edge of the park leads into the park. There is a trailhead at 17th Avenue SW and a trailhead at 18th Avenue SW and SW 146th Street at the southern end of the park.

Seahurst Park encompasses 0.75 miles of marine shoreline and is heavily used. The park contains 4,400 linear feet of paved or crushed rock shoreline trails, including the Nearshore Trail, as well as 9,500 linear feet of hiking trails throughout the park.

Eagle Landing Park is located at the west end of SW 149th Street, at the intersection of 25th Avenue SW. A short trail leads from the parking area to a beach on Puget Sound.

Street ends and other public right of way ends within the City include:

- South side of Three Tree Point (Maplewild Avenue SW and SW 172nd Street)
- North side of Three Tree Point (SW 170th Street)
- SW 163rd Street end
- Small 6-foot wide right of way ends (approximately 2 to 4) on north side of Three Tree Point
- 20 foot wide right-of-way end located near 2400 SW 172nd Street extending to Puget Sound

7 CHANNEL MIGRATION ZONES AND FLOOD PLAINS

According to the WAC 173-26-201(3)(c)(vii), the City must supply relevant and/or reasonable available information on the general location of channel migration zones, and flood plains. However, in Burien, there are no riverine shorelines; therefore, there are no channel migration zones. Due to the incised nature of the stream channels, riverine flood plains are also nonexistent in Burien; however, flooding information related to wetlands and other Critical Areas is covered in Section 3.

8 ARCHAEOLOGICAL AND HISTORIC RESOURCES

No historic sites are shown in Burien on the State's Department of Archeology and Historic Preservation (DAHP) Washington Information System for Architectural and Archaeological Records Data (WISAARD) mapper. However, based on the City's contact with DAHP, there are some potential areas that are of archeological significance within the City (Williams, pers. comm. 2008). These areas do not necessarily contain known sites but may be locations of past native activities. In general, potential areas of significance include mouths of streams discharging into Puget Sound (e.g., Salmon Creek, streams within Seahurst Park, and one stream south of Seahurst Park) or areas where shellfish may be present (Williams pers. comm. 2008).

9 GAPS IN EXISTING INFORMATION

Gaps in "Ecology Required Inventory Items" (WAC 173-26-201(3)(c)) primarily involve a lack of available or updated GIS information or layers. Several of the Critical Areas data are based on old King County information, such as wetland and/or geologically hazardous areas. Additionally, wetland information that may have been collected for individual projects within the City has not been translated into digital data. Similar gaps in available or updated digitized data exist for the Land Use category, including transportation, utilities and/or water-oriented uses.

10 CONDITIONS AND OPPORTUNITIES BY INVENTORY REACH

10.1 REACH M1

Reach M1 is the northernmost marine reach along the Burien shoreline, extending from Seola Beach to the north end of Seahurst Park. The reach is 1.14 miles in length and is primarily single family residential. Reach M1 is located entirely within drift cell KI-5-1, which is the longest drift cell in King County (11.2 miles) and extends north to Seattle (northeastern side of the Duwamish Head) (Johannessen, MacLennan, and McBride, 2005). Net shore-drift in KI-5-1 is from south to north. Historically, most of Reach M1 was exceptional or potential feeder bluff. Now it is almost entirely modified shoreline (Johannessen, MacLennan, McBride, 2005). Figure 4A depicts historic and current shoreforms from Johannessen, MacLennan, and McBride (2005).

Current Land Use

This reach is predominantly single family use, with portions of undeveloped property associated with high gradient slopes, street ends and vacant parcels comprising approximately 24 percent of the reach. Future land use within this reach will likely include development of the remaining parcels as single family structures, then redevelopment of smaller residences as property value increases.

Critical Areas

Critical Areas within this reach include the right bank and buffer of Seola Creek, Salmon Creek and associated buffers, several small unnamed tributaries to Puget Sound. There is potential presence of coho salmon in Salmon Creek. The forested ravines associated with these streams are mapped as Urban Natural Open Space, a Priority Habitat in Washington State.

Approximately 70 percent of Reach M1 is mapped as 100-year floodplain. The entire reach is mapped a landslide hazard area.

Below the OHW mark, the entire reach is mapped as having geoduck beds. Eelgrass patches are present as a sparse fringe along the reach. The southernmost end of Reach M1 is mapped having surf smelt spawning habitat. All of these areas are considered Fish and Wildlife Habitat Conservation Areas, a Critical Area type. In addition, estuarine wetlands associated with the marine aquatic bed are considered Category 1 wetlands.

Salmonid Habitat Limiting Factors

A high stream gradient limits opportunities for salmonids in Seola Creek and the unnamed tributaries within Reach M1. Salmon Creek has historically had salmon presence. A private structure near the mouth of Salmon Creek confines the channel and may impede fish passage to habitat upstream. Most of the marine shoreline is hardened with private bulkheads and numerous private boat ramps that affect littoral drift and longshore migration during most tidal stages. The intertidal is separated from uplands functions, by vegetation maintained in a highly altered (manicured) state.

Opportunities for Conservation and Restoration

Reach M1 includes the segment (49) identified as the highest priority for restoration within drift cell KI-5-1 (Johannessen, MacLennan, and McBride, 2005). This segment also ranked among the top restoration priorities in WRIA 8/9 based on historic conditions. Drift cell KI-5-1 also is generally ranked as moderately high and high prioritization for restoration and conservation respectively by Johannessen, MacLennan, and McBride (2005). As noted previously, this study is based on comparison between current and historic shoreline conditions and does not consider biological or socio-economic factors. The limited public land ownership in Reach M1 constrains opportunities for larger restoration programs. However, modifications to the baseline condition on a small scale can incrementally provide restoration of nearshore and riparian functions within the reach.

Most of the single family residences along Reach M1 are not setback from the shoreline a significant distance and impede bulkhead redesign. Other locations may be suitable for bulkhead removal or setback, with a contoured shoreline either in place of or in front of the remaining structure. Shoreline native vegetation can be installed in several locations, particularly in the undeveloped shoreline areas where vegetation can overhang shallow intertidal areas and provide the most export function.

Other restoration opportunities include mouths of Seola and Salmon Creeks where sediment transport to the beach and fish passage to the streams is impeded by structures. Modifications in both of these locations can serve to avail more habitat to salmonids and allow continued sediment nourishment to the high intertidal zone.

10.2 REACH M2

Reach M2 is a marine shoreline reach comprised of Seahurst Park and the undeveloped shoreline south of the park to SW 149th Street or the northern edge of resumed shoreline development. Reach M2 is 1.21 miles long and primarily undeveloped. Reach M2 is the southernmost part of drift cell KI-5-1, which begins at what is now Seahurst Park (Johannessen, MacLennan, and McBride, 2005). Based on Johannessen, MacLennan, and McBride (2005), historically Reach M2 included areas of feeder bluff, potential feeder bluff, and exceptional feeder bluff, some of which has now been modified. An accretion shoreform is present along most of its north end. Figure 4A depicts historic and current shoreforms from Johannessen, MacLennan, and McBride (2005).

Current Land Use

Nearly 80 percent of Reach M2 is park, set aside for passive recreation and conservation. The second highest percentage of land use is single family with 14 percent and the remainder of the reach is vacant. Seahurst Park is currently in the process of redevelopment and restoration, but it is anticipated to remain parkland for the foreseeable future.

Critical Areas

Reach M2 has several important Critical Area types represented within the reach. Two large stream systems dominate the reach, with associated buffers. The riparian ravines surrounding

the streams are mapped as Urban Natural Open Space, providing habitat to wildlife and fish species as well as plant diversity.

Below the OHW mark, the entire reach is mapped as having geoduck beds. Eelgrass patches are present as a sparse fringe along the reach. Most of Reach M2 has surf smelt spawning habitat and a portion of the intertidal in front of the Park has been mapped as Pacific sand lance spawning habitat. All of these areas are considered Fish and Wildlife Habitat Conservation Areas, a Critical Area type. In addition, estuarine wetlands associated with the marine aquatic bed are considered Category 1 wetlands. A bald eagle nest located outside of the shoreline zone near the south end of Reach M2 has a heritage buffer for nest and forage area protection that extends into the shoreline zone and occupies nearly half (southern half) of Reach M2.

Seahurst Park is entirely flanked on the upland side with a landslide hazard area. Approximately 30 percent of Reach M2 is mapped within the 100-year floodplain.

Salmonid Habitat Limiting Factors

The streams within Reach M2 are high gradient, incised streams with salmonid habitat limited to the lowest reaches. The southern stream system has some habitat available to the toe of the slope incline. The northern stream system has been modified to accommodate the fish acclimation facilities at the Marine Occupational Center in the North end of the Park. These facilities rear coho salmon as part of the Highline School District marine science curriculum.

Opportunities for Conservation and Restoration

Reach M2 includes the segment (48) identified as the third highest priority for restoration within drift cell KI-5-1, as well as the segment (207) ranked as the highest priority for conservation (Johannessen, MacLennan, and McBride, 2005). As noted previously, this study is based on comparison between current and historic shoreline conditions and does not consider biological or socio-economic factors.

Although the Seahurst Park Master Plan pre-dates the WRIA 8/9 shoreforms study, it does incorporate elements to address conservation and restoration of sediment sources and transport processes within the Park. As part of the Seahurst Park Master Plan, the long seawall reach south of the south park entrance was removed and the beach reshaped to a more natural shoreline state, including native vegetation and large longshore wood placement. Additional phases of the Master Plan include seawall redevelopment and nearshore restoration for the remainder of the park and are in either planning or permitting phases. The remainder of Reach M2 has limited restoration opportunity relative to other shoreline reaches within the City. South of the park, nearshore vegetation is intact and provides water quality and biological function to the intertidal areas during most tide stages. The single family residences within Reach M2 are protected by bulkheads, yet placement of the homes near the bulkhead presents the same constraints to restoration as described in Reach M1.

10.3 REACH M3

Marine shoreline Reach M3 is the longest shoreline reach within the City of Burien and is delineated by the increased residential development at the south end of Reach M2 and the tip of

Three Tree Point at the south end of the reach. Reach M3 is 1.75 miles long. Reach M3 is essentially defined by drift cell KI-7-2 as well as existing land use patterns. Net shore-drift in KI-7-2 is generally from the north to the south/southwest. Based on Johannessen, MacLennan, and McBride (2005), historically Reach M3 (KI-7-2) included feeder bluff and potential feeder bluff areas alternating with accretion shoreforms. The bluffs in this reach have been entirely modified, as have some of the accretion shoreforms. Figure 4A depicts historic and current shoreforms from Johannessen, MacLennan, and McBride (2005).

Current Land Use

Land use in Reach M3 is developed single family residential with 87 percent of the shoreline developed in that land use category. The remaining areas of the reach are vacant. It is anticipated that the land use in Reach M3 would remain single family residential and that properties will redevelop over time.

Critical Areas

Critical Areas within Reach M3 include several small unnamed tributaries to Puget Sound and their associated buffers. The forested ravines associated with these streams are mapped as Urban Natural Open Space, a Priority Habitat in Washington State. The heritage buffer associated with a bald eagles nest in Reach M2 extends into Reach M3 to approximately SW 156th Street.

Twenty-six percent of Reach M3 is mapped as 100-year floodplain. The entire upland area of the reach is mapped a landslide hazard area. In addition, the soils surrounding Three Tree Point and immediately north are mapped as a seismic hazard zone.

Below the OHW mark, almost the entire reach is mapped having geoduck beds, which almost all the way south to the tip of Three Tree Point. Eelgrass patches are present as a sparse fringe along the reach and kelp beds are mapped within this reach. The southern half of Reach M3 is mapped as having surf smelt spawning habitat, overlaying a small reach of Pacific sand lance spawning habitat near SW 156th Street. All of these areas are considered Fish and Wildlife Habitat Conservation Areas, a Critical Area type. In addition, estuarine wetlands associated with the marine aquatic bed are considered Category 1 wetlands.

Salmonid Habitat Limiting Factors

High stream gradients limit opportunities for salmonids in the unnamed tributaries within Reach M3. The marine shoreline is hardened with private bulkheads and numerous private boat ramps that affect littoral drift and longshore migration during most tidal stages. Reach M3 also has several single family docks. The intertidal areas utilized by juvenile salmon are separated from uplands functions by the high intensity of vertical bulkheads and the nearshore vegetation maintained in a highly altered (manicured) state.

Opportunities for Conservation and Restoration

As Reach M3 and KI-7-2 are in complete overlap, the reach includes all includes segments identified for priority restoration (3) and conservation (1) within the drift cell (Johannessen, MacLennan, and McBride, 2005). Although none of these segments individually are ranked

among the top restoration and conservation priorities in WRIA 8/9 based on historic conditions, drift cell KI-7-2 is generally ranked as one of the highest drift cells for restoration and conservation respectively (Johannessen, MacLennan, and McBride 2005). As noted previously, this study is based on comparison between current and historic shoreline conditions and does not consider biological or socio-economic factors. The limited public land ownership in Reach M3 constrains opportunities for larger restoration programs. However, modifications to the baseline condition on a small scale can incrementally provide restoration of nearshore and riparian functions within the reach. Prioritization for restoration and conservation presented by Johannessen, MacLennan, and McBride (2005) can additionally inform where these small scale efforts may reap the most benefit within this reach.

Most of the single family residences along Reach M3 are located immediately behind the bulkheads and can impede bulkhead redesign. There appear to be few locations suitable for bulkhead removal or setback. Some areas may allow for a contoured shoreline, though the elevation of the uplands within the south end of this reach is low, where bulkhead removal could render increased risk to the upland structures. Shoreline native vegetation can be installed in the few areas of undeveloped shoreline areas where vegetation can overhang shallow intertidal areas and provide the most export function.

Other restoration opportunities include the unnamed tributaries where invasive vegetation can be controlled, but the high intensity of maintenance in private property ownership is limiting to even this restoration opportunity.

10.4 REACH M4

Reach M4 is similar to Reach M3 in that it is characterized by consistent residential development with a south facing aspect. The reach extends from the tip of Three Tree Point to the southern City limits. Reach M4 is 1.44 miles long. Reach M4 is located at the terminus of drift cell KI-7-3, which originates just north of the Des Moines Creek estuary and is approximately 4.5 miles in length (Johannessen, MacLennan, and McBride, 2005). Net shore-drift in KI-7-3 is from south to north. Historically, Reach M4 was feeder bluff, which has subsequently been modified, and an accretion shoreform that is still functioning despite shoreline modifications (Johannessen, MacLennan, McBride, 2005). Figure 4A depicts historic and current shoreforms from Johannessen, MacLennan, and McBride (2005).

Current Land Use

Land use in Reach M4 is developed single family residential with 91 percent of the shoreline developed in that land use category. The remaining areas of the reach are split between low density multifamily use (4.99 percent), vacant (2.65 percent) and commercial use (1.23 percent). It is anticipated that the land use in Reach M4 would remain predominantly single family residential and that properties will redevelop over time. Reach M4 is characterized as having narrower parcels than the other marine reaches, which extend into the intertidal south of Three Tree Point.

Critical Areas

Reach M4 includes few small unnamed tributaries to Puget Sound and their associated buffers. These are very high gradient streams with no associated Urban Natural Open Space.

Forty-eight percent of Reach M4 is mapped as 100-year floodplain. The entire upland area of the reach is mapped a landslide hazard area, excepting the soils surrounding Three Tree Point and immediately south. Those soils are mapped as a seismic hazard zone.

Below the OHW mark, the entire reach is mapped having geoduck beds. Eelgrass patches are present as patchy beds along the Reach M4 shoreline. A small segment of the reach is identified as Pacific sand lance spawning habitat. All of these areas are considered Fish and Wildlife Habitat Conservation Areas, a Critical Area type. In addition, estuarine wetlands associated with the marine aquatic bed are considered Category 1 wetlands.

Salmonid Habitat Limiting Factors

The marine shoreline of Reach M4 is hardened with private bulkheads and a few private boat ramps that affect littoral drift and longshore migration during most tidal stages. Reach M4 also has several single family docks. The intertidal areas utilized by juvenile salmon are separated from uplands functions by the high intensity of vertical bulkheads and the nearshore vegetation maintained in a highly altered (manicured) state. SW 172nd Street parallels the shoreline near most of the reach immediately behind the small residential (garage) structures along the beach. Storm water runoff from the road enters Puget Sound with no opportunity for treatment.

Opportunities for Conservation and Restoration

Reach M4 does not include any of the top three priority segments for restoration or conservation within drift cell KI-7-3 (Johannessen, MacLennan, and McBride, 2005). Of the three drift cells within the City, KI-7-3 is the relatively lowest priority for restoration (moderate) or conservation (moderately high) within WRIA 8/9. As noted previously, this study is based on comparison between current and historic shoreline conditions and does not consider biological or socio-economic factors. The land ownership pattern (private single family) in Reach M4 constrains opportunities for larger restoration programs. However, modifications to the baseline condition on a small scale can incrementally provide restoration of nearshore and riparian functions within the reach.

Reach M4 is characterized by structures either immediately on or near the OHW mark, between the road and the intertidal zone. Johannessen, MacLennan, and McBride (2005) identify a single specific potential restoration opportunity, removal of a number of creosote pile and possible groin removal (number 35), within the City (although this may be in part or entirely on privately owned land). There appear to be few locations suitable for bulkhead removal or setback. Those areas with residential structures set further back are characterized as "high bank" waterfront. Some areas may allow for a contoured shoreline either in place of or in front of the remaining structure. These are also locations where the City can encourage shoreline native vegetation to overhang shallow intertidal areas and provide the most export function.

10.5 REACH LB

Reach LB consists of the entire shoreline of Lake Burien and is the only freshwater shoreline reach in the City. The perimeter of the lake is 1.67 miles long.

Current Land Use

Lake Burien is mostly developed as single family use (87 percent) with a small portion (8.3 percent) in Special Planning Area 2, the Ruth Dykeman Children's Center. Reach LB is developed to its entire potential and is likely to remain in single family residential use.

Critical Areas

Lake Burien is mapped as an Aquifer Recharge Area. Wetlands associated with the lake edge are Critical Areas rated Category 2 wetlands. The buffer associated with a Category 2 wetland is 100 feet. There are no Priority Habitat and Species documented within Lake Burien.

Lake Burien is not within the 100-year floodplain and there are no landslide or seismic hazards associated with the lake.

Salmonid Habitat Limiting Factors

There is no fish access into Lake Burien; therefore, salmonids are not expected within the lake.

Opportunities for Conservation and Restoration

The intensity of development around the lake and private ownership preclude programmatic habitat restoration. Water quality within Reach LB is affected by storm water input and non-point runoff from maintained property surrounding the shoreline. Typically, these conditions provide opportunity for property owners to maintain water quality through coordinated stewardship and landscape maintenance practices.

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Note – Other sources, such as on-line mappers and GIS layers, are listed in the annotated bibliography (Appendix A).

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**CITY OF BURIEN
SHORELINE MASTER PROGRAM UPDATE**

**SHORELINE INVENTORY
FIGURES**



Legend

- Approx Marine OHWM
- Approx Marine OHWM +200'
- Approx Lake OHWM
- Approx Lake OHWM +200'
- Parcels
- City Boundary

Reaches

- Lake Burien
- Marine 1
- Marine 2
- Marine 3
- Marine 4

Note: OHWM = ordinary high water mark

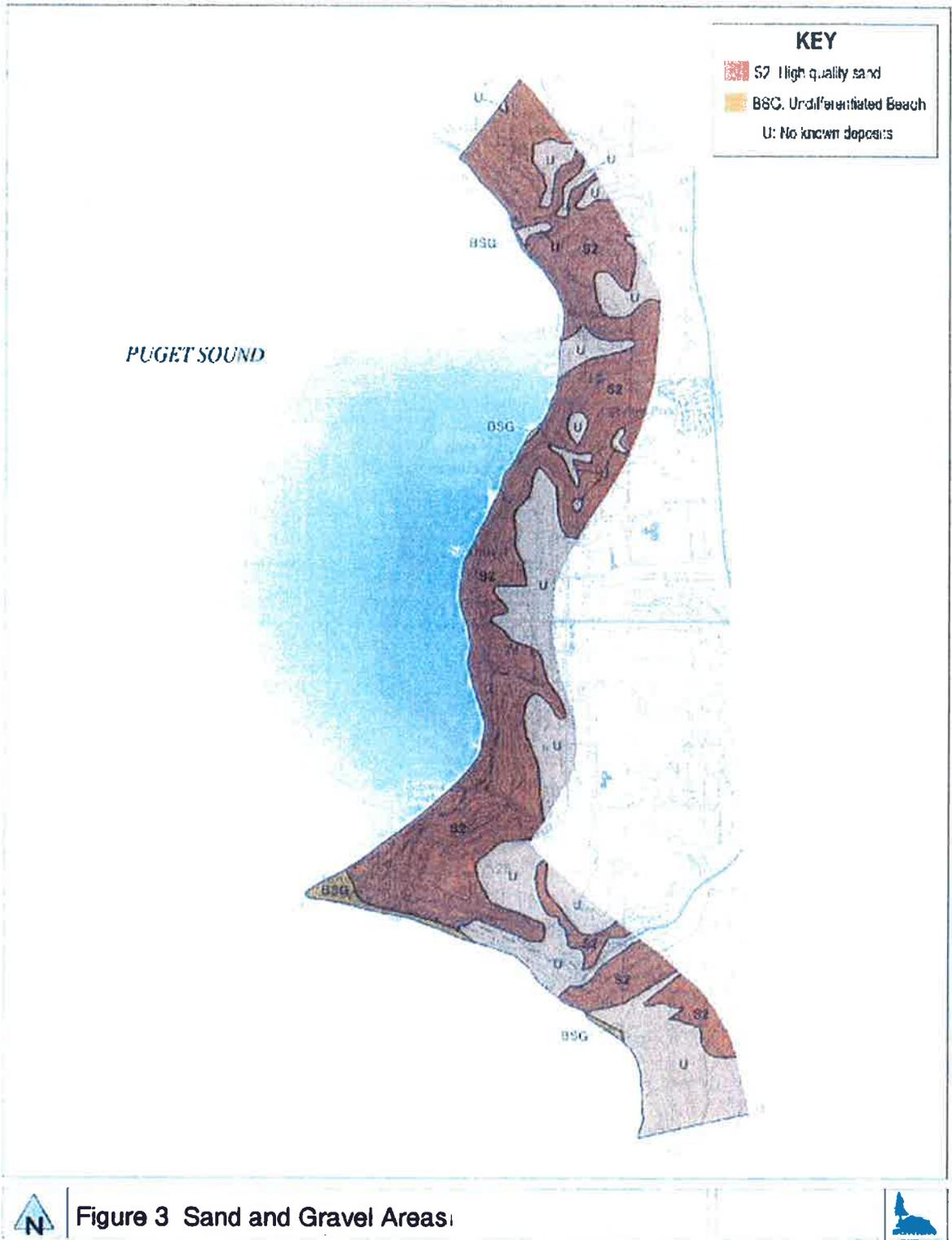
Data Sources: City of Burien, King County

City of Burien

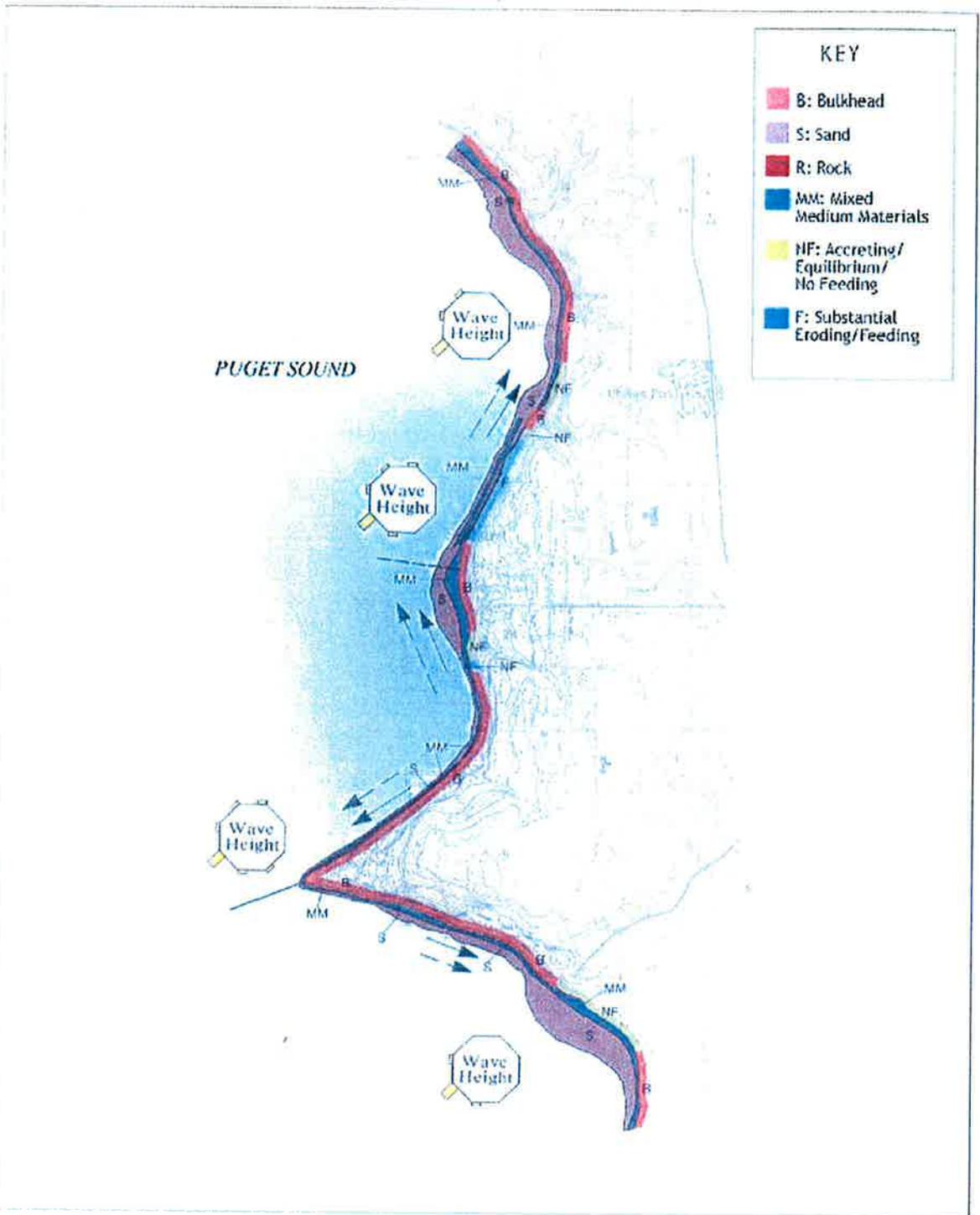
Shoreline Master Program

Figure 1
Preliminary
Shoreline Jurisdiction

DATE: 05/04/08

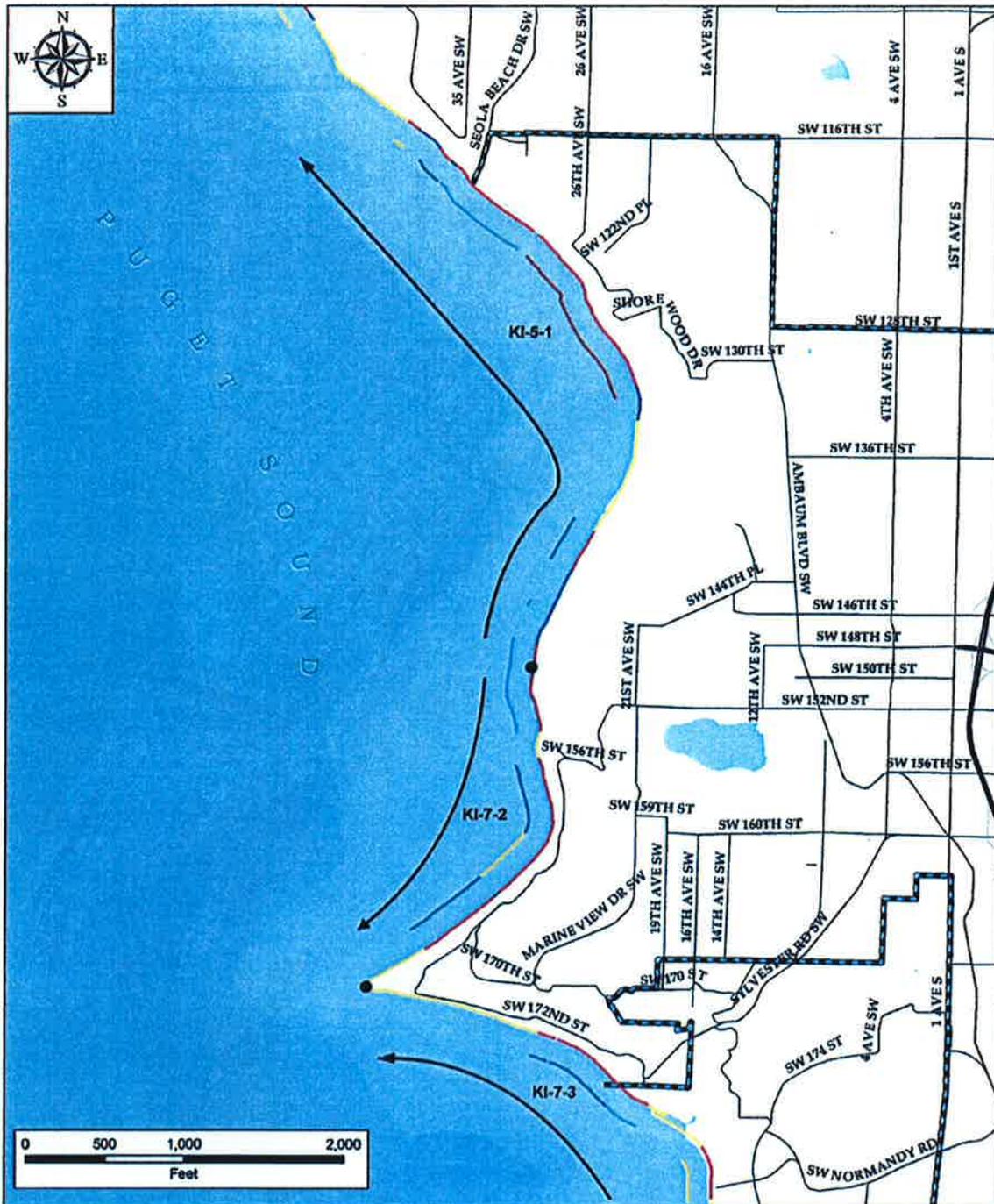


(adapted from The Burien Plan; City of Burien 2006)



 **Figure 4 Coastal Drift**

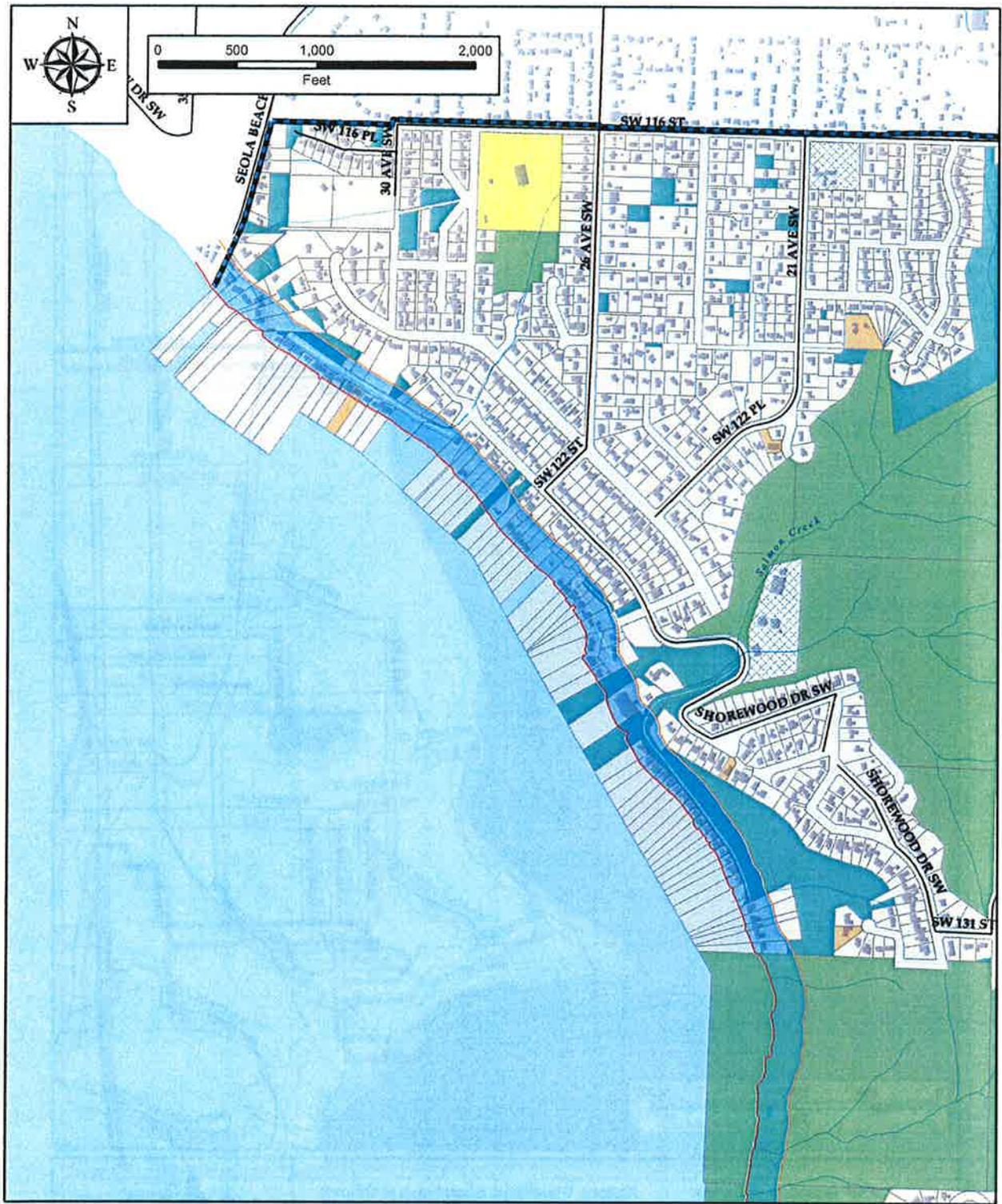
(adapted from The Burien Plan; City of Burien 2006)



<p> Boundary of Burien</p> <p> Drift Cell Boundaries</p>	<p>Historic Conditions Shoretypes (offshore)</p> <p> Feeder Bluff</p> <p> Feeder Bluff Exceptional</p> <p> Potential Feeder Bluff</p> <p> NOT Feeder Bluff</p> <p>Current Conditions Shoretypes</p> <p> Accretion Shoreform</p> <p> Feeder Bluff</p> <p> Feeder Bluff Exceptional</p> <p> Modified</p>	 <p>City of Burien</p> <p>Shoreline Master Program</p> <p>Current & Historic (buffered offshore) Sediment Sources</p> <p>Figure 4A</p>
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Data Source: Inventory and Assessment of Current and Historic Beach Feeding Sources/Erosion and Accretion Areas for the Marine Shorelines of Water Resource Inventory Areas 8 & 9

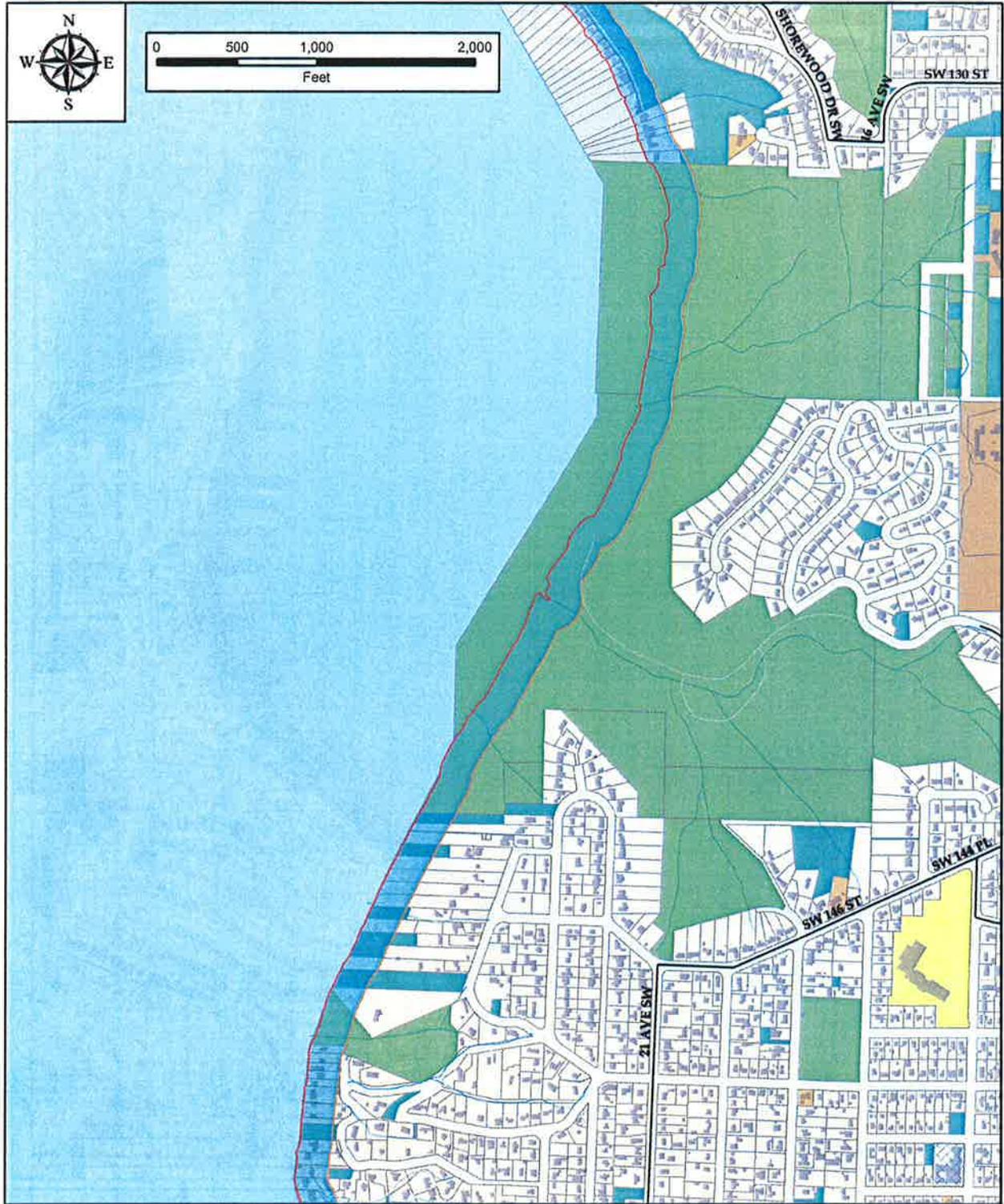
Published: December 2005



Boundary of Burien Buildings Reaches Lake Burien Marine 1 Marine 2 Marine 3 Marine 4	Land Use SFR Low Density MFR High Density MFR Industrial Commercial Institutional Office Park Retail School Transportation VACANT Other	 City of Burien Shoreline Master Program Land Use <i>Marine 1</i> <small>Date: May 24, 2009</small>
--	---	---

5-42

Figure 5A



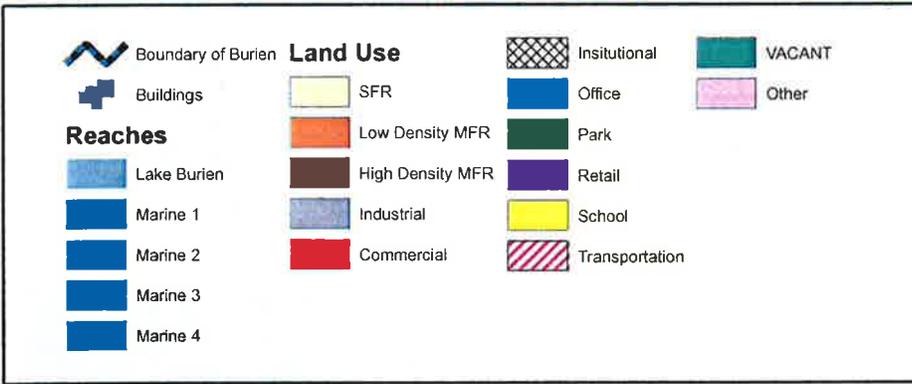

City of Burien

Shoreline Master Program

Land Use
Marine 2

Date: 3/10/08

Figure 5B




City of Burien

Shoreline Master Program

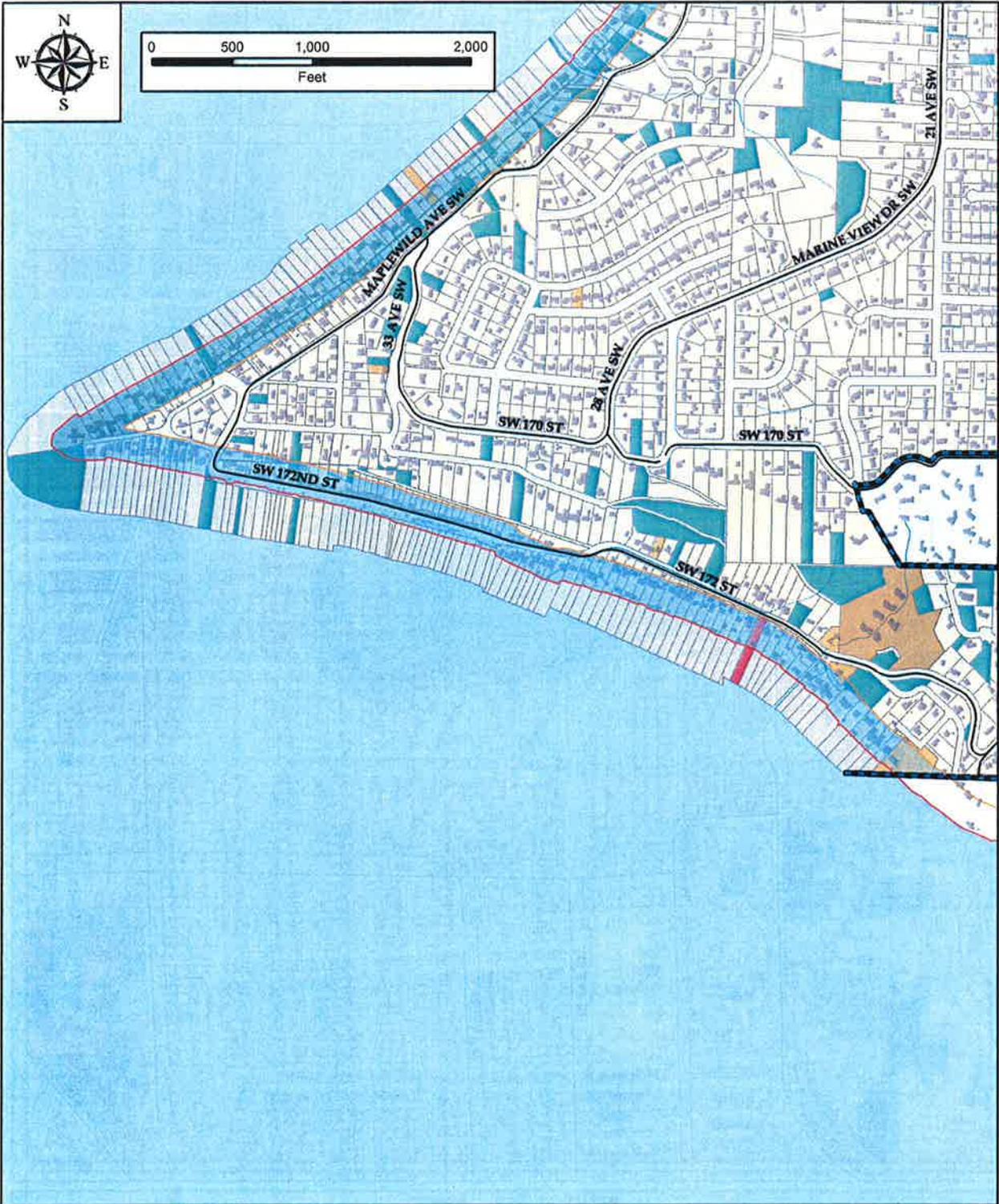
Land Use

Marine 3

Date: Mar 31, 2009

Figure 5C

5-44

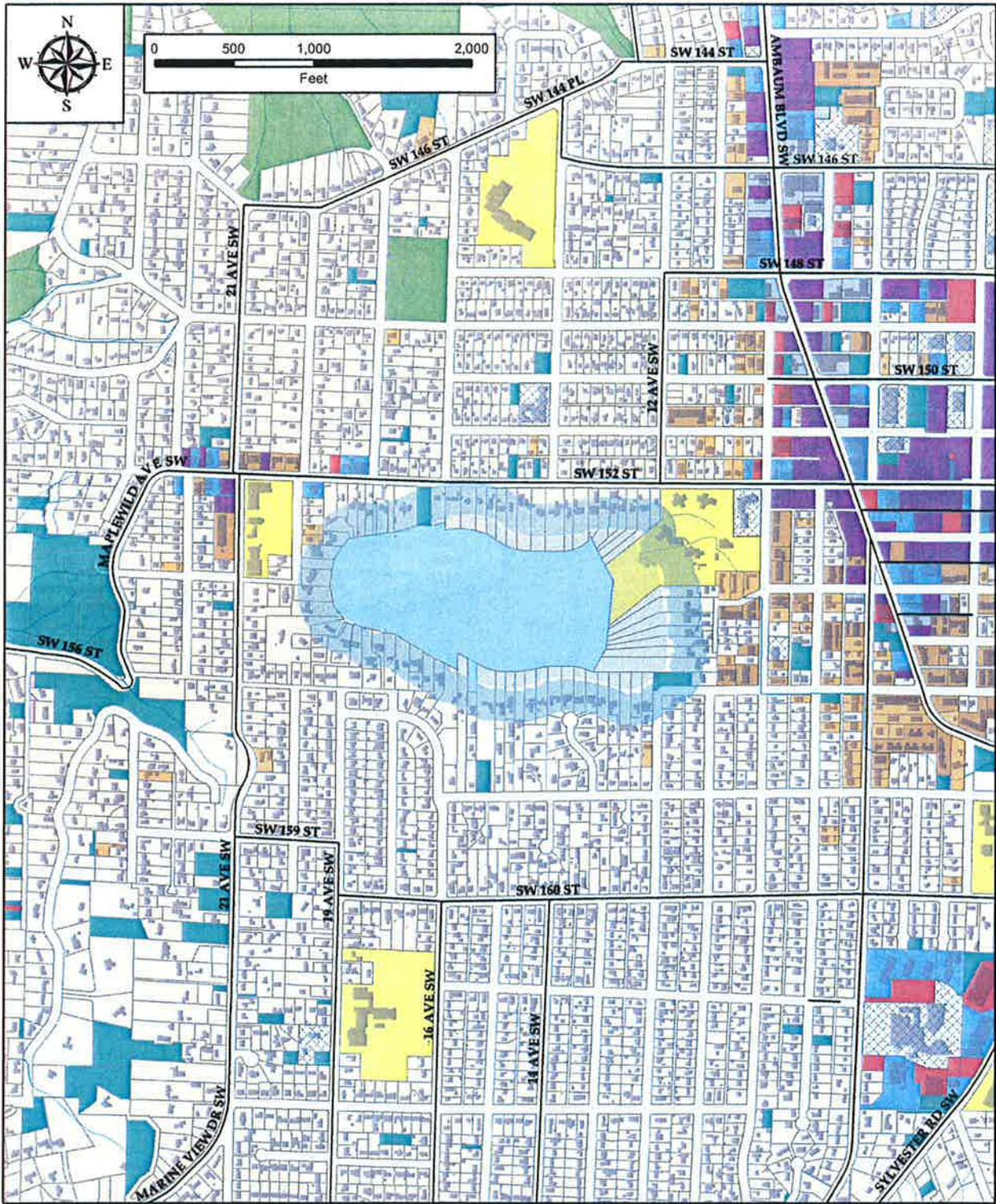



City of Burien
Shoreline Master Program

Land Use
Marine 4

Date: Mar 04, 2009

Figure 5D



	Boundary of Burien	Land Use		Institutional		VACANT
	Buildings			Office		Other
Reaches				Park		
	Lake Burien			Retail		
	Marine 1			School		
	Marine 2			Transportation		
	Marine 3					
	Marine 4					



City of Burien

Shoreline Master Program

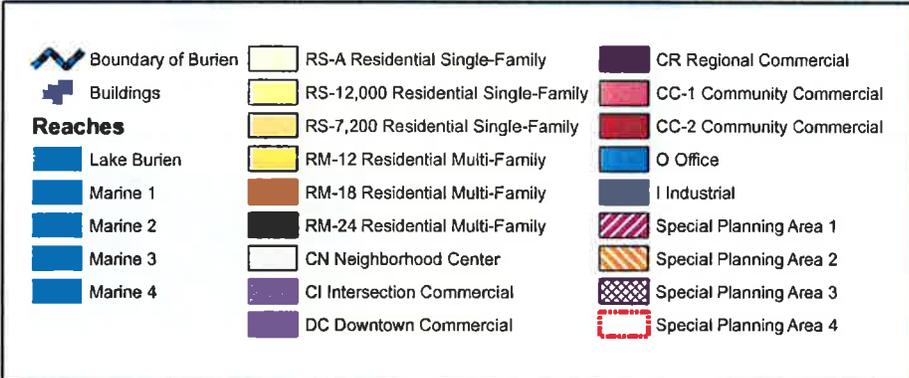
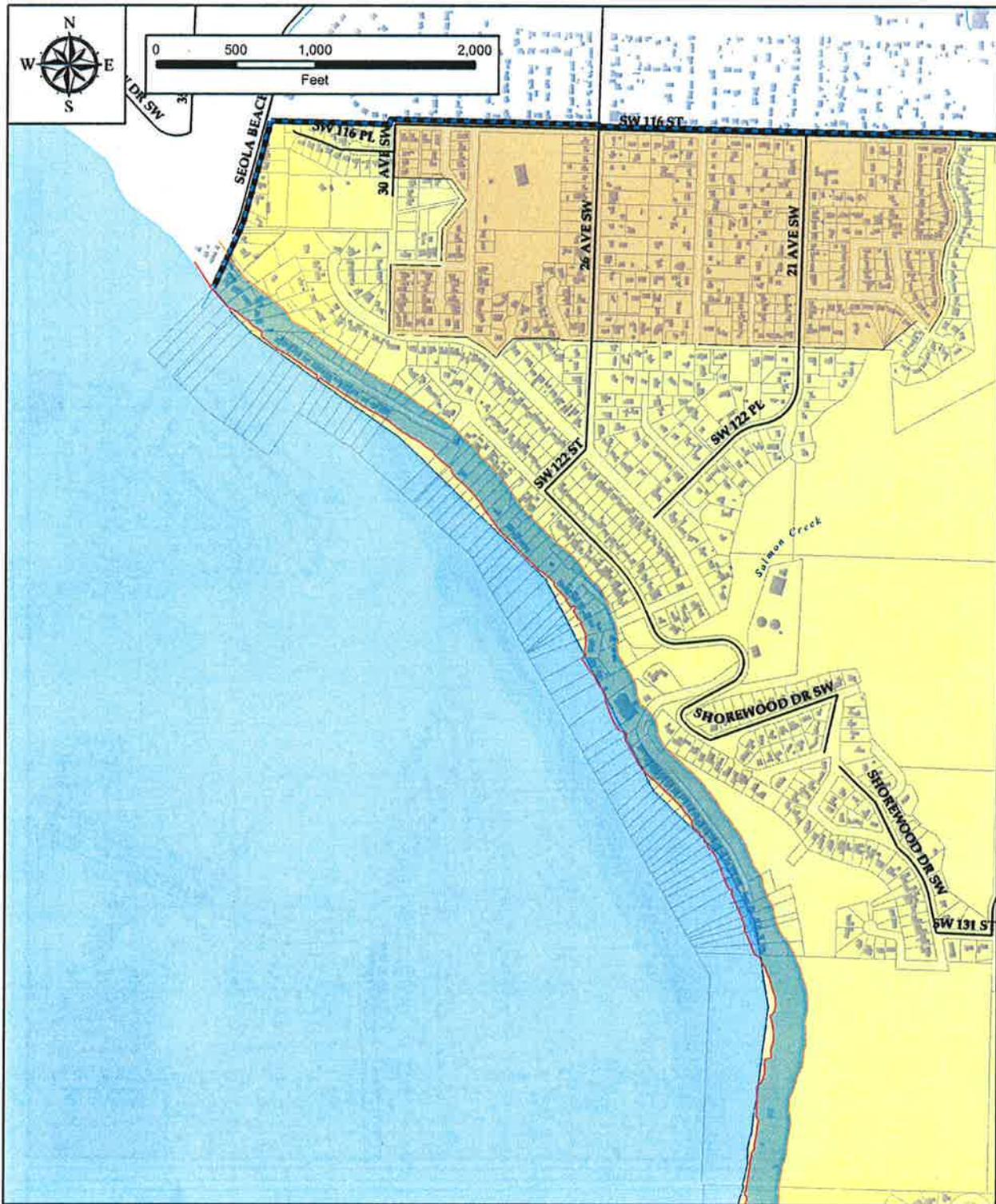
Land Use

Lake Burien

Date: Mar 04, 2019

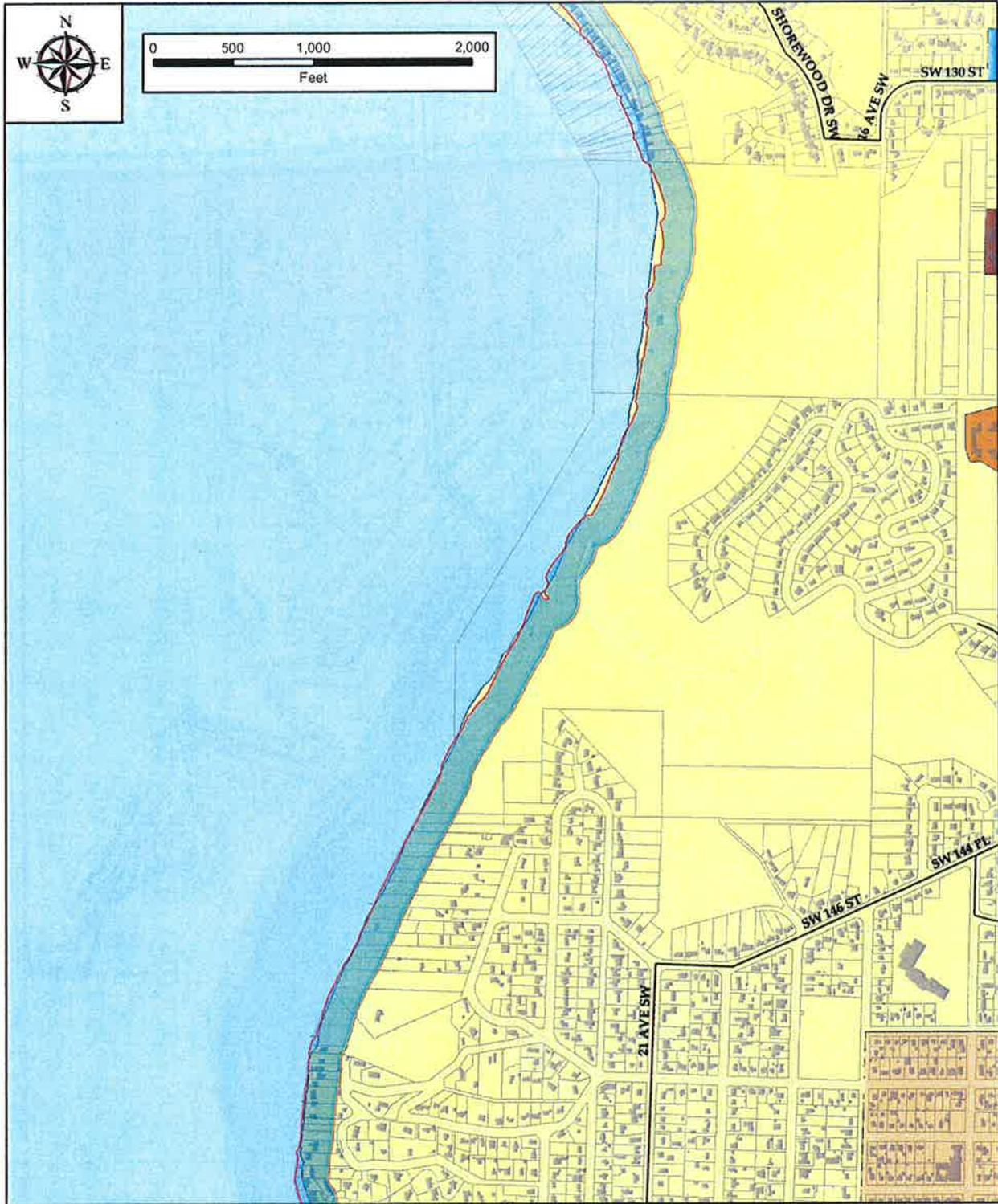
Figure 5E

5-46




City of Burien
Shoreline Master Program
Zoning
Marine 1

Date: May 04, 2009 Figure 6A



Boundary of Burien	RS-A Residential Single-Family	CR Regional Commercial
Buildings	RS-12,000 Residential Single-Family	CC-1 Community Commercial
Reaches	RS-7,200 Residential Single-Family	CC-2 Community Commercial
Lake Burien	RM-12 Residential Multi-Family	O Office
Marine 1	RM-18 Residential Multi-Family	I Industrial
Marine 2	RM-24 Residential Multi-Family	Special Planning Area 1
Marine 3	CN Neighborhood Center	Special Planning Area 2
Marine 4	CI Intersection Commercial	Special Planning Area 3
	DC Downtown Commercial	Special Planning Area 4

City of Burien

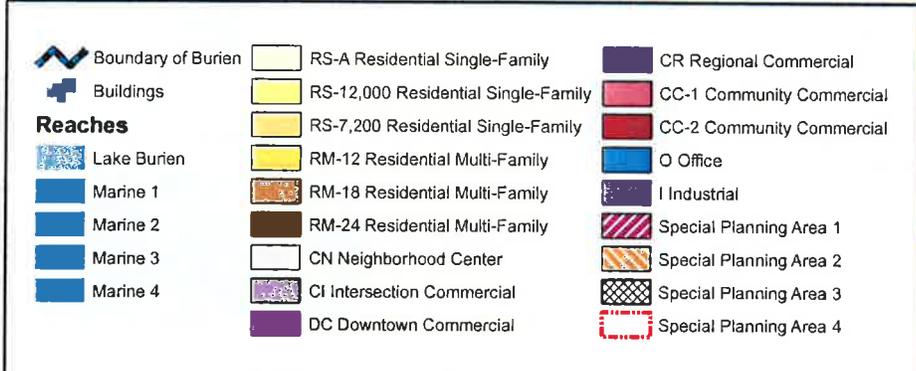
Shoreline Master Program

Zoning
Marine 2

DATE: Mar 04, 2002

Figure 6B

5-48



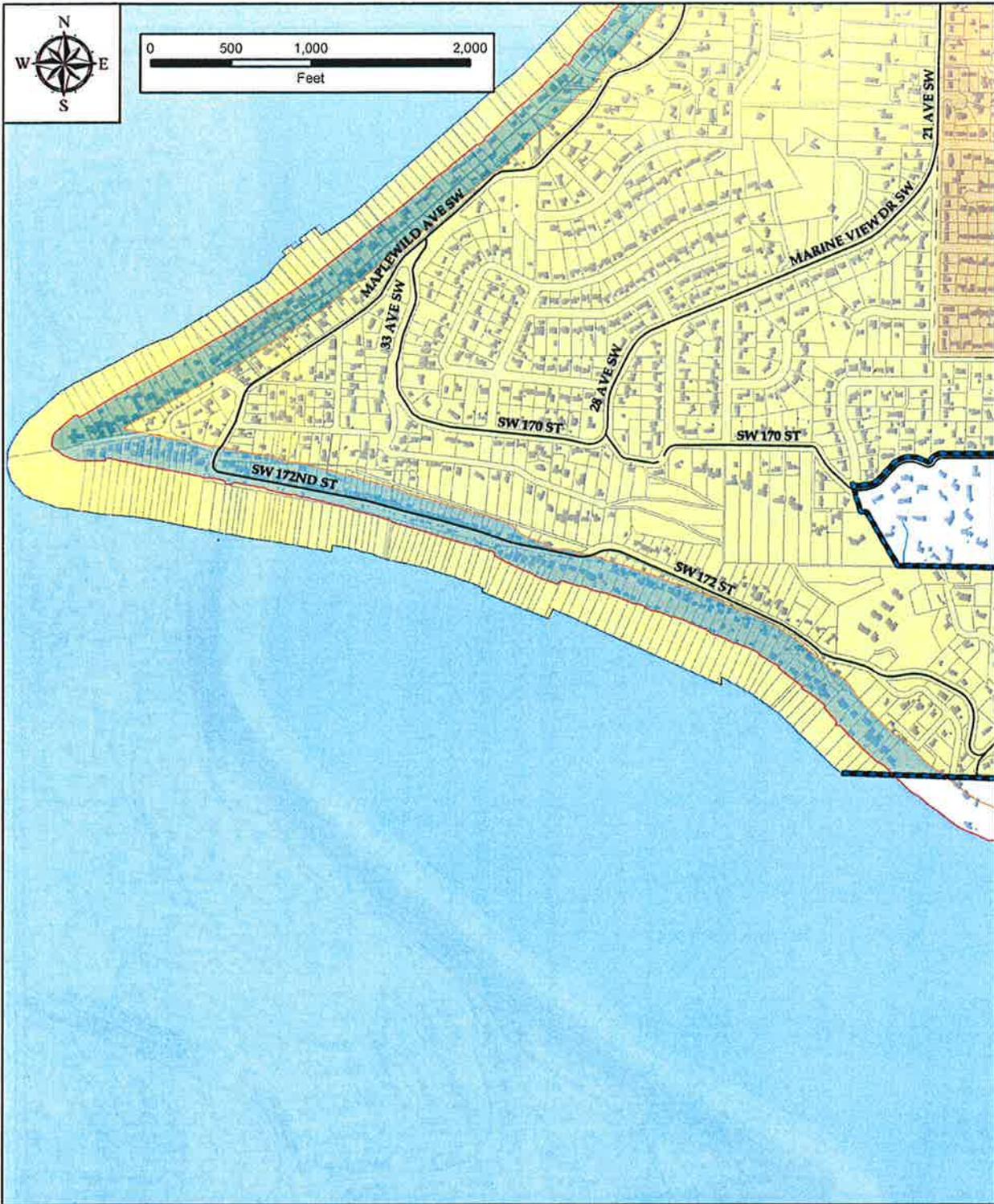

City of Burien

Shoreline Master Program

Zoning
Marine 3

Drawn May 04, 2009

Figure 6C



Boundary of Burien	RS-A Residential Single-Family	CR Regional Commercial
Buildings	RS-12,000 Residential Single-Family	CC-1 Community Commercial
Reaches	RS-7,200 Residential Single-Family	CC-2 Community Commercial
Lake Burien	RM-12 Residential Multi-Family	O Office
Marine 1	RM-18 Residential Multi-Family	I Industrial
Marine 2	RM-24 Residential Multi-Family	Special Planning Area 1
Marine 3	CN Neighborhood Center	Special Planning Area 2
Marine 4	CI Intersection Commercial	Special Planning Area 3
	DC Downtown Commercial	Special Planning Area 4



City of Burien

Shoreline Master Program

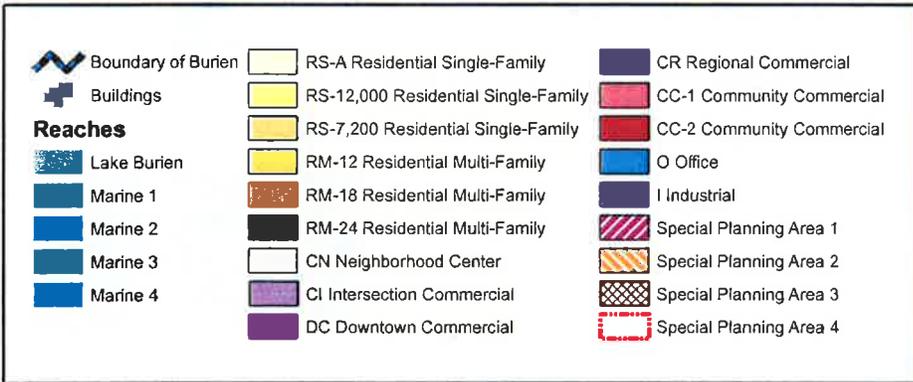
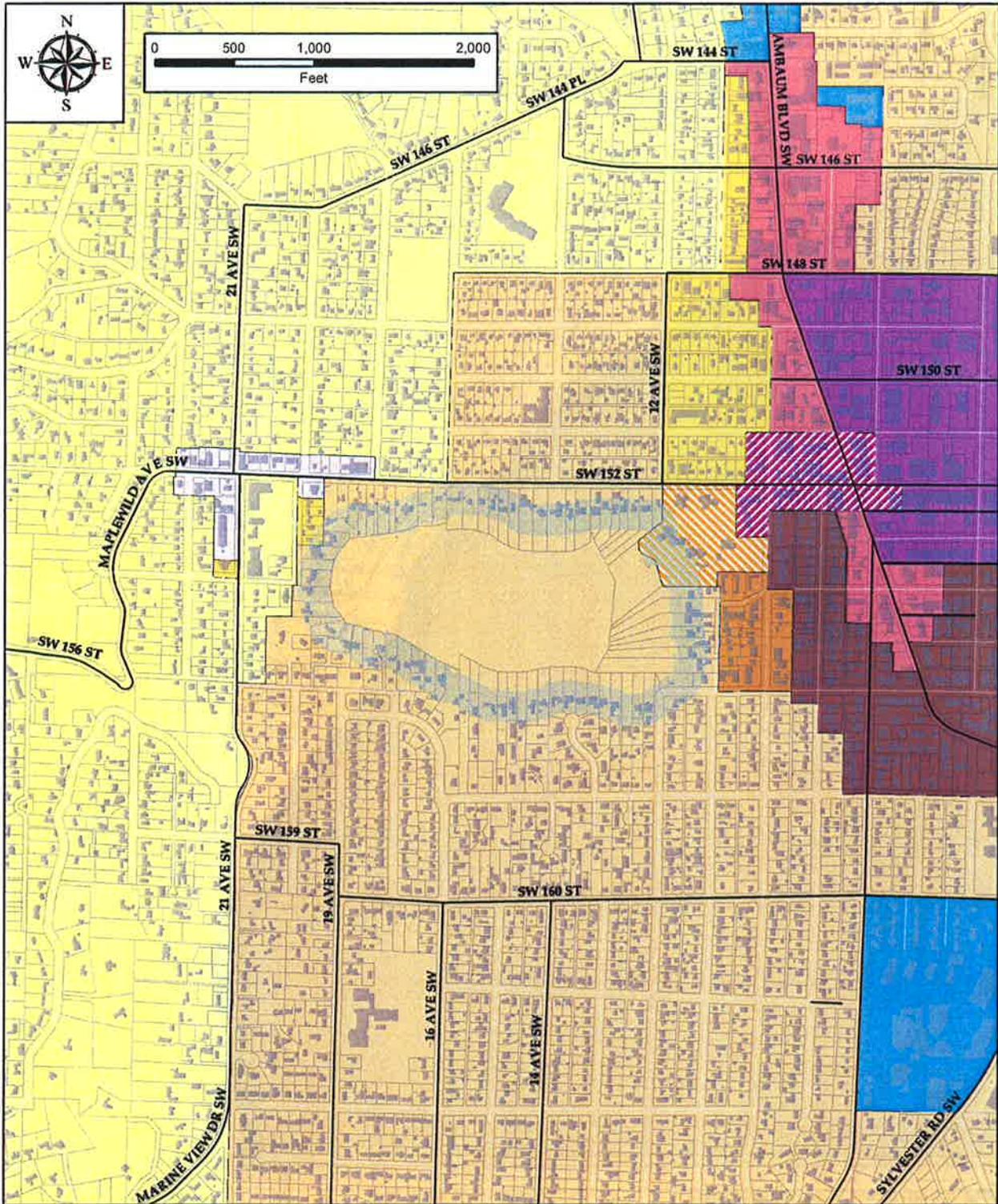
Zoning

Marine 4

Date: Mar 04, 2008

Figure 6D

5-50





City of Burien

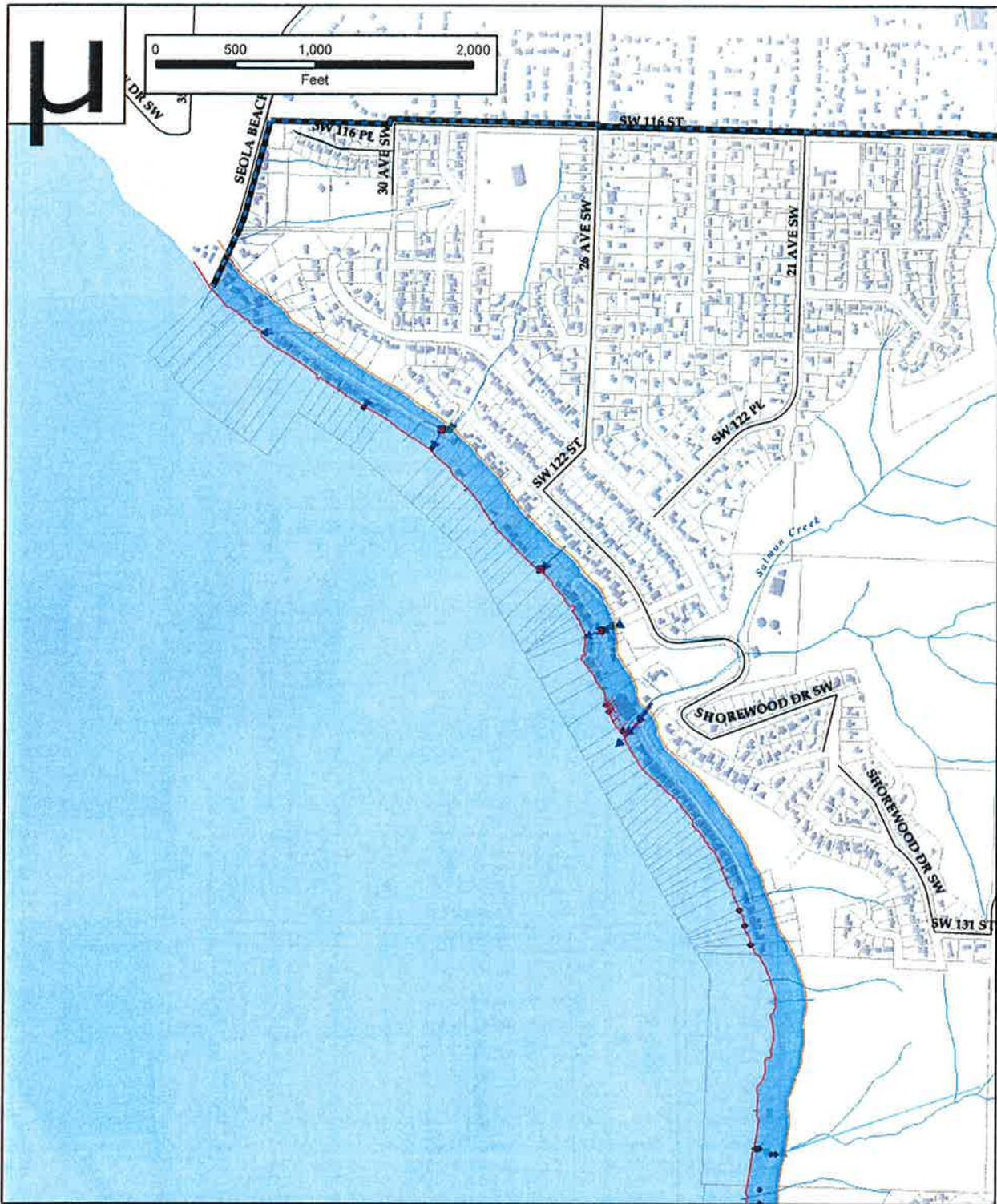
Shoreline Master Program

Zoning

Lake Burien

Date: Mar 04, 2008

Figure 6E



	Boundary of Burien		CB Type 1 Infiltration		Salmon Creek
	Buildings		CB Type 1 Inlet		Miller Creek
Reaches	Catchbasin Reach		CB Type 2		Small Creek
	Lake Burien		Type 2 FROP		Open Flow
	Marine 1		CB Type 2 Infiltration		Bioswale
	Marine 2		Type 2 Inlet		Sheet Flow
	Marine 3		Type 3 Infiltration		Ditches
	Marine 4		Type 3 Vault		Storm Pipes
	TYPE		No Data		Other
			Joint		



City of Burien
Shoreline Master Program
Stormwater System
Marine 1

Date: 10/04/2023

Figure 7A

5-52



Boundary of Burien	Catchbasin Reach	* CB Type 1 Infiltration	Salmon Creek
Buildings	TYPE	Y CB Type 1 Inlet	Miller Creek
Reaches	\$ Type 2 Flow Splitter	I CB Type 2	Small Creek
Lake Burien	- Other	+ Type 2 FROP	Open Flow
Marine 1	⚡ Downstream Defender	I CB Type 2 Infiltration	Bioswale
Marine 2	U Pump Station	(Type 2 Inlet	Sheet Flow
Marine 3	2 Stormfilter Vault	4 Type 3 Infiltration	Ditches
Marine 4	7 CB Type 1	N Type 3 Vault	Storm Pipes
	S Type 1 FROP	• No Data	
		• Other	
		D Joint	

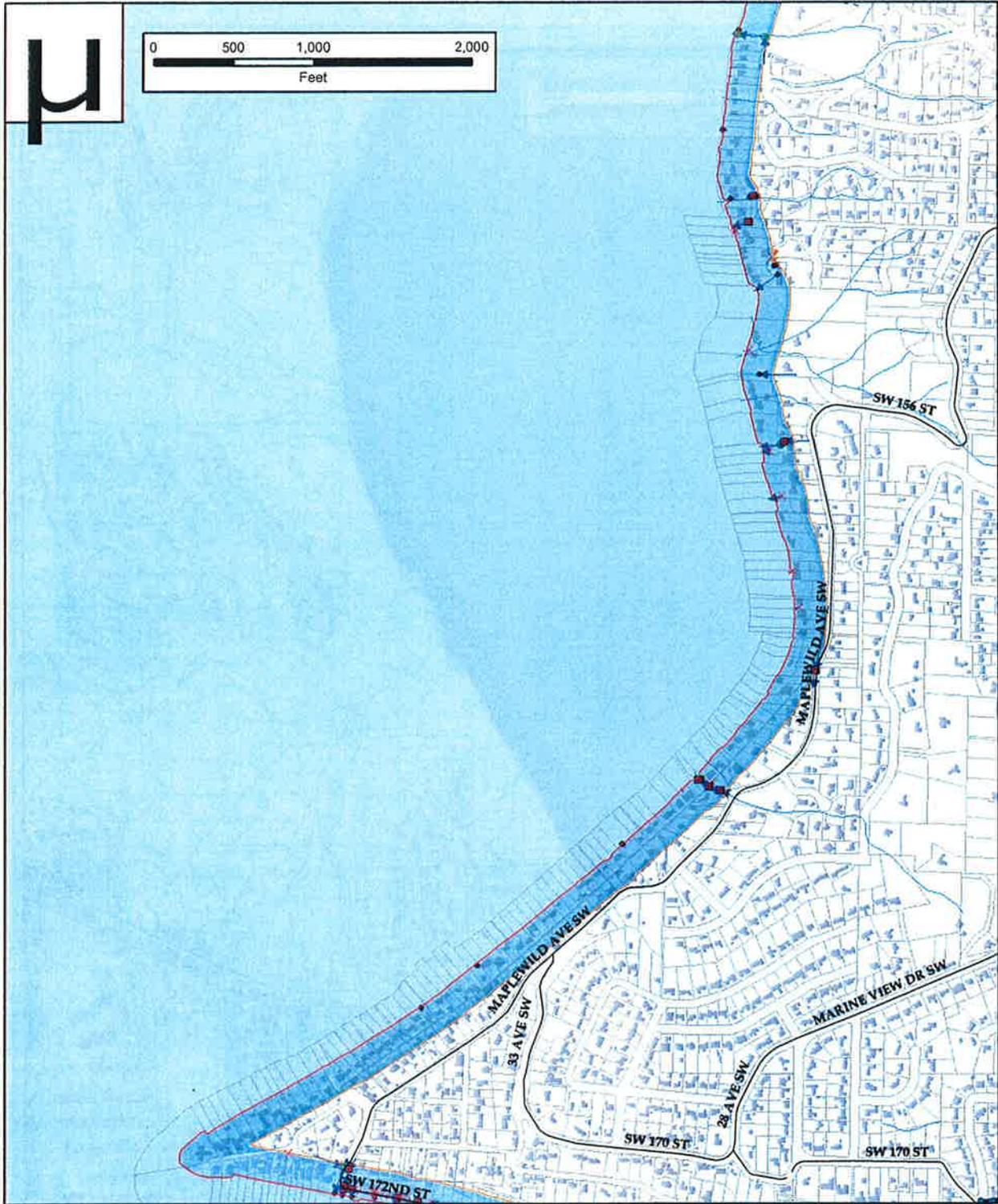


City of Burien
Shoreline Master Program

Stormwater System
Marine 2

Date: May 14, 2009

Figure 7B



Boundary of Burien



Buildings

Reaches

- Lake Burien
- Marine 1
- Marine 2
- Marine 3
- Marine 4

Catchbasin Reach

TYPE

- Type 2 Flow Splitter
- Other
- Downstream Defender
- Pump Station
- Stormfilter Vault
- CB Type 1
- Type 1 FROP

- CB Type 1 Infiltration
- CB Type 1 Inlet
- CB Type 2
- Type 2 FROP
- CB Type 2 Infiltration
- Type 2 Inlet
- Type 3 Infiltration
- Type 3 Vault
- No Data
- Other
- Joint
- Salmon Creek
- Miller Creek
- Small Creek
- Open Flow
- Sheet Flow
- Ditches
- Storm Pipes



City of Burien

Shoreline Master Program

Stormwater System

Marine 3

Date: Mar 04, 2008

Figure 7C



	Boundary of Burien		CB Type 1 Infiltration		Salmon Creek
	Buildings		CB Type 1 Inlet		Miller Creek
Reaches	Catchbasin Reach TYPE		CB Type 2		Small Creek
	\$ Type 2 Flow Splitter		Type 2 FROP		Open Flow
	- Other		CB Type 2 Infiltration		Bioswale
	↳ Downstream Defender		Type 2 Inlet		Sheet Flow
	U Pump Station		Type 3 Infiltration		Ditches
	2 Stormfilter Vault		Type 3 Vault		Storm Pipes
	∕ CB Type 1		No Data		
	s Type 1 FROP		Other		
			Joint		



City of Burien

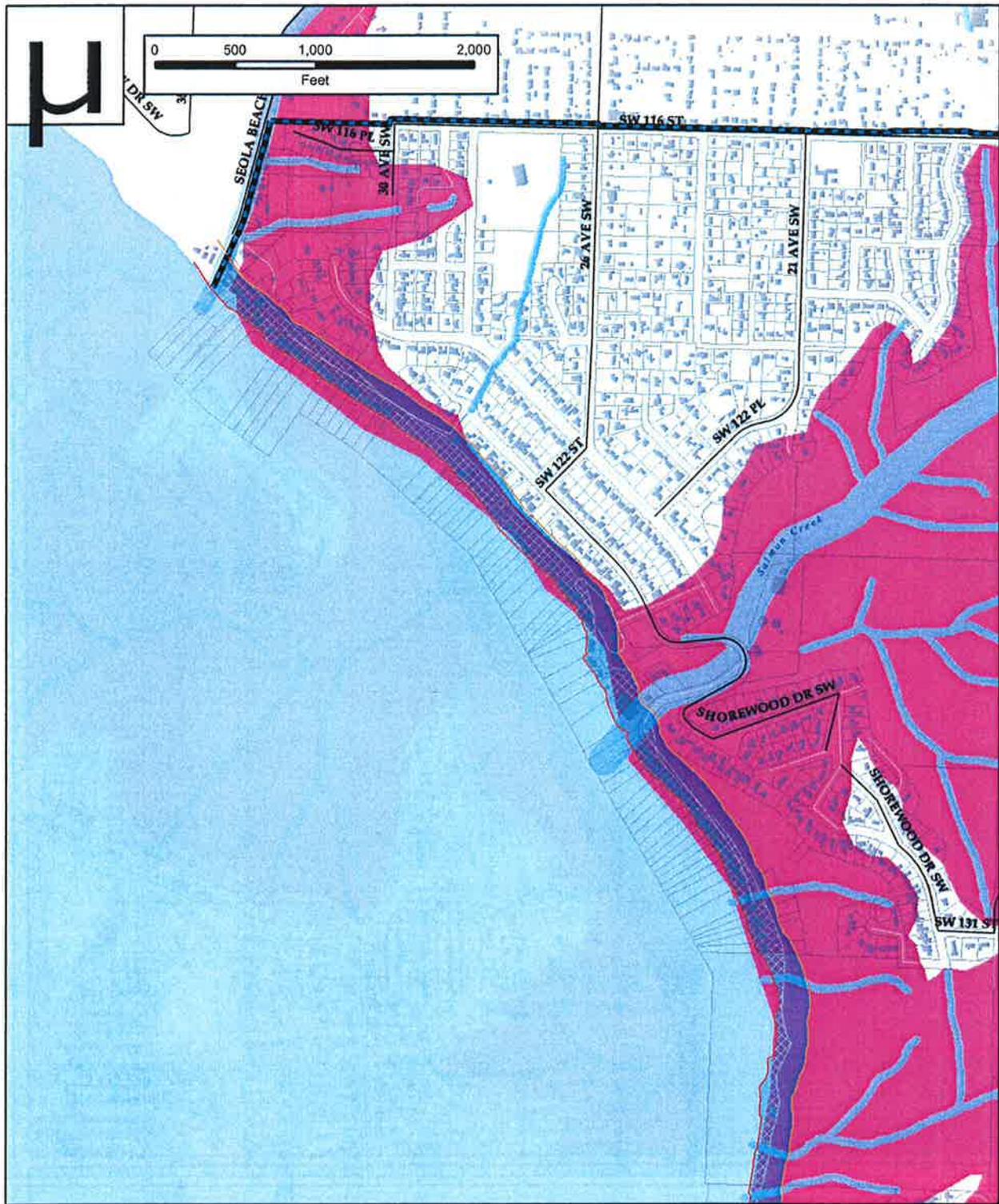
Shoreline Master Program

Stormwater System

Marine 4

Date: Mar 04, 2009

Figure 7D



- | | |
|--------------------|----------------------------|
| Boundary of Burien | Seismic |
| Buildings | Landslide |
| Reaches | Aquifer Recharge Areas |
| Lake Burien | Wetlands |
| Marine 1 | Stream Buffers |
| Marine 2 | 100-Year Flood Area - FEMA |
| Marine 3 | |
| Marine 4 | |



City of Burien

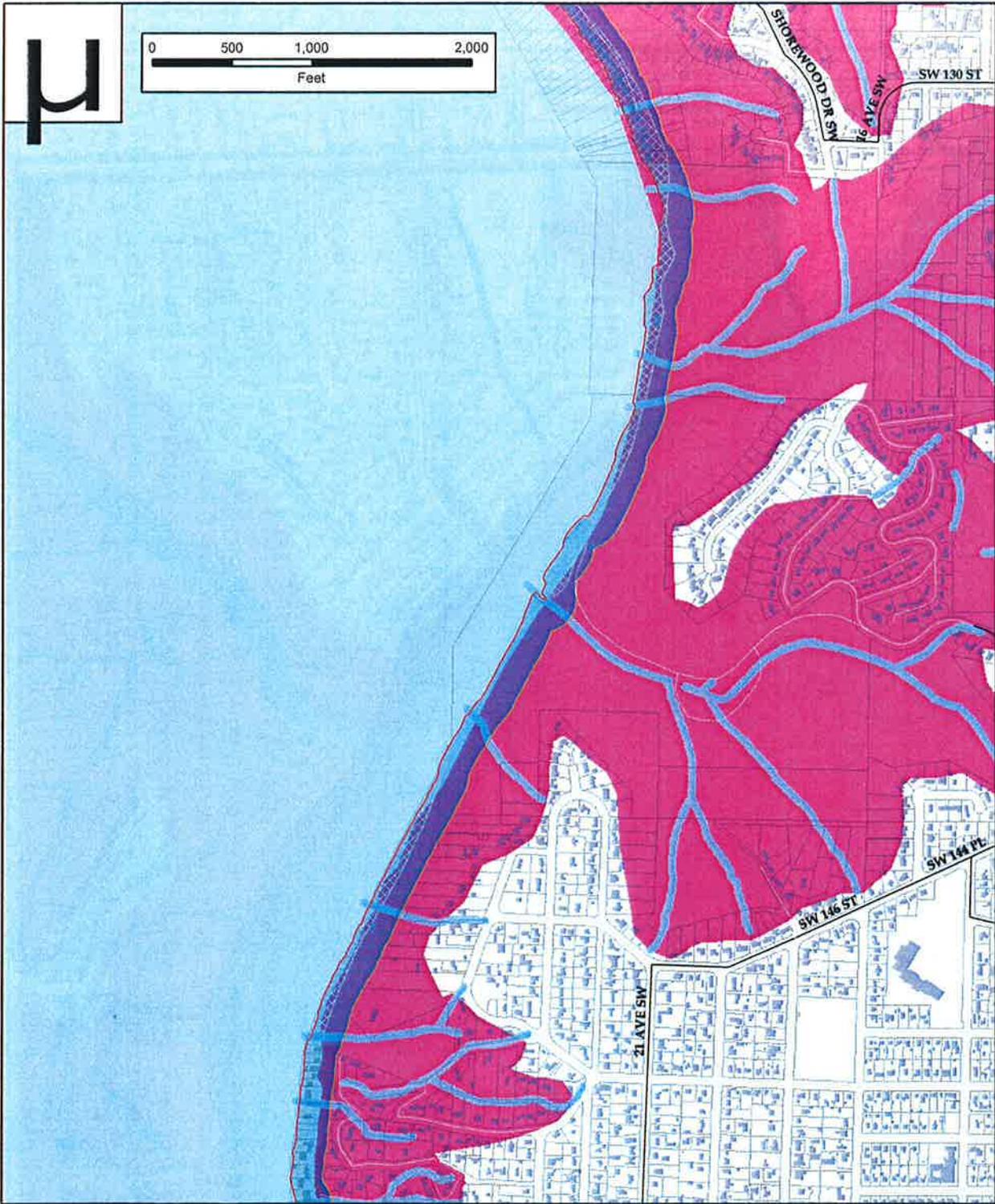
Shoreline Master Program

Critical Areas

Marine 1

Scale: Mar 04, 2008

Figure 8A



- | | | | |
|----------------|--------------------|--|----------------------------|
| | Boundary of Burien | | Seismic |
| | Buildings | | Landslide |
| Reaches | | | Aquifer Recharge Areas |
| | Lake Burien | | Wellands |
| | Marine 1 | | Stream Buffers |
| | Marine 2 | | 100-Year Flood Area - FEMA |
| | Marine 3 | | |
| | Marine 4 | | |



City of Burien

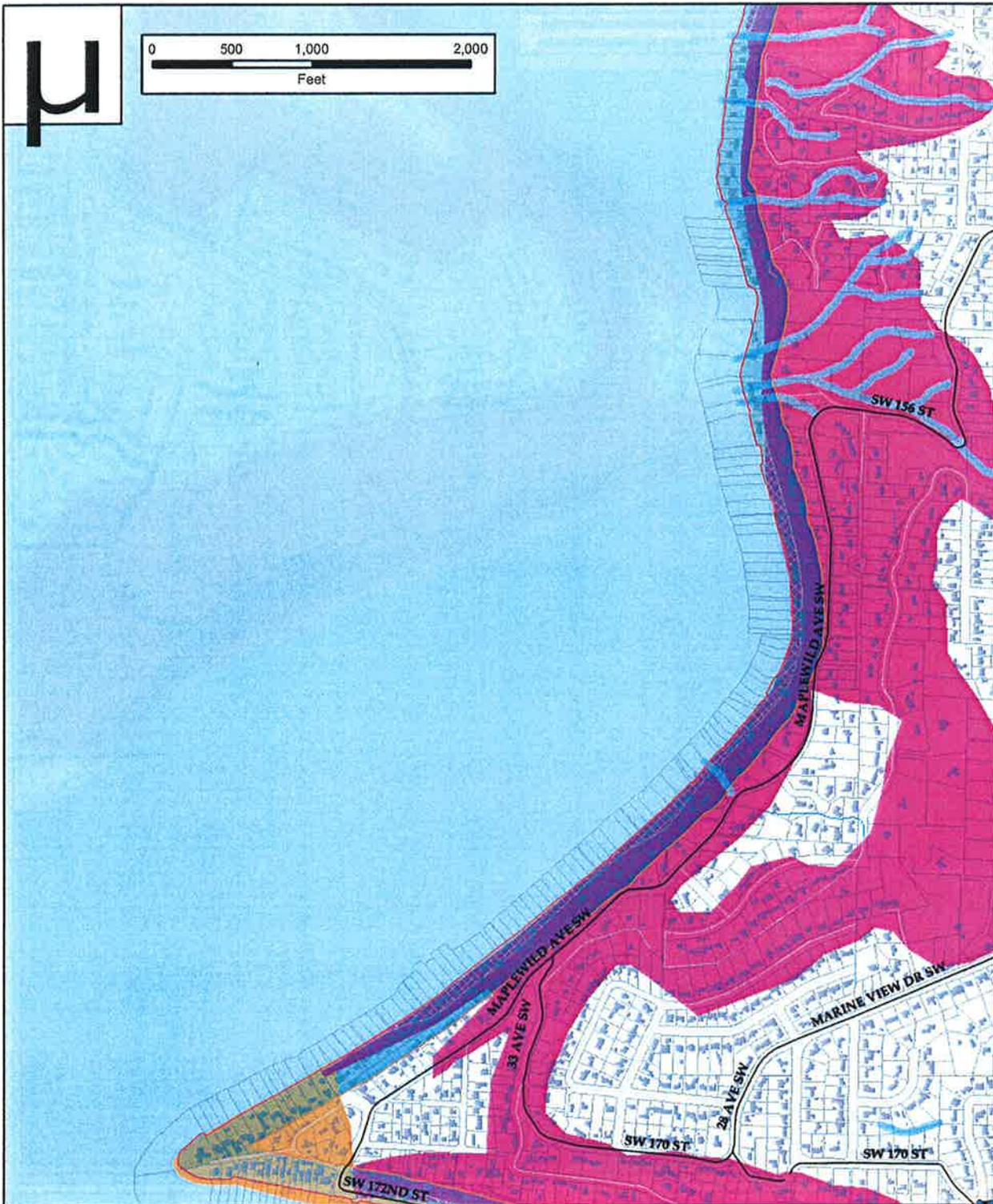
Shoreline Master Program

Critical Areas

Marine 2

Date: Mar 04, 2019

Figure 8B



- | | |
|--------------------|----------------------------|
| Boundary of Burien | Seismic |
| Buildings | Landslide |
| Reaches | Aquifer Recharge Areas |
| Lake Burien | Wetlands |
| Marine 1 | Stream Buffers |
| Marine 2 | 100-Year Flood Area - FEMA |
| Marine 3 | |
| Marine 4 | |



City of Burien

Shoreline Master Program

Critical Areas

Marine 3

Date: Mar 04, 2009

Figure 9C



- | | |
|--------------------|----------------------------|
| Boundary of Burien | Seismic |
| Buildings | Landslide |
| Reaches | Aquifer Recharge Areas |
| Lake Burien | Wellands |
| Marine 1 | Stream Buffers |
| Marine 2 | 100-Year Flood Area - FEMA |
| Marine 3 | |
| Marine 4 | |



City of Burien

Shoreline Master Program

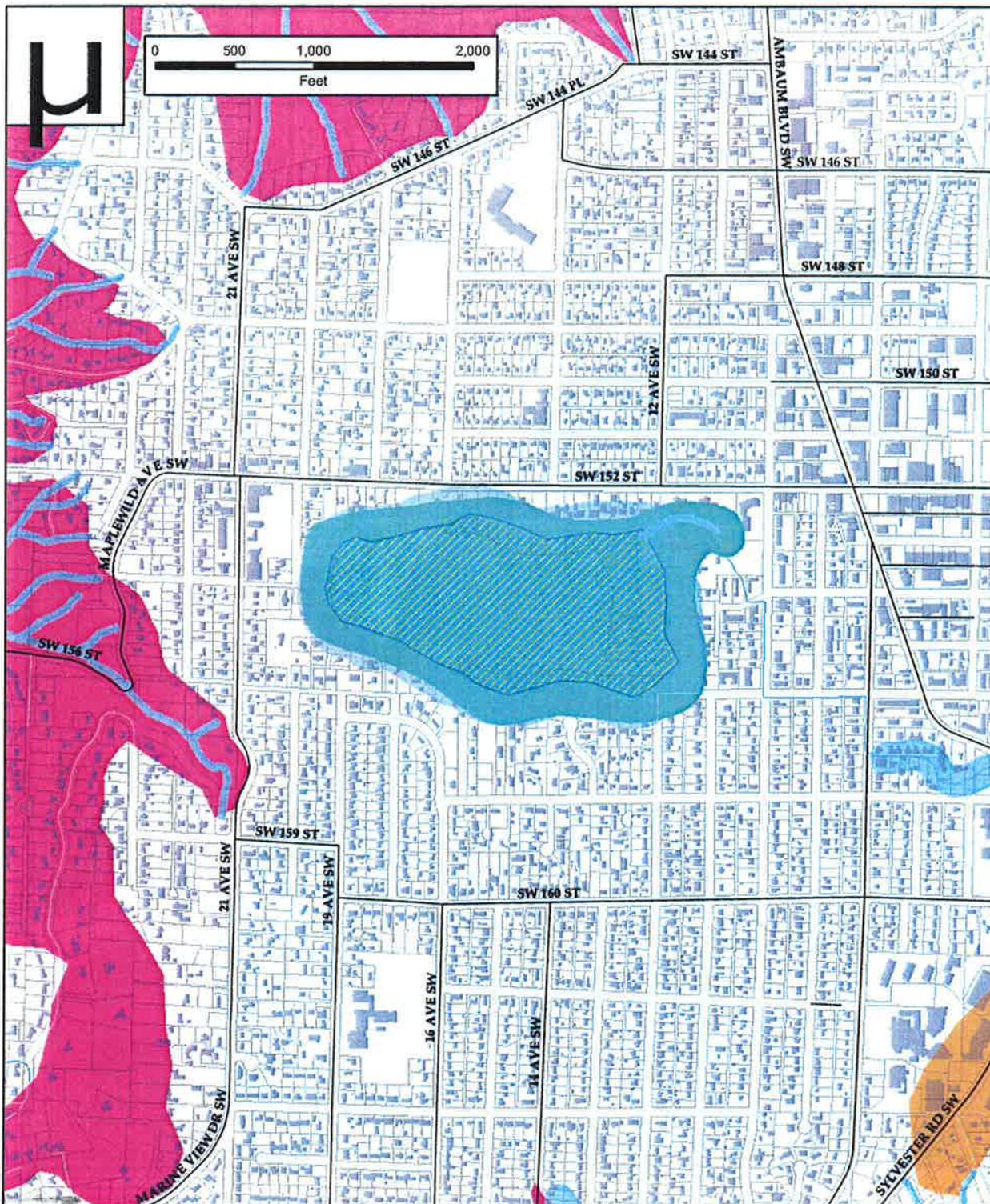
Critical Areas

Marine 4

Date: Mar 04, 2008

Figure 8D

5-60



- | | | | |
|----------------|--------------------|--|----------------------------|
| | Boundary of Burien | | Seismic |
| | Buildings | | Landslide |
| Reaches | | | Aquifer Recharge Areas |
| | Lake Burien | | Welllands |
| | Marine 1 | | Stream Buffers |
| | Marine 2 | | 100-Year Flood Area - FEMA |
| | Marine 3 | | |
| | Marine 4 | | |



City of Burien

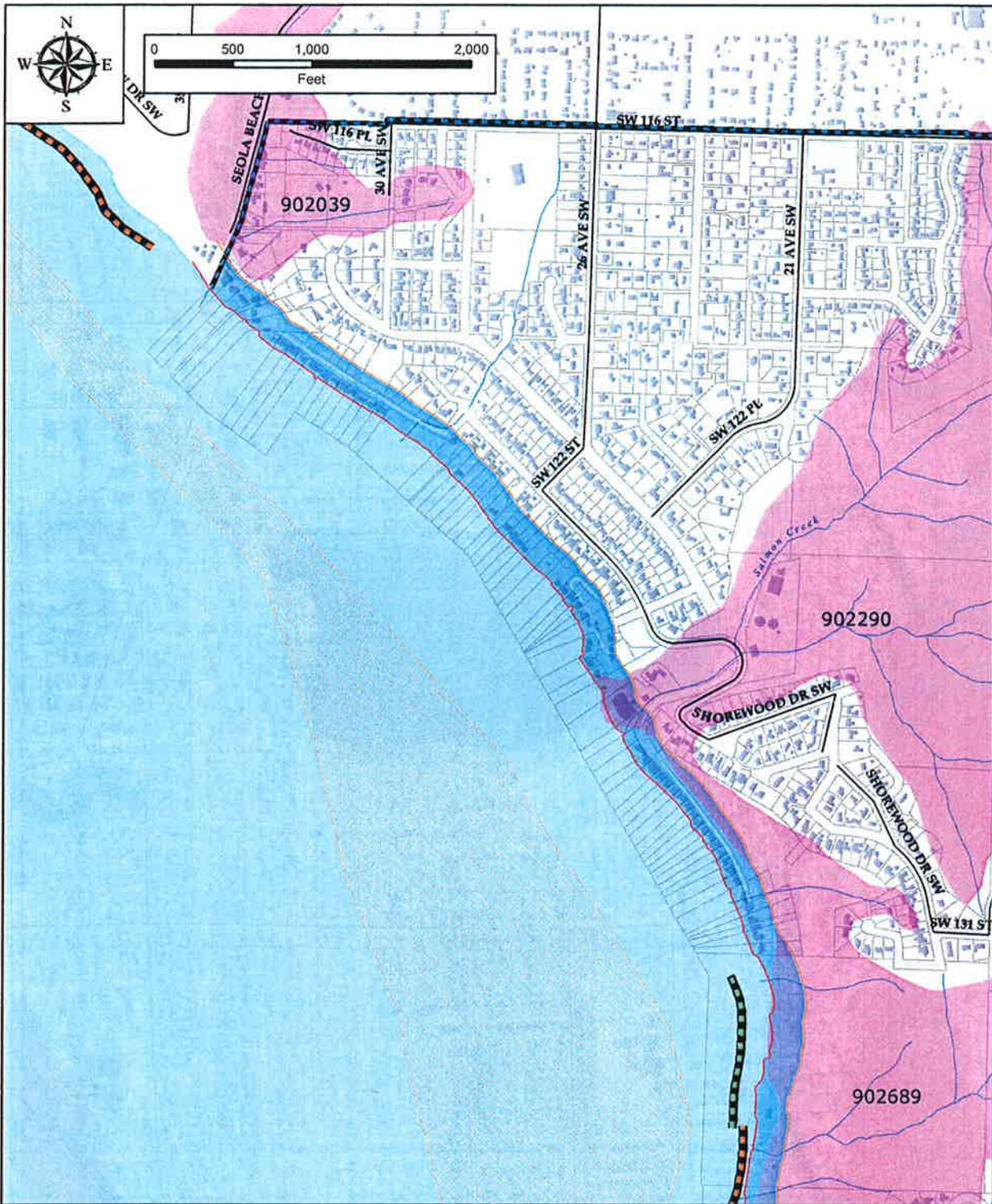
Shoreline Master Program

Critical Areas

Lake Burien

Date: Mar 04, 2008

Figure 3E



	Boundary of Burien		Priority Habitats & Species - WDFW
	Buildings		Heritage Buffer
Reaches			Important Species - WDFW
	Lake Burien		Surf Smelt
	Marine 1		Pacific Sandlance
	Marine 2		Geoduck
	Marine 3		
	Marine 4		

Data represented on these maps are subject to rules and regulations delineated by The Washington Department of Fish and Wildlife under POLICY - 5210. This product contains sensitive information as determined by WDFW and should not be distributed.

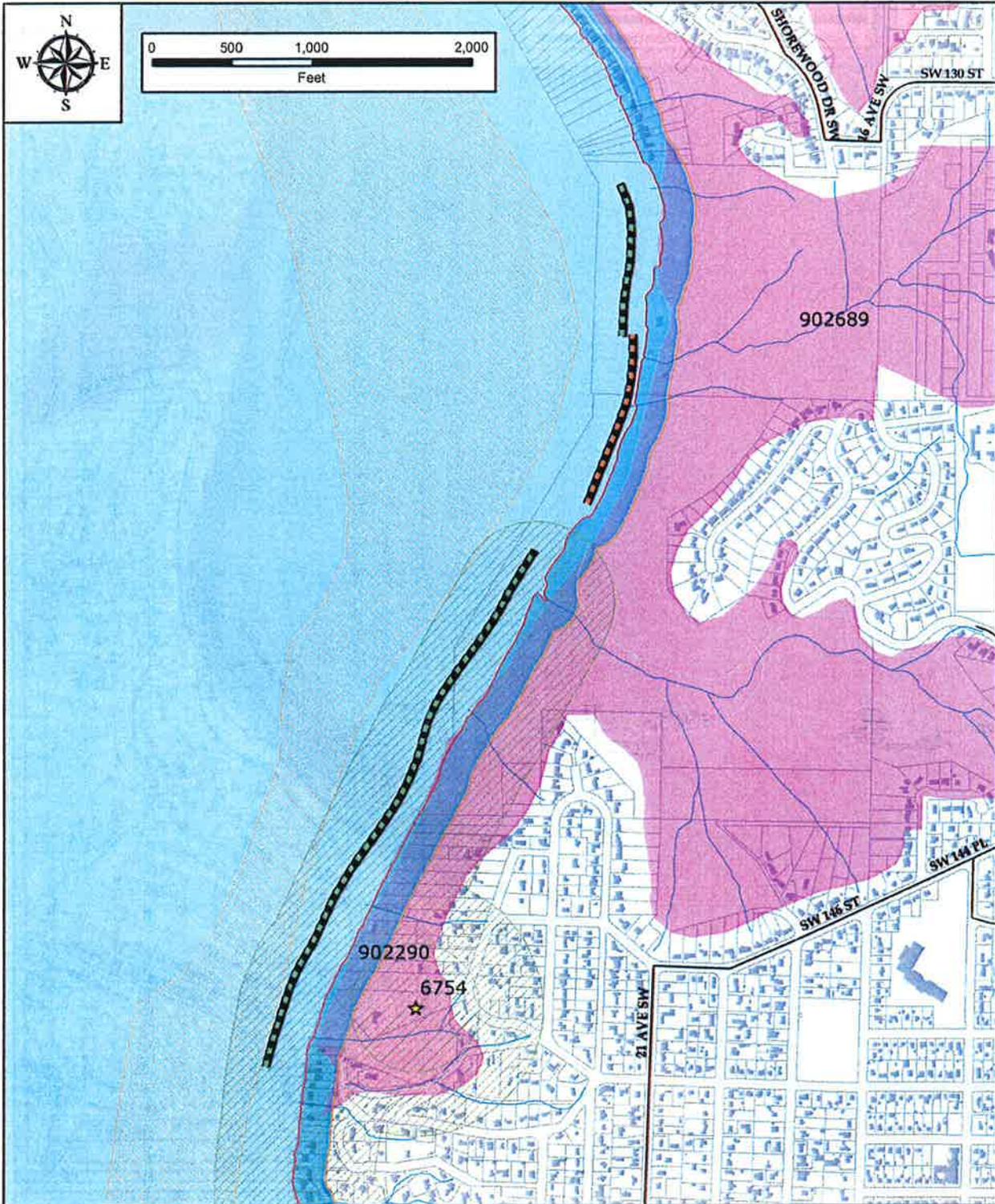


City of Burien
Shoreline Master Program
Fish & Wildlife Habitat Conservation Areas
Marine 1

Date: 10/04/2008

Figure 9A

5-62



	Boundary of Burien		Priority Habitats & Species - WDFW
	Buildings		Heritage Buffer
Reaches			Important Species - WDFW
	Lake Burien		Surf Smelt
	Marine 1		Pacific Sandlance
	Marine 2		Geoduck
	Marine 3		
	Marine 4		

Data represented on these maps are subject to rules and regulations delineated by The Washington Department of Fish and Wildlife under POLICY - 5210. This product contains sensitive information as determined by WDFW and should not be distributed.



City of Burien

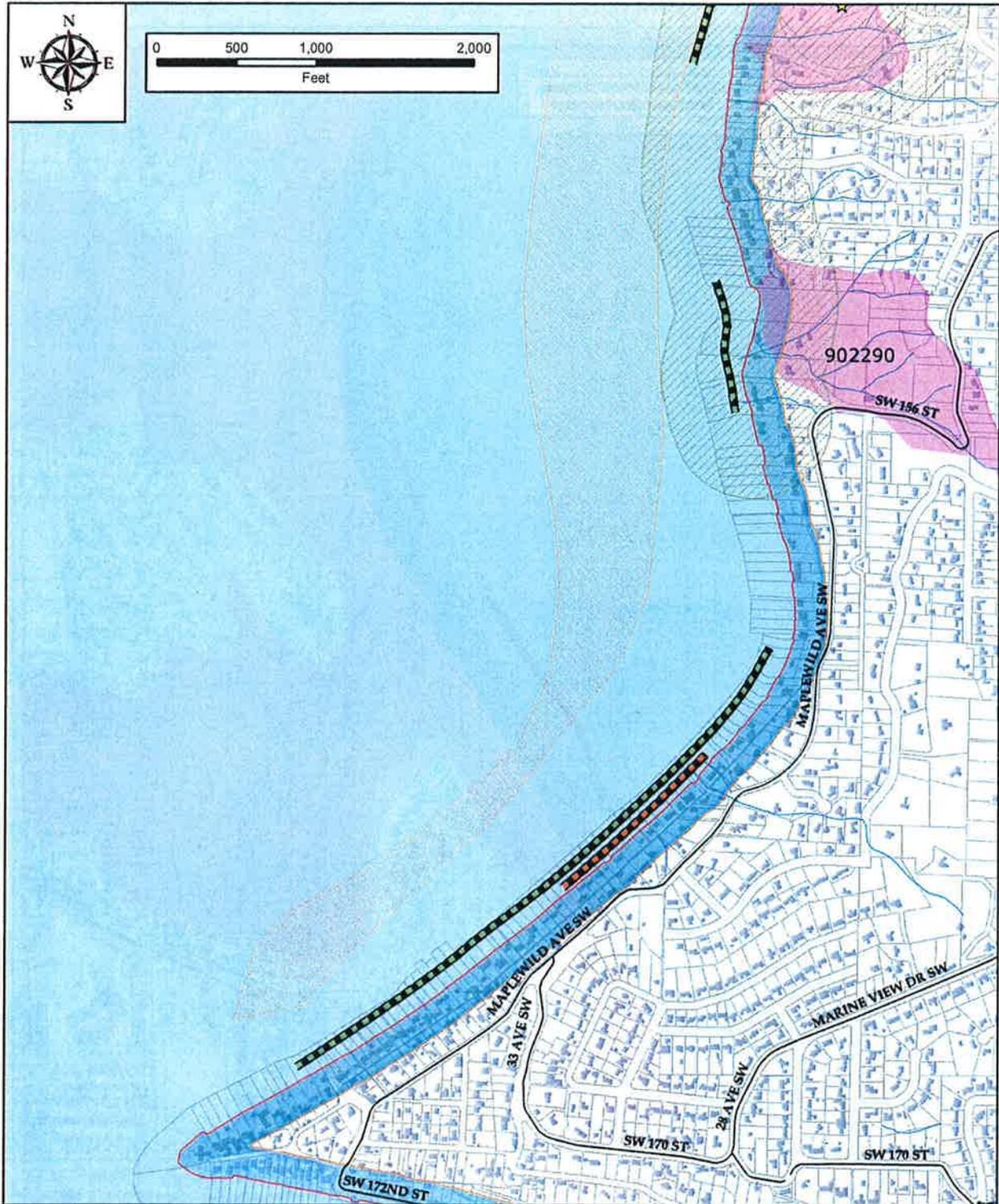
Shoreline Master Program

Fish & Wildlife Habitat Conservation Areas

Marine 2

DATE: May 04, 2013

Figure 9B



	Boundary of Burien		Priority Habitats & Species - WDFW
	Buildings		Heritage Buffer
Reaches			
	Lake Burien		Important Species - WDFW
	Marine 1		Surf Smelt
	Marine 2		Pacific Sandlance
	Marine 3		Geoduck
	Marine 4		

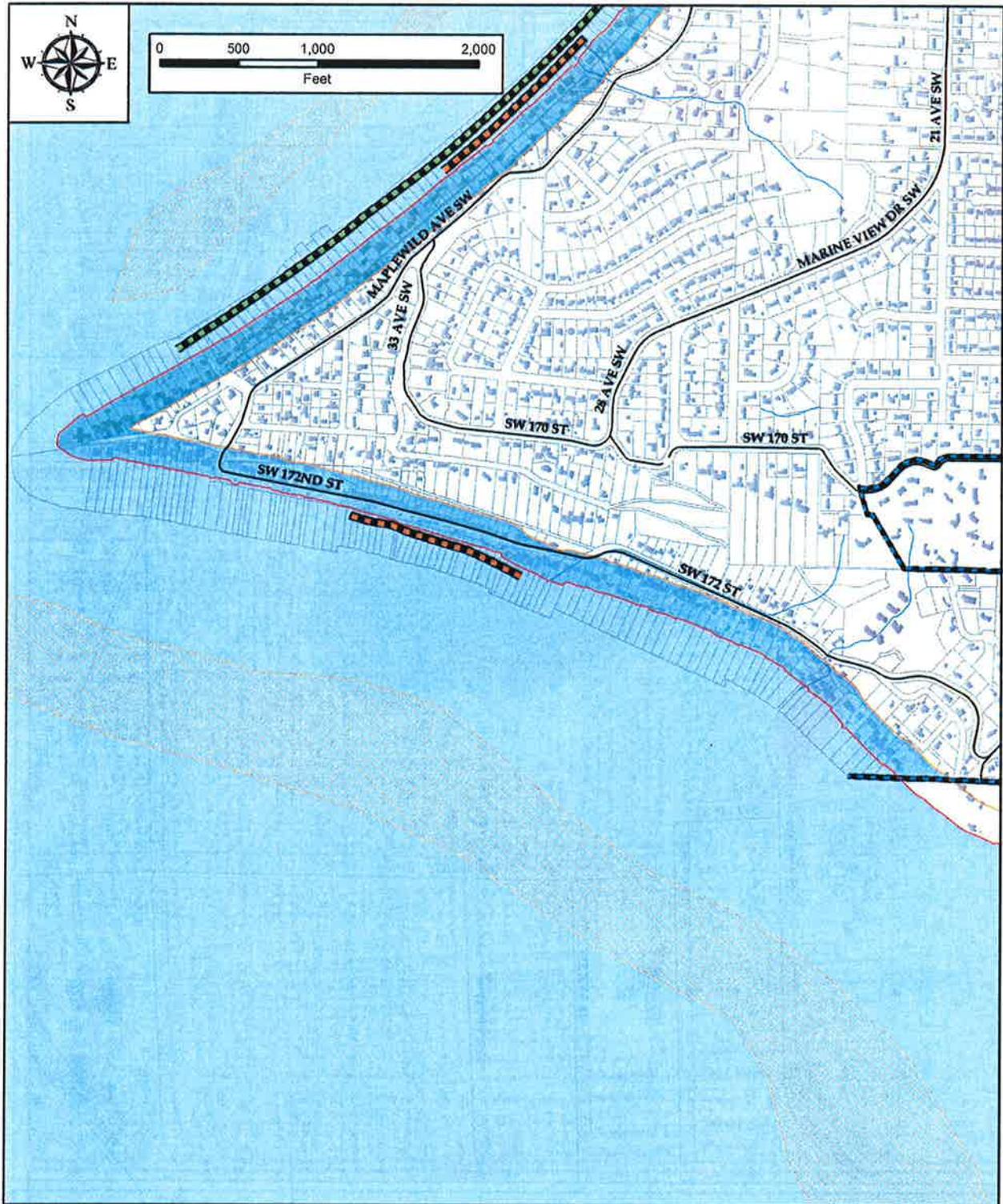
Data represented on these maps are subject to rules and regulations delineated by The Washington Department of Fish and Wildlife under POLICY - 5210. This product contains sensitive information as determined by WDFW and should not be distributed.



City of Burien
Shoreline Master Program
Fish & Wildlife Habitat Conservation Areas
Marine 3

Date: May 04, 2009 Figure 9C

5-64



	Boundary of Burien		Priority Habitats & Species - WDFW
	Buildings		Heritage Buffer
Reaches			
	Lake Burien		Surf Smelt
	Marine 1		Pacific Sandlance
	Marine 2		Geoduck
	Marine 3		
	Marine 4		

Data represented on these maps are subject to rules and regulations delineated by The Washington Department of Fish and Wildlife under POLICY - 5210. This product contains sensitive information as determined by WDFW and should not be distributed.



City of Burien

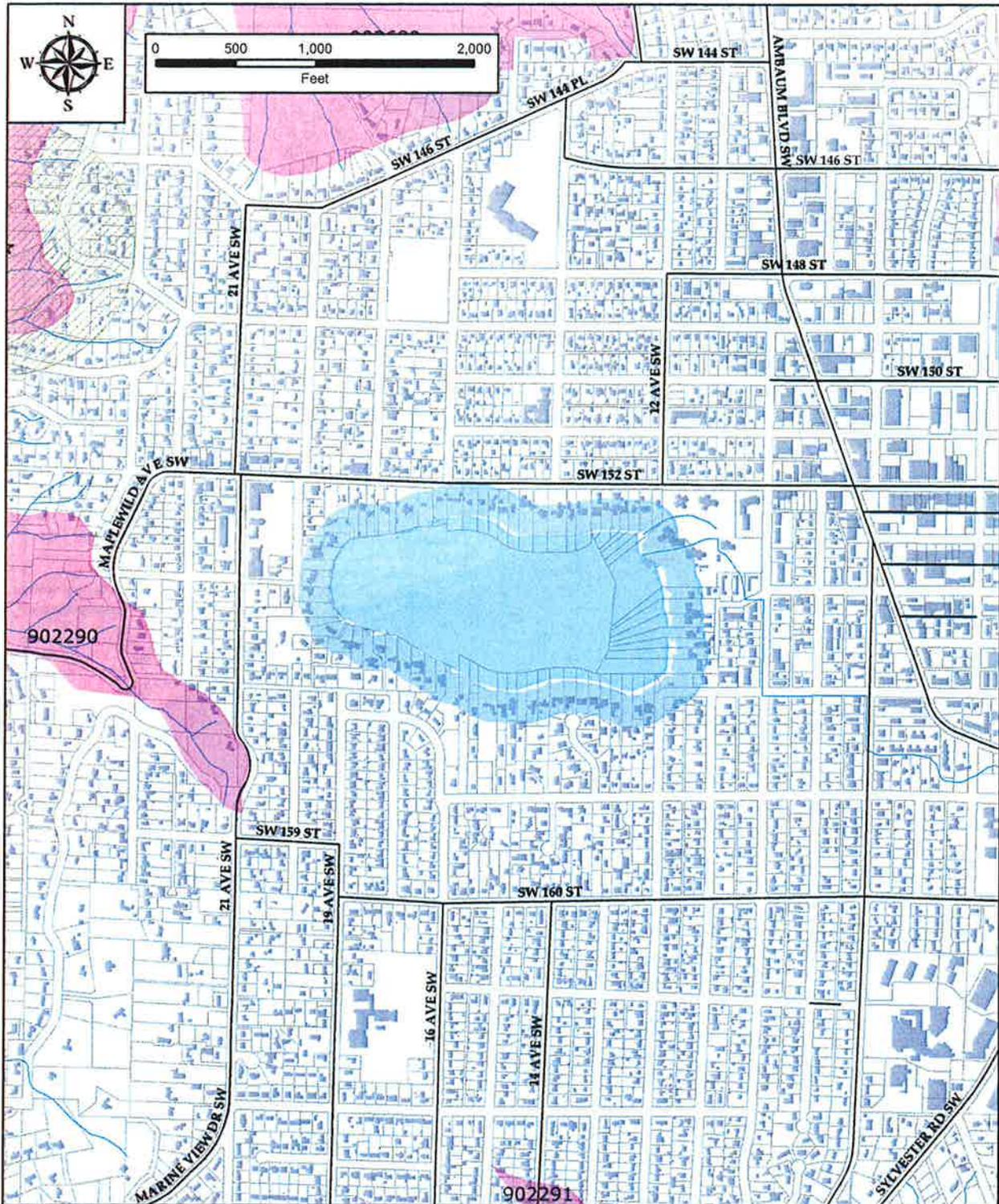
Shoreline Master Program

Fish & Wildlife Habitat Conservation Areas

Marine 4

CSM: Mar 04, 2008

Figure 9D



- | | | | |
|----------------|--------------------|--|------------------------------------|
| | Boundary of Burien | | Priority Habitats & Species - WDFW |
| | Buildings | | Heritage Buffer |
| Reaches | | | |
| | Lake Burien | | Surf Smelt |
| | Marine 1 | | Pacific Sandlance |
| | Marine 2 | | Geoduck |
| | Marine 3 | | |
| | Marine 4 | | |

Data represented on these maps are subject to rules and regulations delineated by The Washington Department of Fish and Wildlife under POLICY - 5210. This product contains sensitive information as determined by WDFW and should not be distributed.



City of Burien

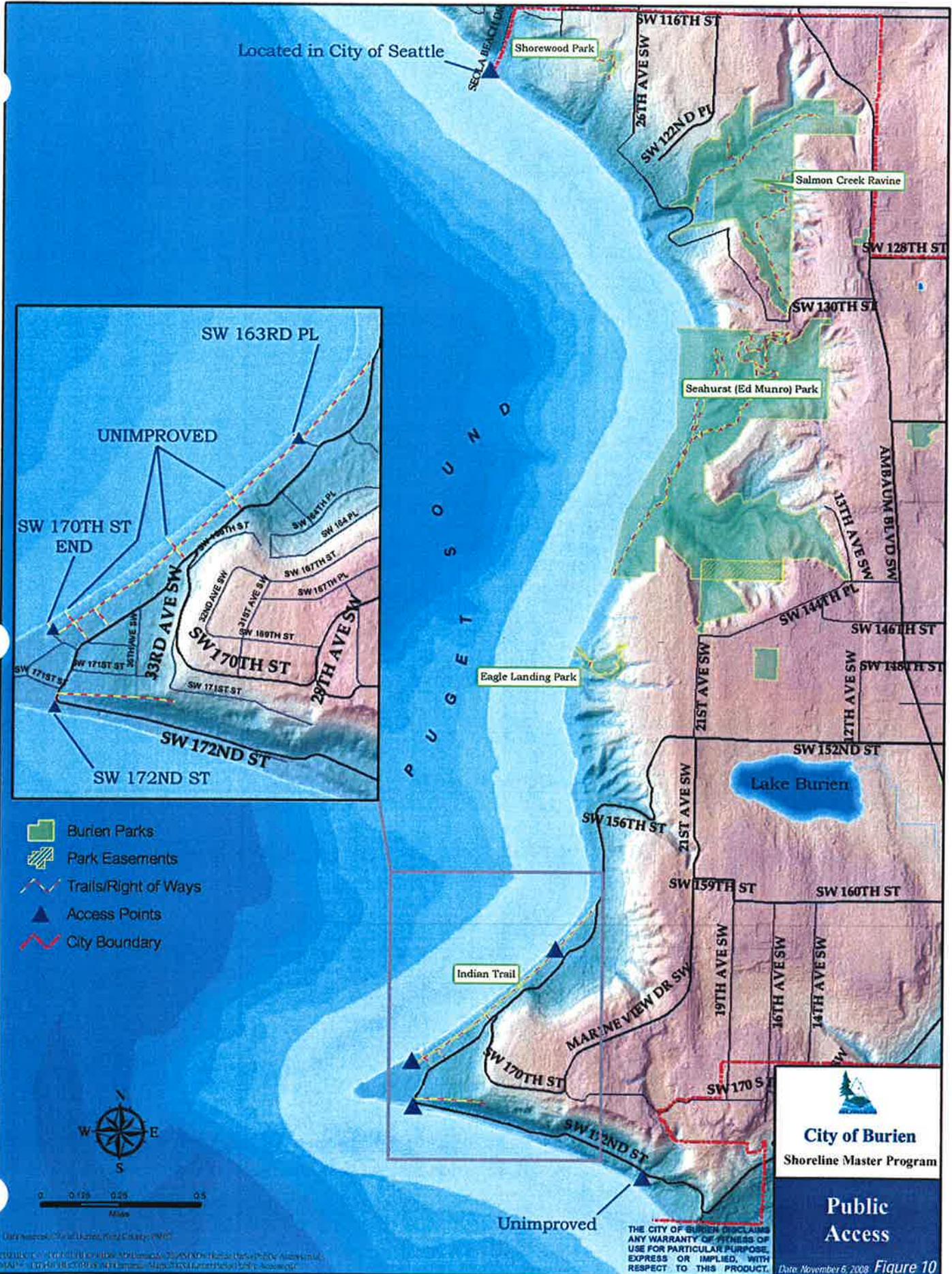
Shoreline Master Program

**Fish & Wildlife Habitat
Conservation Areas**
Lake Burien

DWP 11/04/2009

Figure 9E

5-66



CITY OF BURIEN
SHORELINE MASTER PROGRAM UPDATE

SHORELINE INVENTORY
APPENDIX A: ANNOTATED BIBLIOGRAPHY

A number of information sources were used during the City of Burien Shoreline Inventory. This annotated bibliography is intended to provide readers with a list of the type, source, and use of the information in this report.

Name	Description (as needed)	Source	Applicable Section
CITABLE SOURCES			
Anchor 2002	Literature cited from Section 11 – Bibliography	Anchor Environmental, LLC (Anchor). 2002. Seahurst Park Master Plan. Prepared for the City of Burien. August 2002- as amended through February 2003.	2.11, 4.2
Anchor 2005	Literature cited from Section 11 – Bibliography	Anchor Environmental, LLC (Anchor). 2005. Wetland Delineation for the Vicinity of the Seahurst Park South Seawall Project. Prepared for the City of Burien. April 2005.	3.1
City of Burien 2004	Literature cited from Section 11 – Bibliography	City of Burien. 2004. Salmon Creek Neighborhood Plan. October 2004.	2, 2.1
City of Burien 2006	Literature cited from Section 11 – Bibliography	City of Burien. 2006. The Burien Plan: The Comprehensive Plan for the City of Burien, Washington. November 2006.	2.1
CHE 2007	Literature cited from Section 11 – Bibliography	Coast & Harbor Engineering, Inc. (CHE). 2007. City of Burien Coastal Flood Hazard Zone Delineation-DRAFT. Technical Report Prepared for the City of Burien. June 29, 2007.	3.5
Frankenstein 2000	Literature cited from Section 11 – Bibliography	Frankenstein, G. 2000. Blooms of Ulvoids in Puget Sound. Prepared for The Puget Sound Water Quality Action Team. November 2000.	4.1
Johannessen, MacLennan, and McBride 2005	Literature cited from Section 11 – Bibliography	Johannessen, J.W., MacLennan, A., and McBride, A. 2005. Inventory and Assessment of Current and Historic Beach Feeding Sources/Erosion and Accretion Areas for the Marine Shoreline of Water Resource Inventory Areas 8 & 9, Prepared by Coastal Geologic Services, Prepared for King County Department of Natural Resources and Parks, Seattle, WA. December 2005.	2.1, 4.2, 10
Kerwin and Nelson 2000	Literature cited from Section 11 – Bibliography	Kerwin, J. and Nelson, T. S. (eds.). 2000. Habitat Limiting Factors and Reconnaissance Assessment Report, Green/Duwamish and Central Puget Sound Watersheds (WRIA 9 and Vashon Island). Washington Conservation Commission and the King County Department of Natural Resources. December 2000.	2.1
Wild Fish Conservancy 2003	Literature cited from Section 11 – Bibliography	Wild Fish Conservancy. 2003. Water Type Survey Results for South King County, May/ June 2003. Available on-line at http://www.washingtontrout.org/kcpuget/index.shtml .	2.11

Name	Description (as needed)	Source	Applicable Section
Williams 2008	Literature cited from Section 11 – Bibliography	Williams, Scott. 2008. Personal communication between David Johanson (City of Burien) with Scott Williams (Washington State Department of Archeology and Historic Preservation) regarding cultural and archeological resources. February 14, 2008.	8

Name	Description (as needed)	Source	Applicable Section
GIS LAYERS			
Aquifer Recharge Areas	GIS data	King County, City of Burien	3.2, 10.5
Base Flood Elevation	GIS data	CHE 2007	3.5
Buildings	GIS data	City Burien	2.3
FEMA Flood Plain	GIS data	Federal Emergency Management Agency (FEMA)	3.5
Land Use	GIS data	King County Assessor (January 2008)	1.4, 2.1, 2.3, 9, 10.1-10.5
Parcels	GIS data	City of Burien	1.4, 2.3, 2.4
Priority Habitats and Species, maps/reports	GIS data	WA Department of Fish and Wildlife PHS Office	1.2, 3.1, 3.3, 10.1-10.5
Seismic Hazards	GIS data	King County	3.4, 10.3, 10.4, 10.5
Storm Water Infrastructure	GIS data	City of Burien	2.7, 2.9, 2.10, 10.4
Stream Buffers	GIS data	City of Burien	1.1, 3.1, 3.3, 10.1-10.5
Susceptible Landslide Areas	GIS data	City of Burien	3.4, 10.1-10.5
Water Areas	GIS data	King County, City of Burien	1-5, 7, 10
Water Courses in Burien	GIS data	King County, City of Burien	1-5, 7, 10
Wetlands in and around Burien	GIS data	King County, City of Burien	1.1, 1.2, 3.1, 9, 10.1-10.5

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Name	Description (as needed)	Source	Applicable Section
Zoning	GIS data	City of Burien	1.4, 2.3, 2.4
ON-LINE MAPPERS			
National Wetlands Inventory	Mapper	US Fish and Wildlife Service http://www.nwi.fws.gov	1.1, 1.2, 3.1, 9, 10.1-10.5
WA Digital Coastal Atlas	Including Ecology ShoreZone layers, flood zone data, others	WA Department of Ecology http://www.ecy.wa.gov/programs/sea/SMA/atlas_home.html	1.4, 3, 7, 10.1-10.5
SalmonScape	Salmonid presence and use, forage fish spawning areas, aerial photos	WA Department of Fish and Wildlife http://wdfw.wa.gov/mapping/salmonscaper/index.html	3.3
StreamNet	Salmonid presence and use	StreamNet http://www.streamnet.org/online-data/map_catalog.html	3.3
Washington State 303(d) list	Mapper	Washington State Department of Ecology http://apps.ecy.wa.gov/wqawa/viewer.htm	4.1
King County iMap	Includes King County sensitive areas information, restoration opportunities, tax assessor data, zoning designations, others	King County iMap page http://www.metrokc.gov/gis/mappointal/iMAP_main.htm	2.4, 3, 4.2
Washington Information System for Architectural and Archaeological Records Data (WISAARD)	Mapper and text	Washington State Department of Archeology and Historic Preservation http://www.dahp.wa.gov/pages/wisaardIntro.htm	8
AERIAL PHOTOS			
Ecology Aerial Photos	Aerial photo layer available for visual analysis of shorelines and some measurements	WA Department of Ecology Digital Coastal Atlas, photo layer http://www.ecy.wa.gov/programs/sea/sma/atlas_home.html	1.4, 2, 3, 4

e	Description (as needed)	Source	Applicable Section
Ecology Shoreline Photos	Oblique-view shoreline photo points; most recent photos available from 2006	WA Department of Ecology Digital Coastal Atlas, photo points http://www.ecy.wa.gov/programs/sea/sma/atlas_home.html	1.4, 2, 3, 4
Google Earth Aerial Photos	Photo layer available for visual analysis of shorelines and some measurements	Google Earth program, photo layer; available for download http://earth.google.com/	1.4, 2, 3, 4
SalmonScape	Color digital ortho aerial photos for visual analysis of shorelines and some measurements	WA Department of Fish and Wildlife http://wdfw.wa.gov/mapping/salmonscope/index.html	1.4, 2, 3, 4
OTHER			
Adolfson 2003	Source reviewed, but not cited for this inventory	Adolfson Associates, Inc. (Adolfson). 2003. Limited City of Burien Stream Survey. Memorandum to Pat Smith and Scott Greenburg from Alex Ottley. April 15, 2003.	N/A
City of Burien Municipal Code (except Zoning)	On-line version	Code Publishing On-Line http://nt5.scbbs.com/cgi-bin/om_isapi.dll?clientID=289678&infobase=burien.nfo&softpage=PL_fra	2.2, 2.3, 3.1, 3.4
City of Burien Municipal Code, Zoning	On-line version	City of Burien http://www.ci.burien.wa.us/commdev/omnt/zoning/zoningcodeindex.htm	2.4
Dowty et al. 2005	Source reviewed, but not cited for this inventory	Dowty, P., B. Reeves, H. Berry, S. Wyllie-Echeverria, T. Mumford, A. Sewell, P. Milos and R. Wright. 2005. Puget Sound Submerged Vegetation Monitoring Project: 2003-2004 Monitoring Report. Prepared for the Nearshore Habitat Program, Puget Sound Ambient Monitoring Program. July 2005.	N/A
State Administrative Code and Rules	On-line WAC and RCW	Washington State Legislature http://www.leg.wa.gov/rcw http://www.leg.wa.gov/wac	1.2, 1.3, 3, 5, 7, 9
Water Type Survey Results	Water Type Survey Results for South King County, May/June, 2003	Wild Fish Conservancy http://www.washingtontrout.org/kcpuget/index.shtml	2.6-2.11

5-74a

CITY OF BURIEN
SHORELINE MASTER PROGRAM UPDATE



SHORELINE INVENTORY
APPENDIX B: SHORELINE PHOTO AND GIS ATLAS
SEE FIGURES

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