

CITY OF POULSBO SHORELINE MASTER PROGRAM UPDATE

INVENTORY AND CHARACTERIZATION

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INTRODUCTION

This report is intended to provide baseline information on the existing ecosystem and shoreline processes occurring within the City of Poulsbo's (City) shoreline jurisdiction (Figure 1) to provide a basis for the update of the City's Shoreline Master Program (SMP). This document is supplemental to the Shoreline Inventory, submitted to the Washington State Department of Ecology (Ecology) in November 2009 as part of the SMP update, and incorporates much of the information presented therein. This document describes larger-scale (i.e., watershed) physical and biological processes occurring in the City's shoreline jurisdiction as well as specific shoreline functions based on a shoreline reach analysis. Finally, this report analyzes opportunities for shoreline protection and restoration, as well as public access and shoreline uses, and provides information on specific data gaps or limitations that were identified during the analysis and characterization process.

1.1 STUDY AREA BOUNDARY

The City of Poulsbo, which is 4.67 square miles in area, is located at the north end of Liberty Bay, a glacially-carved inlet of Puget Sound. Exhibit A shows an aerial view of the City and surrounding areas. The 2009 population was 8,855. The shoreline within the City of Poulsbo and its UGA boundaries is approximately 3.93 miles long. Approximately 458 acres of Liberty Bay are within the City and Urban Growth Area (UGA) boundaries. The City's "shoreline jurisdictional area" (i.e., within 200 ft of the shoreline), includes approximately 139 acres, divided into 196 individual parcels.

The shoreline of Liberty Bay is defined as a "shoreline of statewide significance" waterward of the line of extreme low tide (RCW 90.58.030(2)(e)(iii)), extending waterward to the offshore city and UGA limits. The portion of Dogfish Creek that is influenced by saltwater (the estuary area) is also considered to be part of the shoreline. There are no lakes or streams within the City or UGA that qualify as a "shoreline of the state". All portions of wetlands and creeks that are directly hydraulically connected to shorelands are included within the City's shoreline jurisdictional boundary.

Although not required during the SMP update process, the City has also chosen to pre-designate the shoreline environment within its UGA. Therefore, this inventory and characterization addresses approximately 3.93 miles of Puget Sound marine shoreline (Liberty Bay) within the city limits and UGA of the City of Poulsbo. Pre-designation of the shoreline environment within the UGA is based on several determining factors. The remaining UGA is very small and it is not anticipated that the shoreline UGA will be expanded in the next seven-year planning cycle, although it is likely that the remaining UGA shoreline will be incorporated. The existing Interlocal Agreement between the City and Kitsap County has applied City zoning designations and City development standards to the remaining unincorporated UGA, including shorelands. Additionally, the City and County are currently negotiating an ILA that would transfer all permit processing for the UGA to the City.

For these reasons, pre-designating the remaining shoreline UGA in the City's SMP update appears to be both practical and reflective of likely annexations within the planning period.

However, until the unincorporated shoreline UGA is incorporated or the City and County enter into a ILA for permit processing, jurisdiction for permitting in this area will remain with the County.

In areas where the City or the UGA are located on both sides of the bay, the entire bay is within the City's jurisdiction. Where the City jurisdiction is on one side, and non-UGA County area on the other side, the City's jurisdiction extends to the midpoint of the bay. The overall shoreline jurisdiction is shown on Exhibits A (Aerial with Shoreline Jurisdiction) and B (Jurisdictional Area). It should be noted that the parcels shown on the Inventory and Characterization's exhibit maps include only upland parcels (i.e., those located landward of the ordinary high water mark), and do not include the public and private tidelands and submerged lands of Liberty Bay.

1.2 METHODOLOGY

The purpose of this document is to provide baseline information regarding City shorelines in order to inform the SMP update. It is intended to integrate information from a number of existing sources in order to address the requirements of the Shoreline Management Act (SMA), and to identify gaps for which existing information is not available. It relies heavily on adaptation of existing information and analyses of City shorelines. New data gathering and extensive re-analysis of existing data are outside of the scope of the City's SMP update; however, the tidal portion of Dogfish Creek was redelineated by a professional stream biologist (C3 Habitat Corp.) due to significant changes in stream channel location and flow since the creek was last mapped in 1977 (Exhibit X).

This document addresses City shorelines at two different spatial scales: regional and reach. Regional information is largely in narrative form and comes from documents addressing conditions at Water Resource Inventory Area (WRIA), County, watershed, or basin level. In particular, *Liberty Bay Nearshore Habitat Evaluation and Enhancement Project* (referenced hereafter as "Liberty Bay NHEEP", May et al. 2005) provides an excellent source of information on the natural history, existing condition, and shoreline functions of Liberty Bay, and was completed with the intention of providing information in support of SMP updates. Other sources from which regional-scale information were drawn include:

- *City of Poulsbo Draft Comprehensive Plan* (City of Poulsbo 2009)
- Kitsap Basin (WRIA 15) *Watershed Planning Initial Basin Assessment* (Ecology 1997) and *Level 1 Assessment* (Golder Associates 2002)
- *Willamette Valley-Puget Trough-Georgia Basin Ecoregional Assessment* (Floberg et al. 2004)
- *Kitsap Salmonid Refugia Report* (May and Peterson 2003)
- *Salmonid Habitat Limiting Factors WRIA 15 (East)* (Haring 2000)

Reach scale information is largely based on geospatial data available in map format, as summarized in the Shoreline Inventory. Additionally, aerial photos, site visits, and institutional knowledge within the City all were used to supplement information at the reach scale. City shorelines were included in *East Kitsap County Nearshore Habitat Assessment and Restoration Prioritization Framework* (referenced hereafter as “East Kitsap Nearshore Assessment”, BMSL 2009), which included analyses at both drift cell and smaller Nearshore Assessment Unit (NAU) scales. As with the Liberty Bay NHEEP, the East Kitsap Nearshore Assessment was intended to provide information in support of SMP updates.

In order to best use limited grant resources, this Inventory and Characterization is focused on reach-scale analysis of conditions and opportunities within the City shorelines. Regional information is presented within the context of City shorelines where it is available from the sources listed above, but will not be the sole source of information used by the City during the SMP update process. Kitsap County is conducting its SMP update concurrent with the City effort, and will prepare a county-wide assessment of regional conditions including watershed processes and shoreline functions. The City will supplement the regional information provided herein with additional information as it becomes available during the SMP update process.

1.3 REPORT ORGANIZATION

This report is organized to correlate with requirements of Shoreline Management Act (SMA), Revised Code of Washington (RCW) 90.58, and its implementing guidelines in Washington Administrative Code (WAC) 173-26. It is intended to review large-scale information, and scale down sequentially to smaller reaches (reaches defined below in Section 1.4). This approach combines the requirement outlined in WAC 173-26-201(3)(d), Ecology’s draft SMP Handbook Chapter 7 *Shoreline Inventory and Characterization* (Ecology 2009), and Ecology’s guidance document *Protecting Aquatic Ecosystems: A Guide for Puget Sound Planners to Understand Watershed Processes* (Stanley et al. 2005).

1.4 SHORELINE REACHES

During the inventory process, the City of Poulsbo divided the shoreline into “planning segments” based upon the existing development patterns along the shoreline (Table 1 and Exhibit C). These segments were not defined based on shoreline drift cells or the finer-scale nearshore assessment units (NAUs) identified during the East Kitsap Nearshore Assessment (BMSL 2009); however, because land use often develops as a function of conditions driven by shoreline physical processes, these segments correspond relatively well with the shoreline drift cells and remarkably well with the finer-scale NAUs, as described below.

Except for the two NAUs at the ends of the City’s shorelines, the entire shoreline is comprised of two drift cells (Table 1, Exhibit O). Drift cell 67 is the area of no appreciable drift (NAD) associated with the mouth of Dogfish Creek; by length, this drift cell comprises the majority of the City’s shoreline (13,381 ft). The other drift cell within the City is drift cell 95 (3,214 ft) which is a left to right drift cell (sediment transport toward Dogfish Creek) and is relatively short in comparison to drift cell 67. Small areas of two other drift cells exist at the ends of City shorelines. Drift cell 66 (11,680 ft, of which 2,347 ft is in the City/UGA) is a right to left drift

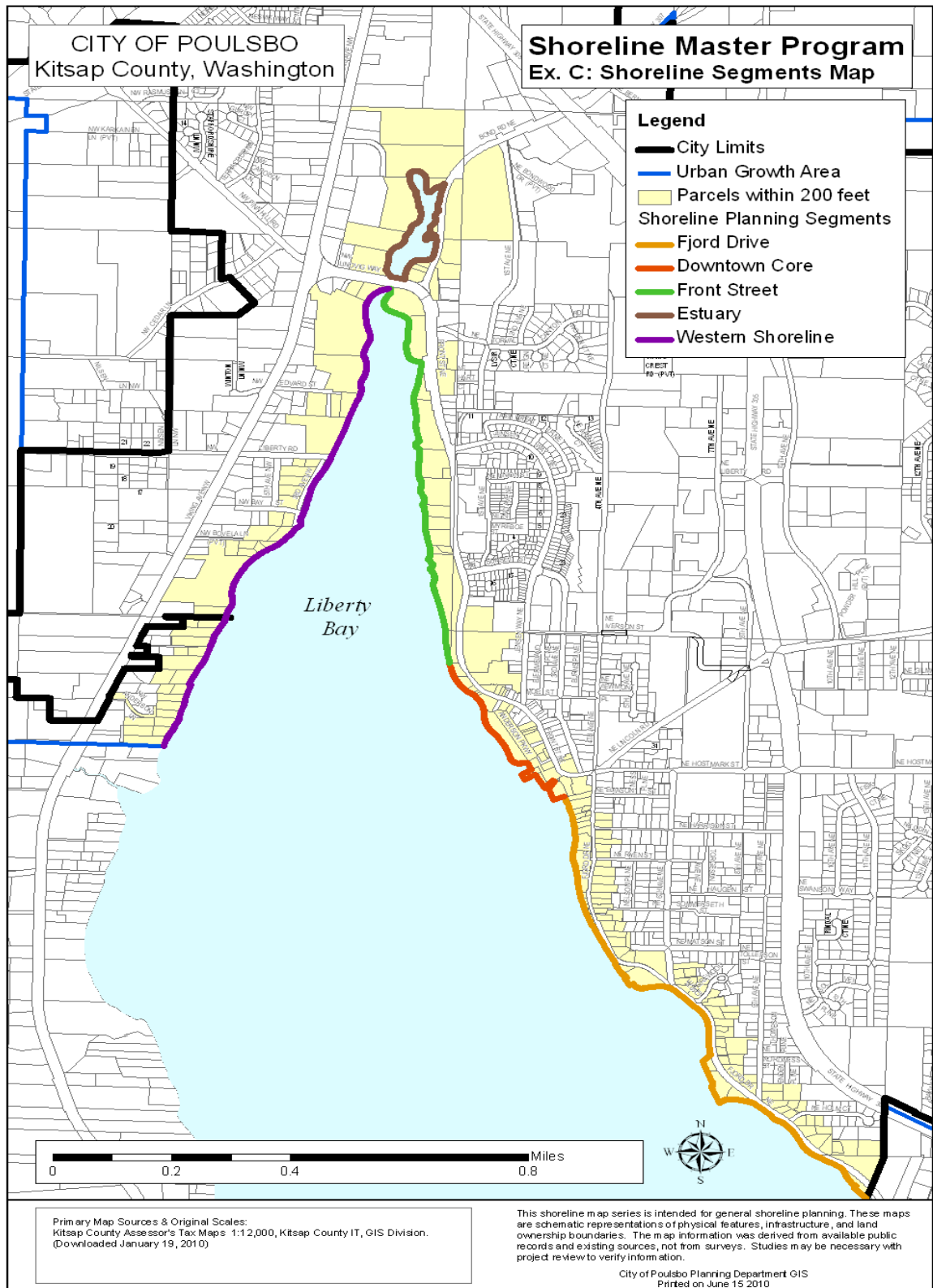
cell (sediment transport toward Dogfish Creek) which begins further south in Liberty Bay. Finally, drift cell 68 (2,786 ft, of which 1,627 ft is in the City/UGA) is another relative short drift cell which is a divergence zone between areas of opposite sediment transport.

The Fjord Drive planning segment (see Exhibit C, page 6) corresponds well with the area of left to right sediment transport within the City. Most of the remainder of the City is within an area of no appreciable drift, with the exception of the far western shoreline where drift cell 66 contributes to some right to left sediment transport. In these cases, the planning segments correspond well to shoreline features and processes (e.g., vegetation, embayments, slope type) and condition (e.g., level of development). This is supported by the fact that the breaks between planning segments all correspond well to breaks between NAUs (within one parcel), except at the end of the City's jurisdiction to the west.

Because the planning segments correspond well to shoreline processes (e.g., sediment transport) and conditions, continued use of those segments in reach analysis allows for continuity within the SMP update process. It also allows Poulsbo to conduct its analysis and characterization within the context of the analysis already completed as part of the East Kitsap Nearshore Assessment, which was specifically intended to be used as a tool during SMP updates. Therefore, the areas defined as planning segments have been designated as reaches for the analyses in this document. In order to acknowledge that planning segments and reaches have separate and distinct purposes, the reaches are always referenced using the designations in Table 1, sometimes using the planning segment name parenthetically to provide more specific geographic context. For example, "Marine Reach 1 (Fjord Drive planning segment) is the longest shoreline reach within the City". In this document, the general term "reach" always applies to the reaches identified in Table 1. To avoid confusion with other studies, when sections of shoreline (reaches, segments, units) defined elsewhere are referenced, the source document is referenced as well. For example, "NAU 3451 (East Kitsap Nearshore Assessment) is the only portion of drift cell 68 in Poulsbo shorelines".

Table 1. Shoreline inventory reaches in the City of Poulsbo.

Designated Reach (Planning Segment)	Description	Approx. Length (ft)	Approx. Length (mi)	East Kitsap NAU (Drift Cell)
Marine Reach 1 (Fjord Drive)	This area extends from the south end of the Marine Science Center property to the end of the Poulsbo city/UGA boundary. The Fjord Drive shoreline primarily consists of single-family residential development. Two marinas (Poulsbo Yacht Club and Liberty Bay Marina) are also located in this segment.	5,560	1.05	3451 (68), 3450 (95), 3449 (95), 3448 (95), 3447 (95), 3446 (67)
Marine Reach 2 (Downtown Core)	This area corresponds to the City's Downtown Core (DC) zoning overlay area, and includes the City's historic downtown waterfront, which is primarily commercial. The Poulsbo Marina is also located in this segment. For the shoreline, the area evaluated lies generally between the south end of the American Legion waterfront park and the Marine Science Center.	2,245	0.43	3445 (67), 3444 (67)
Marine Reach 3 (Front Street)	This area extends from American Legion park north to Lindvig Way on the eastern shoreline of the bay. The Front Street shoreline is characterized by single-family residential development, and limited commercial development (primarily near the head of the bay).	4,220	0.84	3443 (67), 3442 (67)
Marine Reach 4 (Estuary)	This area, lying north of Lindvig Way, includes the tidally-influenced mouth of Dogfish Creek at the head of the bay, and associated stream and wetland areas. This area contains a large portion of Fish Park, single-family residential development, and limited commercial development near the intersection of Bond Rd and Lindvig Way.	3,170	0.60	3441 (67), 3440 (67), 3439 (67)
Marine Reach 5 (Western Shoreline)	This area extends from Lindvig Way south to the end of the Poulsbo City/UGA boundary. The western shoreline has single-family and multi-family residential development, as well as some limited commercial and assisted living uses.	5,375	1.02	3438 (67), 3437 (67), 3436 (67), 3435 (66)
	Total Jurisdictional Shoreline	20,770	3.93	



ECOSYSTEM CONTEXT

Liberty Bay, including its estuary at the mouth of Dogfish Creek, is the major body of water in Poulsbo. Relatively narrow and shallow, the Bay serves as the receiving waters for Dogfish Creek, as well as a number of other streams at the edges of the city limits. Dogfish Creek is the largest stream system in Poulsbo and extends into multiple forks and tributaries spanning an area of approximately 4,700 acres outside of the city limits. None of the streams within the City are under SMA jurisdiction based on flow rate, although a portion of Dogfish Creek at the mouth of Liberty Bay (estuary) is under SMA jurisdiction based on tidal influence. In order to place the jurisdictional marine shorelines within an ecosystem context, the following subsections describe the natural and development characteristics of the larger watershed.

City shorelines are entirely within the greater Liberty Bay watershed. Sub-watersheds and shorelines draining directly to marine areas are described in the Liberty Bay NHEEP. With the exception of the area at the mouth of mouth of Dogfish Creek, City shorelines fall into the latter category.

2.1 WATERSHED NATURAL CHARACTERISTICS

2.1.1 Precipitation

Climate and precipitation information are discussed in a number of WRIA 15 documents (Ecology 1997, Harring 2000, Golder Associates 2002). Kitsap County typically experiences short, cool, dry summers and longer, mild, wet winters. The majority of rainfall occurs from November through April. The Poulsbo subarea receives an average annual rainfall of 37 inches. Snow has little or no influence on seasonal hydrology in this region.

2.1.2 Vegetation

Watershed-scale vegetation information is discussed in the Liberty Bay NHEEP and May and Peterson (2003). In the Liberty Bay watershed, uplands were historically forested with native conifers and patches of native hardwoods. Urbanization within the watershed has reduced forest cover by about half. Within the Dogfish Creek watershed, the north, east, and west forks of the creek retain over 60% natural forest cover. By contrast, the south fork draining much of the City retains less than 30% natural forest cover, and has over 40% total impervious surface. Vegetation-related stressors within in the watershed include urbanization, agricultural uses, riparian fragmentation, floodplain modifications, and increased impervious surface. Relative to other watersheds within WRIA 15, Dogfish Creek watershed is among the lowest scoring for both total forest cover and riparian quality.

Shoreline vegetation in Liberty Bay has been greatly affected by development, including urbanization within the City. Roads, residences, parks, marine facilities, commercial and industrial uses have all altered shoreline vegetation presence and cover, particularly within the City itself. Invasive species, including English ivy (*Hedera helix*) and Himalayan blackberry (*Rubus armeniacus*) are present in many disturbed areas. Restoration of native shoreline vegetation was completed along approximately 7,500 lineal feet of Liberty Bay as part of the

Liberty Bay NHEEP. Restoration was completed in at least three noncontiguous areas, including shoreline stretches with Marine Reaches 1 (Fjord Drive planning segment) and 3 and 4 (Front Street and Estuary planning segments).

2.1.3 Surficial Geology and Soils

Soils information was primarily derived from the *Soil Survey of Kitsap County, Washington* (McMurphy 1980). The soils of Kitsap County formed mainly in glacial drift deposited by the most recent several continent-sized glacial ice sheets. This 3,000-foot thick glacier, emanating from Canada, formed most of the topography and waterways of the area between 13,000 and 15,000 years ago. The predominant deposit, and therefore parent soil material, is glacial till. It generally consists of compact basal till covered by a thin discontinuous layer of ablation till. The Kapowsin, Poulsbo and Sinclair soils, prominent soils in Poulsbo, were formed in this till material. Underlying these glacial deposits is sediment deposited during previous glacial or interglacial periods. This sediment, generally exposed only on sea cliffs, consists primarily of stratified clay, silt, sand and gravel. Where this deposit has glaciolacustrine¹ properties, Kitsap soils formed. Kitsap soils are prominent soils on the eastern shoreline of Liberty Bay, and north of Hostmark to Bond Road. Potentially geologically hazardous areas, characterized as mapped unstable slopes or unstable recent slides, are places highly susceptible to erosion, landslides, earthquakes, or other geologic events. In Poulsbo, the most hazardous of these areas are typically found along the marine shorelines and stream ravines along the eastern shoreline (Table 2). A large area of contiguous hazard areas is mapped through much of Front Street and Estuary planning segments, and a smaller area occurs at the north of the Fjord Drive planning segment. This area includes the Fjord Drive landslide that occurred on November 19, 2009. The landslide has resulted in reduction of the road to local access only, single-lane, one-way traffic on Fjord Drive between 6th Avenue and Hostmark Street. This situation is considered to be temporary but it is not known when the road will be repaired, or if it will be restored to its previous configuration and function.

Table 2. Geologically hazardous areas in City shorelines, by reach.

Planning Segment	Potential hazard areas
Marine Reach 1 (Fjord Drive)	Two unstable recent slides are mapped at the north end of this planning segment (both 15 to 30 percent slope) ^{1,2} . Both occur in mostly Poulsbo gravelly sandy loam, although the smaller one also includes some Urbanland-Alderwood complex soil. This is also the area of the November 19, 2009 Fjord Drive landslide. There is also a mapped intermediate slope area (0 to 6 percent slope) ¹ .
Marine Reach 2 (Downtown Core)	No mapped potential hazard areas or intermediate slopes are mapped in this planning segment ^{1,2} .

¹ Glaciolacustrine deposits and subsequent soil properties were created by temporary lakes that formed when glaciers were melting. These deposits usually have a high concentration of fine-grained soil.

Marine Reach 3 (Front Street)	The majority of this segment is mapped as a series of contiguous potential geological hazard areas including both unstable slopes and unstable recent slides. Soils are mostly Kitsap silt loam with some Urbanland-Alderwood complex soil. Slopes in the hazard areas are mostly 15 to 30 percent with some areas of 2 to 8 percent. This series of hazard areas extends north into Marine Reach 4.
Marine Reach 4 (Estuary)	Much of the southwest area of this reach north of the Lindvig Way bridge is mapped as a series of contiguous unstable slopes. Over half of the potentially hazardous area is a single unstable slope extending north from Marine Reach 3, which is Kitsap silt loam (15 to 30 percent slope). Soil types in other unstable areas include more Kitsap silt loam, Urban-Alderwood complex, Kapowsin variant gravelly clay loam (typically 0 to 15 percent slope with one small area of 30 to 45 percent slope). There also are intermediate slope areas that are typically set back from the shore, but in jurisdiction. Soil types include Kitsap silt loam (8 to 15 percent slope) and Kapowsin variant gravelly clay loam (0 to 5 percent slope).
Marine Reach 5 (Western Shoreline)	No mapped potential hazard areas or intermediate slopes are mapped in this planning segment ^{1, 2} .

¹ Data, including slope and soil unit, derived from City of Poulsbo GIS analysis.

² Data derived from Ecology Digital Coastal Atlas.

Areas of mapped geologically hazardous areas are shown on Exhibit H.

2.1.4 Topography

As described in the City's comprehensive plan, Poulsbo's landscape is typical of North Kitsap County, with numerous hills and valleys, streams and frontage on the waters of Puget Sound. Elevations range from sea level to 440 feet, with moderate to steep slopes. Two ridges run along each side of Liberty Bay and gradually rise in elevation to the north, accentuating the general topographic trend in Poulsbo. The west leg of the ridge slopes gradually toward Liberty Bay, while the eastern leg slopes in a broken pattern of knolls, valley and benches to the eastern shore.

2.2 LAND USE

2.2.1 Historic

The first settlers arrived, in what became the Town of Poulsbo, in the mid-1880s and were primarily of Norwegian descent. The early community economy was based on farming, fishing and logging. Poulsbo became incorporated as a town in January 1908 and as a city in June 1913.

The buildings constructed during the City's first 50 years were concentrated on the east side of Liberty Bay, along the waterfront and its immediate ridgeline. Many of the original buildings were destroyed in the great fire of 1914, but several structures still remain from that initial building period. During those early years, water was the primary method of travel. Supplies were brought the eighteen-mile trip from Seattle by rowboat and later by steamboat.

Poulsbo experienced a major and permanent change during World War II when some 300 residential units were constructed near the center of Poulsbo by the military for defense workers at the nearby naval installations. Prior to the war, Norwegian was the predominant language spoken in Poulsbo; however, that changed forever as the population tripled in a three-year period.

In the mid-1970s, Poulsbo underwent a second major change with the arrival of the Trident nuclear submarines at the Bangor Naval Submarine Base installation, six miles west of the city. To meet the impacts caused by the dramatically increased population, the city's sewer, water and street systems were upgraded with the assistance of federal grant funding.

The initial resource-based economy, which had dominated the City's waterfront with warehouses, processing plants and docks, gradually disappeared as the city became more urban, and decreased demand and rising costs for timber and fish products made those industries less viable. The City became primarily residential, and a "bedroom community" for many residents who commuted daily to work in Seattle and nearby areas.

2.2.2 Current

Today, Poulsbo is primarily a residential community, and the waterfront reflects this status with the majority of shoreline property zoned and developed for residential use (see Exhibits D and E). Along the shoreline, there are currently 106 single-family homes and 400 multi-family units.

At this time, approximately 88% of the City/UGA shoreline is developed in some manner, and 12% remains undeveloped. Pre-development nearshore habitat included evergreen and deciduous forest and tidal wetlands. Residential shoreline areas south of Hostmark Drive have generally been less modified. A public marina (Port of Poulsbo), the Poulsbo Yacht Club, and a private marina (Liberty Bay Marina) are also located on the eastern shoreline. The western shoreline (5,355 ft long) is more gently sloped and is primarily low-bank, with residential uses. It is not as developed as the eastern shoreline and has less shoreline modification and armoring.

3 WATERSHED PROCESSES

Ecology's *Protecting Aquatic Ecosystems: A Guide for Puget Sound Planners to Understand Watershed Processes* guidance (Stanley et al. 2005, referenced hereafter as *Protecting Aquatic Ecosystems*) provides a framework for assessing important watershed processes. The six processes addressed by this guidance are the delivery, movement, and loss of water, sediment, phosphorus and toxins, nitrogen, pathogen, and large woody debris within a watershed. This guidance has been recommended by Ecology to fulfill the regional-scale analysis of shoreline process and function during the SMP update process.

As described in Section 1.2, in order to best use limited grant resources this document focuses on the reach analysis. Watershed-scale (regional) analysis has been limited to what can be reasonably inferred from the documents and information gathered during the Inventory phase of the SMP update. The City will be able to supplement this information with pertinent regional analyses conducted as part of the Kitsap County SMP update and Ecology's analysis of watershed processes for marine shorelines in Puget Sound.

Because Poulsbo's shorelines are almost entirely marine, the six watershed processes have variable degrees of influence on shoreline function. Additionally, the majority of the Liberty Bay watershed, both shorelines and uplands, is outside of the City's jurisdiction. For each process addressed below, relative importance of each watershed process for influencing Poulsbo's shorelines is assessed. This is followed by a brief discussion of delivery, movement, and loss of each process component within the watershed. Finally, potential alterations of those processes are assessed as much as possible based on inventory information. This assessment has been completed using modified tables describing indications of alteration based on *Protecting Aquatic Ecosystems* appendices. This approach is intended ensure that all six watershed processes have been considered despite the limited nature of the assessment.

Information in this section is largely drawn from the Salmonid Habitat Limiting Factors analysis (Haring 2000), with other documents referenced as noted.

3.1 WATER

Because the City's shorelines are almost entirely marine, water movement is primarily controlled by tidal exchange rather than by freshwater flow. Because of this, the importance of the larger watershed process is relatively low for informing shoreline function within the City. Delivery, movement, and loss of water within larger watershed are described briefly below, based on best available information; a complete analysis of water processes within the Liberty Bay watershed is beyond the scope of this Inventory and Characterization document.

Freshwater delivery from precipitation is described in Section 2.1.1. The majority of rainfall occurs November through April, and average annual rainfall is 37 inches. Snow has little or no influence on seasonal hydrology. Tidal movement delivers marine waters into Liberty Bay.

As described in the Liberty Bay NHEEP, surface water drains to Liberty Bay via 12 smaller sub-watersheds, as well as a number of shoreline areas with direct run off to the Bay. There are also

a number of aquifer recharge areas that receive and store water within the Liberty Bay watershed, as well as wetlands and areas of hydric soils.

Most of the City's shorelines are included in those areas with direct run off (including small unnamed drainages and outfalls). City shorelines also receive all of the water from Dogfish Creek. Freshwater input from other larger drainages adjacent to the City, including Johnson Creek, Big and Little Scandia Creeks and Barrantes Creek also may affect surface water along City shorelines. City shorelines are primarily developed, which substantially decreases their capacity for surface water storage. The Dogfish Creek estuary likely maintains some of this capacity, as may some of the smaller drainages, but most of the developed shoreline more likely runs off into Liberty Bay either overland or by way of the City's storm drain system. Some groundwater recharge may occur, particularly around the aquifer recharge areas in Marine Reach 4 (Estuary planning segment).

Within the Liberty Bay watershed, some amount of water loss would be expected from evaporation and transpiration, however the majority of surface water loss is more likely due to drainage to Liberty Bay. Once water has drained to marine areas, tidal processes become the dominant mechanism in its movement, including export outside of Liberty Bay. At the City scale, tidal export would by far be the dominant form of water loss.

A number of the causes of change and indicators of alteration described in Table B-3 of Protecting Aquatic Ecosystems are present in the Liberty Bay watershed, in particular those related to development along stream and wetland corridors. These indicate that water movement, particularly surface and shallow sub-surface movement, has been altered in this system. However, as stated previously, water movement within shoreline areas is primarily controlled by tidal exchange rather than watershed-processes. Therefore, watershed-scale alterations are unlikely to significantly affect shoreline conditions.

Table 3. Indicators of altered water delivery, movement, and loss within the Liberty Bay Watershed.

Component of Process	Sub-Component	Indicators of Alteration	Present in Liberty Bay Watershed
Delivery	Climate	(none included in Protecting Aquatic Ecosystems Table B-3)	Not evaluated ¹
	Precipitation	Non-forested vegetation in rain-on-snow zones	No
Movement	Surface, overland flow	Watershed imperviousness Stormwater discharge pipes Drainage ditches in seasonally saturated areas Loss of seasonally saturated areas	Yes
	Surface, storage	Loss of depressional wetlands Straight-line hydrography in depressional wetlands Straight-line hydrography of stream reaches with floodplains Dikes and levees on stream reaches with floodplains Dams	Yes
	Below surface, shallow subsurface flow	New construction Land uses with impervious cover on geologic deposits of low permeability Non-forested vegetation on geologic deposits of low permeability	Yes
	Below surface, recharge	Non-forested vegetation on geologic deposits of high permeability Land uses with impervious cover on areas of high permeability Utility lines Septic systems Unlined irrigation canals	Yes
	Below surface, vertical and lateral subsurface flow	Drawdown patterns Baseflow trends	Not evaluated ²
	Below surface, subsurface storage	Constantly wet road ditches	Not evaluated ²
	Return to surface, discharge	Well locations pumping rates and volumes	Not evaluated ²
Loss	Evaporation	(none included in Table B-3)	Not evaluated ¹
	Transpiration	Land cover	Yes
	Streamflow out of basin	Diversion structures	Not evaluated ²
	Groundwater flow out of basin	Baseflow trends Well locations, pumping volumes	Not evaluated ²

¹ Where climate is the major natural control, evaluation of these indicators is beyond the scope of regional analyses (Stanley et al. 2005).

² Evaluation of these indicators is beyond the scope of the City's Inventory and Characterization. The City will utilize Watershed Process analyses completed by Kitsap County as part of their SMP update, and by Ecology specifically for Puget Sound marine shorelines, to inform water processes and indicators of alteration.

3.2 SEDIMENT

Because the City's shorelines are almost entirely marine, the watershed-scale sediment processes are somewhat less important to inform City shoreline function than are the reach-scale sediment processes described in Section 4. However, sediment processes in Dogfish Creek certainly affect conditions at the head of Liberty Bay, and processes elsewhere in the watershed, particularly in the northern area, may also have some effect on City shoreline sediments. Delivery, movement, and loss of sediment within larger watershed are described briefly below based on best available information with a focus on Dogfish Creek; a complete analysis of sediment processes within the Liberty Bay watershed is beyond the scope of this Inventory and Characterization document.

Sediment delivery into Liberty Bay tributaries likely occurs through all three mechanisms described in Protecting Aquatic Ecosystems (Table 3). According to Haring (2000), "Soils in many of the creek corridors in the Liberty Bay/Miller Bay watershed are prone to slumps, slides, or severe water erosion". Subwatershed analyses in that document indicate that this is true in the Poulsbo vicinity, including in Dogfish Creek where a number of the indicators of alteration described in Table B-4 of Protecting Aquatic Ecosystems are present. Development has resulted in vegetation alteration and increased road density in most of the subwatersheds, both of which may contribute to altered sediment processes.

Particularly in Dogfish Creek, sediment processes have been altered to the extent that some areas are sediment starved in places (excised to hardpan) where others have been subject to heavy deposition of fine material (Haring 2000). The mouth of Dogfish Creek was historically constrained by an undersized culvert at Lindvig Way, resulting in extremely high sediment loads in the estuary upstream of the culvert. In 2003 the City replaced the culvert with a bridge and substantially increased the channel width at this location (Lund, pers. comm.). Since then, both tidal flux and creek outflow have been somewhat restored. City personnel have anecdotally reported improved sediment transport out of the upper estuary, as indicated by the development of more natural channel patterns both above and below Lindvig Way.

Within City shorelines, the areas at the head of Liberty Bay have the most potential to be influenced by greater watershed sediment processes. After many decades of restricted sediment transport due to the undersized culvert, sediment transport in the estuary around the Lindvig Way bridge is likely still normalizing. This could result in net sediment transport out of the upper estuary into Liberty Bay. Based on the anecdotal observations described above, concern exists about the potential for this material to interfere with navigation within the bay and its many marinas. However, sediment movement within remaining shoreline areas is primarily controlled by longshore drift.

Longshore drift is not addressed within the guidance document Protecting Aquatic Ecosystems: A guide for Puget Sound Planners to Understand Watershed Processes, which is focused on watershed rather than marine shoreline processes. As described in Section 1.4, the majority of the City shoreline (65 percent) is the area of no appreciable drift (NAD) associated with the mouth of Dogfish Creek. As described above, near the head of the bay sediment transport likely more influenced by watershed processes as sediment is delivered from Dogfish Creek. Further away from the Creek little if any larger-scale sediment transport is likely to occur. Outside of the

NAD, sediment transport is generally to the north along the remainder of both the west and east shorelines (27 percent), except for a small area of divergence zone at the far southwest extent of shoreline jurisdiction (8 percent). Drift cells within the City limits and UGA are shown on Exhibit O. Longshore drift by reach is further addressed in Section 4.

Table 4. Indicators of altered sediment delivery, movement, and loss within the Liberty Bay Watershed.

Component of Process	Sub-Component	Indicators of Alteration	Present in Liberty Bay Watershed
Delivery	Surface erosion	Non-forested land cover on highly erodible slopes adjacent to aquatic resources New construction draining to aquatic resources Row crops agriculture draining directly to aquatic resources Roads within 200 ft of aquatic resources	Yes
	Mass wasting	Roads in high mass wasting hazard areas Non-forested land cover on high mass wasting hazard areas	Not evaluated ¹
	In-channel erosion	Straight-line hydrography in unconfined channels Urban land cover	Yes
Movement	Sedimentation	Loss of depressional wetlands Straight-line hydrography in depressional wetlands Straight-line hydrography on stream reaches with floodplains or depositional channels Dikes and levees on stream reaches with floodplains	Yes
Loss	n/a	Use local data	Not evaluated ¹

¹ Evaluation of these indicators is beyond the scope of the City's Inventory and Characterization. The City will utilize Watershed Process analyses completed by Kitsap County as part of their SMP update, and by Ecology specifically for Puget Sound marine shorelines, to inform water processes and indicators of alteration.

3.3 PHOSPHORUS AND TOXINS

Because the City's shorelines are almost entirely marine, the watershed-scale phosphorus and toxins processes are pertinent to City shorelines primarily in terms of how they affect delivery into Liberty Bay, whether from the subwatersheds or areas draining directly to the Bay. A complete analysis of these processes within the Liberty Bay watershed is beyond the scope of this Inventory and Characterization.

No information sources have been identified during the SMP update that directly inform phosphorus and toxins movement in the watershed. Sediment sampling for metals conducted during the Liberty Bay NHEEP indicated sediment metals concentrations are not currently a concern within the Bay. Ecology's 303(d) and Level 4 listings in the Bay and its tributaries are limited to fecal coliform and dissolved oxygen, Level 2 listings also include pH and temperature, but phosphorus and specific toxins are not listed within the watershed. Other documents

generally identify stormwater run off, sewer, and septic systems as concerns, all of which may result in increased phosphorus and toxin loads. Both urban and agricultural land use are prominent in the basin, which may indicate altered processes according to Protecting Aquatic Ecosystems Table D-2 (Table 4). Phosphorus and toxins also may be introduced into the Bay from the City shorelines areas by way of stormwater, sewer, and septic systems. Potential for direct input in City shorelines by way of outfalls and run off is discussed in Section 4.

Although phosphorus and toxins processes are likely altered within the Liberty Bay watershed, conditions within the Bay and its tributaries indicate that this has had relatively little effect on shoreline function in comparison with other watershed-scale processes.

Table 5. Indicators of altered phosphorus and toxins delivery, movement, and loss within the Liberty Bay Watershed.

Component of Process	Sub-Component	Indicators of Alteration	Present in Liberty Bay Watershed
Delivery	Phosphorus sources	Urban land use Agricultural land use Agricultural land use adjacent to dairies	Yes
	Toxin sources	Urban land use Row crop land use	Yes
	Surface Erosion	(Table 3 – Sediment Delivery, Movement, and Loss)	Yes (see Table 3)
Movement	Biotic uptake and decomposition	(none included in Protecting Aquatic Ecosystems Table D-2)	Not evaluated ¹
	Adsorption (P)	Straight-line hydrography in depressional wetlands with mineral soils Loss of depressional wetlands with mineral soils Urban land cover in areas of clay soils adjacent to aquatic ecosystems	Not evaluated ¹
	Adsorption (T)	Straight-line hydrography in wetlands with organic or clay soils Loss of wetlands with organic or clay soils	Not evaluated ¹
	Sedimentation	(Table 3 – Sediment Delivery, Movement, and Loss)	Yes (see Table 3)
Loss		(Table 2 – Water Delivery, Movement, and Loss)	Yes (see Table 2)

¹ Evaluation of these indicators is beyond the scope of the City's Inventory and Characterization. The City will utilize Watershed Process analyses completed by Kitsap County as part of their SMP update, and by Ecology specifically for Puget Sound marine shorelines, to inform water processes and indicators of alteration.

3.4 NITROGEN

Because the City's shorelines are almost entirely marine, the watershed-scale nitrogen process is pertinent to City shorelines primarily in terms of how it affects delivery into Liberty Bay, whether from the subwatersheds or areas draining directly to the Bay. A complete analysis of

the nitrogen process within the Liberty Bay watershed is beyond the scope of this Inventory and Characterization.

No information sources have been identified during the SMP update that directly inform nitrogen movement in the watersheds, or levels in Liberty Bay. Ecology’s Water Quality Assessment information for Liberty Bay and its tributaries is discussed in Section 3.4. Nitrogen is not listed within the watershed as a Level 5 (303 d), Level 4, or Level 2 impairment. Rather, the only parameter to meet testing standards (Level 1) in vicinity of Poulsbo is ammonia in Liberty Bay. Although potential for process alteration exists with Liberty Bay and its tributaries based on Protecting Aquatic Ecosystems Table E-2 (Table 4), conditions within Liberty Bay and its tributaries indicate that this has had relatively little effect on shoreline function in comparison with other watershed-scale processes.

Table 6. Indicators of altered nitrogen delivery, movement, and loss within the Liberty Bay Watershed.

Component of Process	Sub-Component	Indicators of Alteration	Present in Liberty Bay Watershed
Delivery	Nitrogen sources	Agricultural land use Rural residential land use	Yes
Movement	Biotic uptake and decomposition	Straight-line hydrography in headwater streams	Yes
	Nitrification	Straight-line hydrography in depressional wetlands Loss of depressional wetlands	Not evaluated ¹
	Adsorption	Straight-line hydrography in headwater streams	Yes
Loss	Denitrification	Straight-line hydrography in depressional wetlands Loss of depressional wetlands	Not evaluated ¹

¹ Evaluation of these indicators is beyond the scope of the City’s Inventory and Characterization. The City will utilize Watershed Process analyses completed by Kitsap County as part of their SMP update, and by Ecology specifically for Puget Sound marine shorelines, to inform water processes and indicators of alteration.

3.5 PATHOGENS

Pathogens, specifically fecal coliform bacteria, are a significant concern within the Liberty Bay watershed, including within the Bay itself. The Liberty Bay NHEEP reviewed results of its own water quality sampling, as well as that conducted by Kitsap County Public Health and Ecology. Those results clearly demonstrate elevated levels of fecal coliform in Liberty Bay and a number of its tributaries, as well as in stormwater run off from upland areas draining directly to the Bay. Liberty Bay and a number of its tributaries have been included in Ecology’s 303(d) list in successive years. Dogfish Creek also has fecal coliform water quality impairments, but is listed under Level 4b by Ecology because a pollution control program is in place. Both the Liberty

Bay NHEEP and 303(d) 4b information for Dogfish Creek² describe the history of impairment, and on-going efforts to reduce fecal coliform levels within the watershed.

Of the six watershed-scale processes evaluated, this is the one that most affects City shoreline conditions. It also is the process about which the most information has been identified. Delivery, movement, and efforts to reduce levels of fecal coliform within larger watershed are described briefly below on best available information. As with the other watershed-scale processes, complete analysis of the pathogen process within the Liberty Bay watershed is beyond the scope of this document.

In natural systems, delivery of fecal coliform and other pathogens is from wildlife fecal material. Some delivery from wildlife (terrestrial and aquatic) is pertinent within the Liberty Bay watershed. However, in altered systems fecal coliform loads are more likely due to domestic animals (agricultural and residential) and failing septic systems. Many Liberty Bay subwatersheds have a large component of rural residential land use which may result in both mechanisms. This likely contributes to increased fecal coliform levels within the Liberty Bay watershed, and ultimately within Liberty Bay. Very few homes within the City shorelines remain on septic, the vast majority are served by the public sewer system (Exhibit L). Therefore, within the City itself, the primary upland source of fecal coliform is most likely animal waste.

Increased fecal coliform delivery is likely exacerbated by alterations in its movement through the watershed. Specifically, alterations described in Table F-2 of Protecting Aquatic Ecosystems have reduced the watershed's ability to slow downstream transport, which has in turn reduced sedimentation potential (Table 6). A number of the drainages in the subwatersheds have been subjected to channelization (Haring 2000); often in combination with rural residential land use. Ultimately, this results in less fecal coliform being retained within the watershed, or it being retained for a shorter period of time. This affects the ability for natural predation by other microbes to remove it from the system. Therefore, not only is more fecal coliform being delivered, but the system is less able to remove it. Within City shorelines, increased impervious surface has likely increased the rate of fecal coliform transport directly to Liberty Bay, similarly reducing opportunity for sedimentation and eventual predation. Increased impervious surface in developed areas outside of City shorelines, specifically including areas draining to the South Fork of Dogfish Creek, are also likely to contribute to increased fecal coliform impairments in the creeks and Bay.

As described in the 4b Analysis for Dogfish Creek, watershed-scale efforts to improve fecal coliform conditions within the Bay have been in place for decades, including redirection of sewage treatment effluent to areas outside of the Bay. In the mid 1990s, the Kitsap County Surface and Stormwater Management Program was established to, among other things, address nonpoint source pollution. That Program currently supports activities by Kitsap County's Public Works, Health District, and Department of Community Development, as well as the Kitsap Conservation District. Kitsap County Health District, with support from Ecology, established the Pollution Identification and Correction (PIC) project for the Dogfish Creek watershed in

² This information was accessed through Ecology's Water Quality Assessment Category 4b website, queried in January 2010. <http://www.ecy.wa.gov/programs/wq/303d/wqassesscat4b.html>

2000. As a direct result of the PIC program, fecal coliform levels in the Dogfish Creek have been trending toward improvement, although impairment still exists.

The entire shoreline jurisdiction is included on the 303 (d) list or, in the case of the upper estuary, has Level 4b impairment. It is anticipated that much of the fecal coliform load is generated in the greater watershed area, but conditions within the City, including within its

shorelines, are also likely to contribute to the high levels of fecal coliform present in Liberty Bay.

Table 7. Indicators of altered pathogen delivery, movement, and loss within the Liberty Bay Watershed.

Component of Process	Sub-Component	Indicators of Alteration	Present in Liberty Bay Watershed
Delivery	Fecal inputs	Rural residential land use	Yes
Movement	Transport (overland, surface, and subsurface flow; recharge)	Straight-line hydrography Urban land cover and/or impervious cover Ditching on geologic deposits of low permeability	Yes
	Adsorption	Loss of depressional wetlands Straight-line hydrography in all depressional wetlands	Not evaluated ¹
	Sedimentation	(Table 3 – Sediment Delivery, Movement, and Loss)	Yes (see table 3)
Loss	Death	Loss of depressional wetlands	

¹ Evaluation of these indicators is beyond the scope of the City's Inventory and Characterization. The City will utilize Watershed Process analyses completed by Kitsap County as part of their SMP update, and by Ecology specifically for Puget Sound marine shorelines, to inform water processes and indicators of alteration.

3.6 LARGE WOODY DEBRIS

Because the City's shorelines are almost entirely marine, the watershed-scale large woody debris (LWD) processes are somewhat less important to inform City shoreline function than is direct input of LWD from City shorelines. The tributaries to Liberty Bay are relatively small and most LWD originating along them would not be expected to move very far downstream. The delivery, movement, and loss of LWD within the larger watershed are described briefly below and is based on best available information with a focus on Dogfish Creek. A complete analysis of LWD processes within the Liberty Bay watershed is beyond the scope of this Inventory and Characterization.

In the Liberty Bay watershed, LWD is delivered through streambank erosion and windthrow. In some cases, as with the Viking Way landside in 1997-98, it also may be delivered by mass

wasting (Haring 2000). As stated above, the tributaries are relatively small. Under most conditions, little downstream movement of LWD would be expected. Because LWD is unlikely to move much distance downstream, most LWD loss is due to decomposition and breakage. A number of the indicators of alterations described in Protecting Aquatic Ecosystems Table G-2 are present within the watershed (Table 7).

In general, the Liberty Bay subwatersheds are lacking in LWD, and the LWD condition in Dogfish Creek has been described as “extremely poor” (Haring 2000). A mixture of riparian habitat is present indicating that availability of source material is unlikely to be the only limiting factor. The *Liberty Bay NHEEP* states that almost no LWD exists in marine areas, likely due to human removal over time and a lack of natural input from riparian areas. This may be influenced by the altered LWD process, resulting in lack of LWD recruitment from the greater watershed, but is probably more related to altered conditions related to development around the Bay itself, including within City shoreline areas. Shoreline development has resulted in varying degrees of vegetation clearing, limiting sources for LWD, and bluff and bank stabilization has altered physical processes which would lead to recruitment to marine areas. This has been addressed by reach in Section 4.

Table 8. Indicators of altered large woody debris delivery, movement, and loss within the Liberty Bay Watershed.

Component of Process	Sub-Component	Indicators of Alteration	Present in Liberty Bay Watershed
Delivery	Streambank erosion	Dikes and levees Straight-line hydrography in floodplains Non-forested land cover within 100 ft of stream in a floodplain	Yes
	Mass wasting	Non-forested land cover on high mass wasting hazard areas	Not evaluated ¹
	Windthrow	Non-forested land cover within 100 ft of streams	Yes
Movement	Storage	Dikes and levees Straight-line hydrography in floodplains	Yes
Loss	Breakage/Decomposition	(not included in Protecting Aquatic Ecosystems Table G-2)	

¹ Evaluation of these indicators is beyond the scope of the City’s Inventory and Characterization. The City will utilize Watershed Process analyses completed by Kitsap County as part of their SMP update, and by Ecology specifically for Puget Sound marine shorelines, to inform water processes and indicators of alteration.

4 SHORELINE CHARACTERISTICS AND FUNCTIONS

An assessment of the characteristics and functions of the shoreline is necessary to provide a means of developing viable land use regulations and permitting frameworks. Per WAC 173-26-201(3)(d)(i)(C), shoreline ecological functions in marine waters include, but are not limited to:

- Hydrologic – Transporting and stabilizing sediment, attenuating wave and tidal energy, removing excessive nutrients and toxic compounds, recruitment, redistribution and reduction of woody debris and other organic material.
- Vegetation – Maintaining temperature, removing excessive nutrients and toxic compound, attenuating wave energy, sediment removal and stabilization, and providing woody debris and other organic matter.
- Habitat for aquatic and shoreline-dependent birds, invertebrates, mammals, amphibians, and anadromous and resident native fish – Habitat functions may include, but are not limited to, space or conditions for reproduction, resting, hiding and migration, and food production and delivery.

The following text of this section of the document provides information on the current land use of each of the identified reaches as well as information on hydrologic, vegetation, and habitat functions.

The current land use section provides information on existing land use as well as current and future zoning designations. The current and future zoning designations are established by current zoning maps as well as by the City of Poulsbo's Comprehensive Plan. This section also provides data on transportation infrastructure, utilities, and water dependent uses and structures. This section is concluded with information on public access within the reach including direct and/or view access as provided by City parks, trails/pedestrian easements, and public street ends. The information regarding infrastructure, utilities, water dependent uses/structures, and public access was gathered utilizing the knowledge of City of Poulsbo staff, City of Poulsbo GIS mapping data, Kitsap County GIS mapping data, and information gathered by Battelle included in the Eastern Kitsap Nearshore Assessment. Review of available aerial photography resources including available Kitsap County GIS data and online resources was conducted to confirm or expand upon existing mapped data such as confirmation of shoreline armoring types. The current land use section also commonly provides information on archeological, cultural, and historic resources within in a reach. However, at this time, there are no known archeological, cultural, or historic resources mapped within the City reaches. As such this information is not included.

The hydrologic functions section provides information on shoreline armoring and any other noted shoreline modifications, outfalls and streams located within the reach, FEMA data, and sediment transport.

The vegetation functions section provides a qualitative overview of the vegetation within the reach.

The habitat functions section provides information on habitat within the reach including fish use, wetlands, and terrestrial habitat. Data was obtained by reviewing WDFW, City of Poulsbo and various on-line mapping resources. The following anadromous fish species may frequent Liberty Bay: bull trout, chinook salmon, chum salmon, coho salmon and steelhead trout. Use of each reach within the City by these species is assumed.

Each function subsection is concluded with an assessment of the functionality. A rating of high, medium or low based upon the identified components is provided.

A summary table of the function assessment for each reach is provided at the end of this chapter.

4.1 MARINE REACH 1

Marine Reach 1 (MR1) corresponds to the City of Poulsbo's Fjord Drive planning segment. MR1 is located on the eastern side of Liberty Bay and extends from the south end of the Marine Science Center property to the end of the Poulsbo city/ UGA boundary. The reach is approximately 1.05 miles in length. MR1 is characterized by single-family residential development, as well as two private marinas and a portion of the Port of Poulsbo marina facilities. South of Sixth Avenue, Fjord Drive splits a number of shoreline residential parcels, resulting in most homes in this area being located on the east or upland side of Fjord Drive. Nearly all undeveloped shoreline parcels within MR1 of substandard size and/or are located on steep bluffs. Exhibit P-4 (below), and Exhibits D-4, F, G, H, M and Q-4 provide a visual representation of the data provided below in Table 9 pertaining to this reach.

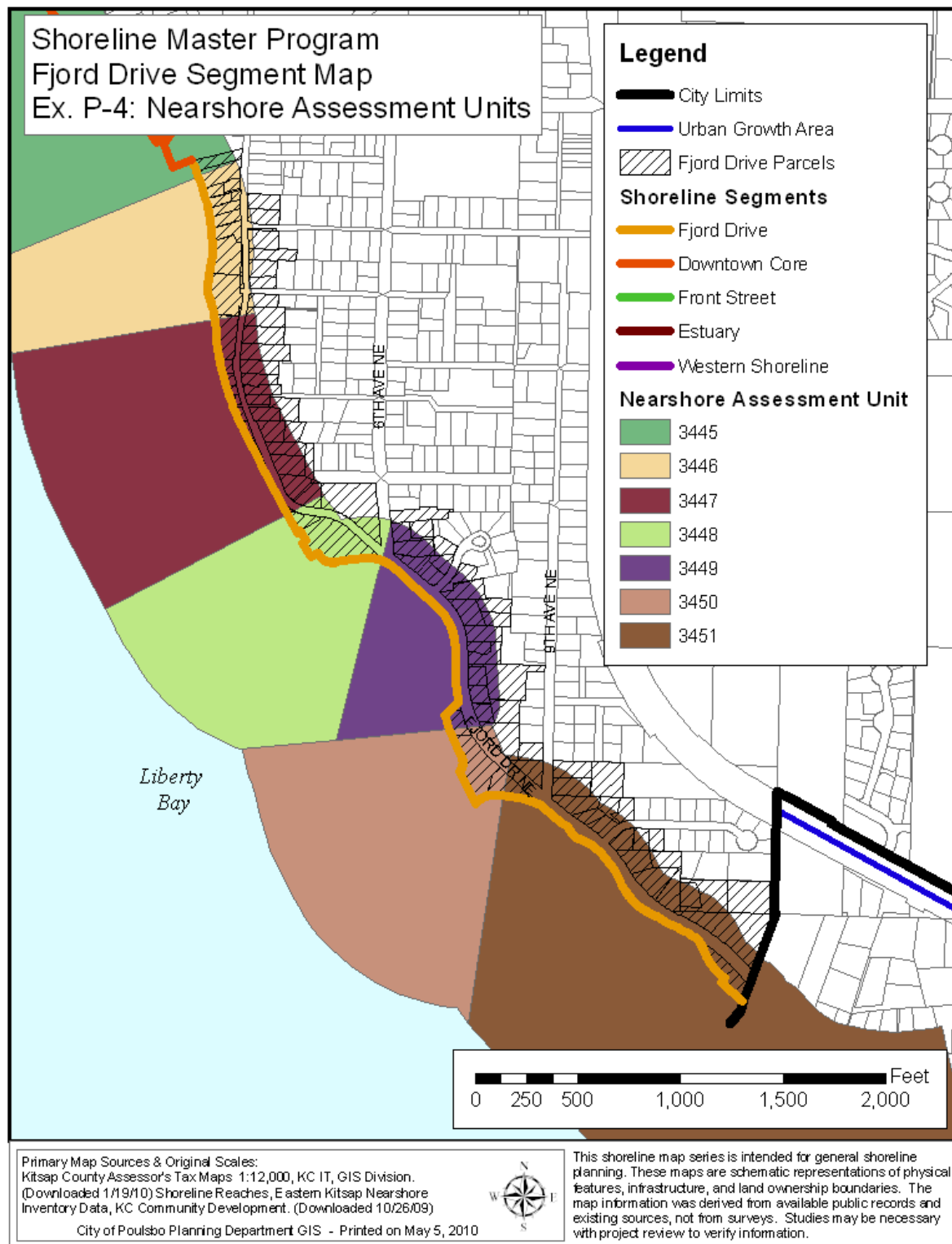


Table 9. MR1 Summary

Total Acreage / Land Use¹	Shoreline Indicators	Public Shoreline Access³	Hazard Areas⁴	Habitat⁵
Total: 29.21 acres Commercial: 0.14 acres (0.48 % of reach) Park: 2.10 acres (7.20 % of reach) Public/Private Marina: 2.07 acres (7.10 % of reach) Multifamily: 0.58 acres (1.98% of reach) Single Family: 22.07 acres (77.95% of reach) Private Common Area: 0.05 acres (0.13% of reach) Private Parking/Easement: 0.04 (0.13% of reach) Undeveloped: 1.46 acres (4.98% of reach)	Shoreline Armoring – 56% (34% below OHWM) Piers/Docks/Overwater Structures – 10 Road length within 200 feet of shoreline – 5796.336 feet	Net Shed Park Sommerseth Street road end Poulsbo Yacht Club pedestrian path easement Liberty Bay Marina public fishing pier	Only two smaller potential geologic hazard areas are mapped within this reach (see Table 2). These areas are located within the northern portion of the reach.	Majority of the shoreline has been developed for residential use. The vegetation within the reach adjacent to the shoreline is disturbed. Fjord Drive is directly adjacent or in close proximity to the shoreline (e.g. within the shoreline management zone) for the majority of the reach.

¹ Data derived from City of Poulsbo GIS analysis. Percentages may not total 100 percent due to rounding during GIS analysis.

² Data derived from City of Poulsbo GIS analysis and Water Outfalls identified for the Eastern Kitsap Nearshore Data, Kitsap County Community Development GIS division

³ Data derived from City of Poulsbo GIS analysis.

⁴ Data derived from City of Poulsbo GIS Analysis

⁵ Data derived by aerial review conducted by Grette Associates.

Current Land Use

Existing land use designations within this reach include commercial/retail and offices, multifamily residential, single-family residential, public and private marinas and parks. In addition, there are three undeveloped properties mapped within the jurisdictional area adjacent to the shoreline (Exhibit D-4). The first column of Table 8 provides a detailed summary of land use for this reach. Current zoning designations within this reach include Commercial, Residential Low (4 to 5 units per acre), Park and Light Industrial (Exhibit E-4). The 2025 Land Use Map found in the City of Poulsbo Comprehensive Plan indicates that zoning designations will remain similar to the current zoning designations. Based upon current and future zoning designations, it is anticipated that future land use within this reach will likely include development of the undeveloped parcels as single family structures and redevelopment of previously developed properties as property value increases.

The majority of the transportation infrastructure serving the parcels within this reach is located within the Shoreline Management Zone. Fjord Drive is located within the Shoreline Management Zones for the entire extent of the reach. In addition, the parking facilities associated with the Poulsbo Yacht Club and Liberty Bay Marina are located within the central portion of the reach and are also situated within the shoreline management zone.

A sewer pipe is located within Liberty Bay and parallels the majority of the shoreline within this reach (Exhibit L). There are approximately seven instances where sanitary sewer pipe from the adjacent upland lots connects to the sewer pipe located within Liberty Bay. In addition there are two lift stations mapped within the central portion of this reach. There are six stormwater outfalls mapped within this reach that appear to have direct input into Liberty Bay (Exhibit M). The most extensive of the mapped stormwater outfall systems appears to begin approximately one mile east of State Highway 309 and extends in a east/west direction parallel to NE Hostmark street. At the intersection of NE Hostmark and 6th Avenue the stormwater pipe turns and extends in a southerly direction and follows parallel to the western side of 6th Avenue until it terminates at the Poulsbo Yacht Club property. Public water service lines are located within and adjacent to Liberty Bay for the majority of this reach (Exhibit J).

Water dependent uses for this reach include the Poulsbo Yacht Club and the Liberty Bay Marina. In addition, there are eighteen water dependent/in-water structures within this reach as identified within the Eastern Kitsap Nearshore Assessment Data (Exhibit T). The water dependent/ in-water structures within this reach include the following: four boat launches, five pier/docks/floats, four areas of pilings, one area of tidal construction. There are 4 overhanging structures (Exhibit U). Water-related/enjoyment uses within this reach include view access from Net Shed Park and unobstructed portions of Fjord Drive directly adjacent to the shoreline.

Existing public access points within MR1 include: Net Shed Park, Sommerseth Street Road end, Poulsbo Yacht Club pedestrian path easement, Oyster Plant Park, and Liberty Bay Marina public fishing pier.

The Poulsbo Trails committee is in the process of conducting a review of all existing and planned trail connections within Poulsbo. Their study indicates that there is an existing side walk connection located landward of the shoreline jurisdiction in the northern and central portions of MR1 (Fjord Drive planning segment). A wide road shoulder that may be utilized by pedestrians extends along the shoreline in southern end of the reach. This wide road shoulder may be utilized to serve as an area of connectivity to the sidewalk trail located in the central part of the reach. Given the proximity of the sidewalk to the shoreline as well as the lack of development in the land located between the sidewalk and the shoreline, it is anticipated that the majority of the identified sidewalks and areas of connectivity provide view access to the shoreline. There are also three shoreline access points mapped within this reach (Exhibit Q). These include a road end near the intersection of Fjord Drive and Sommerseth Street (undeveloped), and two public pedestrian easements across the Poulsbo Yacht Club and Liberty Bay Marina.

Hydrologic Function

All of the reaches within the City of Poulsbo are adjacent to Liberty Bay. General information about the water quality of Liberty Bay is located in Section 3 of this document. This section provides information regarding hydrologic function and associated impacts specific to MR1.

The East Kitsap Nearshore Assessment identifies 30 units of shoreline armoring comprising approximately 56 percent of the shoreline. Of these, 16 units (34 percent of the shoreline) are below the OHWM³. The armoring within this shoreline is not focused in one area, instead the armoring spans a few parcels and then is absent for a few parcels and then starts again. There are two areas where shoreline armoring spans four or more parcels before stopping (Exhibit V). The shoreline armoring types utilized are primarily bulkheads and rip rap however a small portion of the reach also includes an alternative armoring type. The alternative armoring type could not be determined by reviewing available aerial photography. This reach corresponds well to drift cell 95, which is a left to right drift cell with sediment transport moving north toward the head of Liberty Bay. Therefore, these structures may affect the hydrological functions of the shoreline, altering the transportation of sediment to and along the shoreline reach. Armoring also may impair both upland (fringing vegetation) and aquatic (intertidal) habitat structure and function in these areas. Woody debris and organic material redistribution is restricted to the shoreline area waterward of the bulkheads.

Mapped water outfalls in this reach include two culverts and thirteen pipes or tubing outfalls entering Liberty Bay from the uplands adjacent to the shoreline (Exhibit M).

The entire length of the reach is mapped as 100-year floodplain associated with Liberty Bay (Exhibit I). However due to marine bluff heights in this area (Exhibit N-4), the FEMA mapped flood area does not extend far beyond the mapped extents of the shoreline.

Due to the high levels of shoreline armoring and outfalls, the hydrologic function of this reach is considered to be low.

³ While the quality of the East Kitsap Nearshore Assessment data are generally very good, there are some discrepancies based on aerial photo review. This is the case for all reaches reviewed within this document. . While data and figures in this report reflect East Kitsap Nearshore Assessment data as presented, the City acknowledges that some errors and omissions exist and will capture corrections on a parcel-by-parcel basis as it continues to track shoreline conditions through land use review and other efforts.

Vegetation Function

The natural shoreline located within MR1 has been highly altered by residential development. The majority of the vegetation within this reach is landscaped and representative of the residential development including maintained yards with grass, gardens and ornamental shrubs. Very little to no overhanging shoreline vegetation or trees are present within this reach.

Due to the level of alteration to the vegetation, the vegetation function of this reach is considered to be low.

Habitat Function

There are no mapped wetlands associated with this reach. However, there may exist small pocket wetlands in the low banks situated in the northern portion of this reach.

WDFW Priority Habitat and Species mapping indicates that sand lance spawning occurs in the southern portion of the reach. In addition, WDFW mapping indicates that smelt spawning occurs throughout the majority of the reach. Habitat for subtidal hardshell clam is mapped at the southern end of the reach. (Exhibit F)

The entire reach contains saltwater shorelines. Saltwater shorelines are considered Fish and Wildlife Habitat Conservation Areas, a Critical Area type. In addition, site specific studies may yield information regarding, as yet unknown, critical areas.

Due to the minimal levels of mapped habitat (with the exception of smelt and sand lance spawning areas) and in conjunction with the habitat disturbance presented by the reduced hydrologic and vegetation functions, the habitat function rating for this reach is low.

4.2 MARINE REACH 2

Marine Reach 2 (MR2) corresponds to the City of Poulsbo's Downtown Core Planning Segment. MR2 is located on the eastern side of Liberty Bay and is located between American Legion Park and the Marine Science Center. The reach is approximately 0.43 miles in length. This area contains the oldest portion of Poulsbo, including the City's downtown waterfront, and largely corresponds to the Downtown Core (DC) zoning overlay area. In the early to mid 20th century, the downtown waterfront included a number of water-dependent structures and land uses, such as overwater fish and shellfish processing and warehouse docks and sheds, boat manufacture and repair, and a commercial fishing fleet. A significant amount of the upland shoreline that is now developed with parking (e.g., Anderson Parkway) and commercial uses is constructed on fill placed in Liberty Bay from the 1950s into the 1970s. Currently, the primary land use within this reach is commercial, with small-scale retail, services and office buildings. Exhibit P-3 (below), and Exhibits D-3, F, G, H, M, and Q-3 provide a visual representation of the data provided below in Table 10 pertaining to this reach.

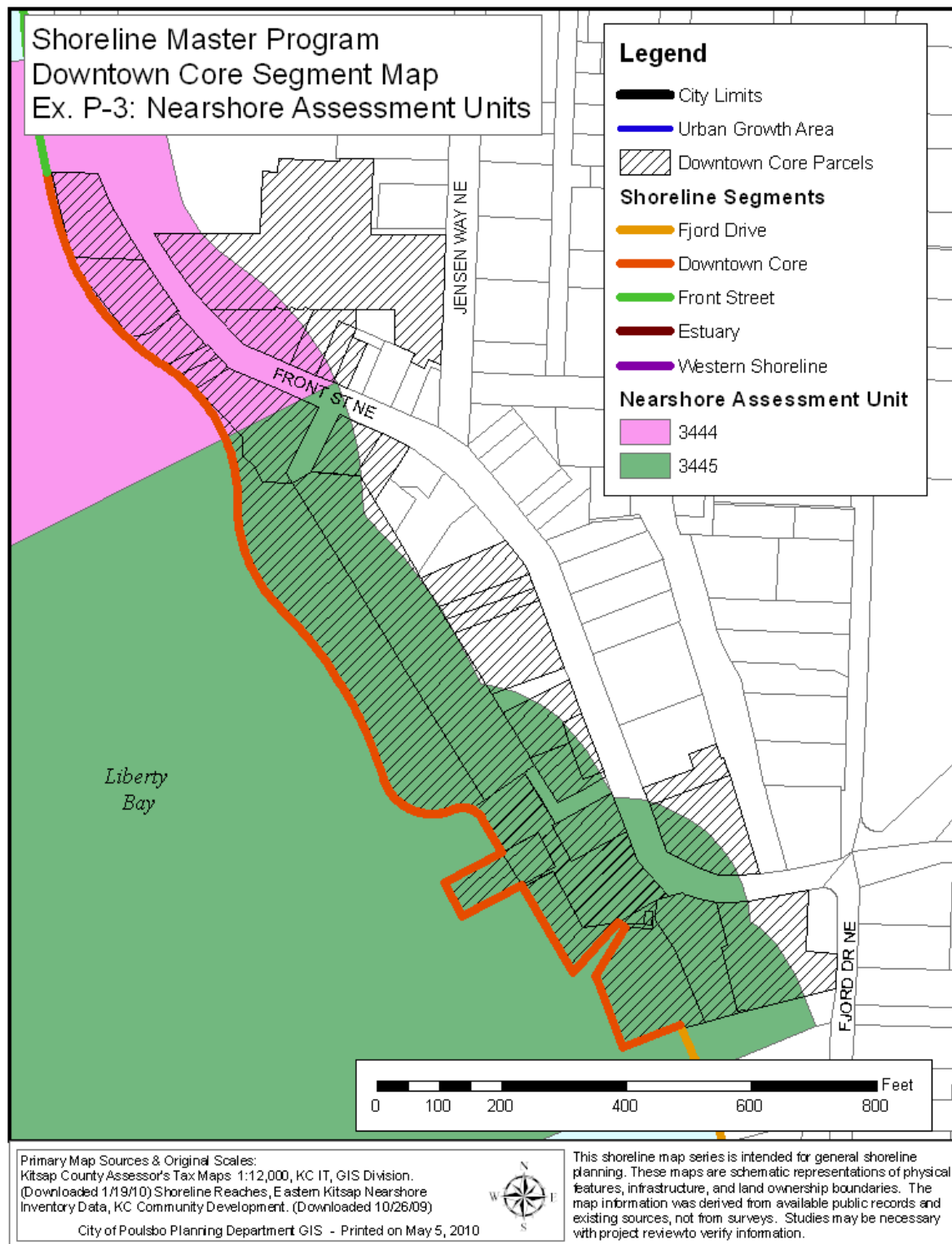


Table 10. MR2 Summary.

Total Acreage / Land Use¹	Shoreline Indicators	Public Shoreline Access³	Hazard Areas⁴	Habitat⁵
Total: 10.89 acres Multifamily (MF): 0.29 acres (2.23 % of reach) Commercial: 3.42 acres (26.38% of reach) Park: 1.67 acres (12.91% of reach) Public Assembly: 0.93 acres (8.28% of reach) Public Facilities: 2.37 acres (18.28 % of reach) Public/ Private Marina: 0.21acres (17.55 % of reach) Private Parking/Easement: 0.05 acres (0.35% of reach) Public Parking: 1.90 acres (14.63% of reach) Undeveloped Land: 0.06 acres (0.50% of reach)	Shoreline Armoring – 75% (66% below OHWM) Piers/Docks/Overwater Structures – 4 Road length within 200 feet of shoreline – 1998.104 feet	Liberty Bay Park Marine Science Center public deck	Current data resources do not map geological hazard areas within this reach.(See Table 2)	Majority of reach adjacent to the shoreline is developed. Majority of reach is armored. Majority of adjacent uplands are impervious.

¹ Data derived from City of Poulsbo GIS analysis. Percentages may not total 100 percent due to rounding during GIS analysis.

² Data derived from City of Poulsbo GIS analysis and Water Outfalls identified for the Eastern Kitsap Nearshore Data, Kitsap County Community Development GIS division

³ Data derived from City of Poulsbo GIS analysis.

⁴ Data derived from City of Poulsbo GIS Analysis

⁵ Data derived by aerial review conducted by Grette Associates.

Current Land Use

Existing land use within this reach is primarily commercial/retail and offices and other public use areas such as public assembly, parks, and parking. There is one multifamily use parcel identified within this reach, and it is located on the northern end of the reach. However, additional single and multifamily residential uses may exist within some of the older buildings on parcels that have the primary use identified as commercial/office/retail. There are no undeveloped parcels located adjacent to the shoreline within this reach (Exhibit D-3). The first column of Table 9 provides a detailed summary of land use for this reach. The current zoning designation for the entire reach is Commercial, with the exception of Park zoning for Liberty Bay Park, and a majority of the area is within the Downtown Core commercial overlay district (Exhibit E-3). The 2025 Land Use Map found in the City of Poulsbo Comprehensive Plan indicates that zoning will remain primarily commercial Based upon current and future zoning designation and land use, it is anticipated that future land use within this reach will continue to be primarily commercial. However, the City Council has indicated that the creation of an overall downtown master plan/development overlay plan may be a Council priority during 2011, and it is possible that the future development pattern may be altered depending on the outcome of this planning effort.

The majority of the transportation infrastructure serving the parcels within this reach is located within the Shoreline Management Zone. Front Street is located within the Shoreline Management Zones on the northern and southern ends of the reach. In addition, a public parking facility is located in the central portion of the reach and is also situated within the shoreline management zone.

Public sanitary sewer is located within the uplands lots of this reach and is parallel to the shoreline (Exhibit L). In addition, there is one lift station mapped within the southern portion of this reach. There are three stormwater system outfalls mapped within this reach. All of these systems appear to collect stormwater from the downtown core area and convey it to Liberty Bay. In addition, the largest series of connected stormwater pipes appears to collect stormwater from the central area of the downtown core and convey it to Liberty Bay; however, there is no mapped stormwater outfall with this system. The water system within this reach is located primarily to the northeast of Front Street. There are two instances where water pipes extend from Front Street towards, but do not extend into Liberty Bay.

Water dependent uses in this reach include the Port of Poulsbo facilities, including public docks and moorage and a floatplane dock. There are six water dependent/ in-water structures identified within this reach as identified within the Eastern Kitsap Nearshore Assessment data (Exhibit T-3). The water dependent/ in- water structures within this reach include the following: one area of pilings, three piers/docks/floats, one boat launch, and one overhanging structure. Water related/enjoyment uses within this reach include view access from Liberty Bay Park and the Marine Science Center public deck as well as the adjacent trail located along the northern portion of the reach.

Existing public access points within MR2 include the Marine Science Center public deck and Liberty Bay Park.

The Poulsbo Trails committee is in the process of conducting a review of all existing and planned trail connections within Poulsbo. Their study indicates that there is an existing trail located along the northern portion of the shoreline within this reach. The study further indicates that the southern portion of this reach provides shoreline access. This access is the deck at the Marine Science Center. In addition, there is water route access also located in the southern end of the reach (Exhibit Q-3) at the Port of Poulsbo boat launch. Public pedestrian access is available at the Port of Poulsbo marina and the City's waterfront park.

Hydrologic Function

All of the reaches within the City of Poulsbo are adjacent to Liberty Bay. General information about the water quality of Liberty Bay is located in Section 3 of this document. This section provides information regarding hydrologic function and associated impacts specific to reach MR2.

The East Kitsap Nearshore Assessment identifies 12 units of shoreline armoring comprising approximately 74 percent of the shoreline. Of these, 8 units (66 percent of the shoreline) are below the OHWM. (Exhibit V). The shoreline armoring types utilized are bulkheads and rip

rap. These structures may affect the hydrological functions of the shoreline, altering the transportation of sediment to and from the shoreline reach. However, any impact to sediment transport would be highly localized as MR2 is within drift cell 67, which is an area of no appreciable drift. Armoring also may impair both upland (fringing vegetation) and aquatic (intertidal) habitat structure and function in these areas. Woody debris and organic material redistribution is restricted to the shoreline area waterward of the bulkheads.

Water outfalls in this reach include three pipe or tubing outfalls entering Liberty Bay from the uplands adjacent to the shoreline (Exhibit M).

The entire length of the reach is mapped as 100-year floodplain associated with Liberty Bay (Exhibit I). However due to marine bluff heights in this area, the FEMA mapped flood area does not extend far beyond the mapped extents of the shoreline.

Due to the high levels of shoreline armoring, the hydrologic function of this reach is considered to be low.

Vegetation Function

MR2 is characterized by its function as the downtown core area for the City of Poulsbo. The majority of the parcels within this reach are developed and contain impervious surfaces that extend to the shoreline, although some native and invasive vegetation remains on steep banks of the three northernmost parcels within this reach. Vegetation within the reach is primarily provided by the landscaped areas of Liberty Bay Park. A few of the parcels in the northernmost portion of the reach contain a small band of vegetation between the shoreline and the edge of the building this vegetation appears to be shrubs or other low-growing vegetation.

Due to the level of alteration to the vegetation, the vegetation function of this reach is considered to be low.

Habitat Function

There are no mapped wetlands associated with this reach.

WDFW mapping indicates that there are seal/sea-lion haulout areas associated with the floats and log booms within the Port of Poulsbo Marina. (Exhibit F)

The entire reach contains saltwater shorelines. Saltwater shorelines are considered Fish and Wildlife Habitat Conservation Areas, a Critical Area type. However, due to the level of development and the lack of vegetation within this reach, it appears that upland habitat function is minimal for this reach.

Due to the minimal levels of mapped habitat and in conjunction with the habitat disturbance presented by the reduced hydrologic and vegetation functions, the habitat function rating for this reach is low.

4.3 MARINE REACH 3

Marine Reach 3 (MR3) corresponds to the City of Poulsbo's Front Street planning segment. MR3 is located on the eastern side of Liberty Bay and extends from Lindvig Way to American Legion Park. The reach is approximately 0.84 miles in length. Historically, most of this reach was vegetated moderate to high bank, with estuarine marsh located in the northern portion of the reach. Timber and seafood processing operations were located at the head of the bay during the early to mid 20th century, when a significant amount of fill was added to expand industrial development opportunities in that area. Currently, the shoreline within this reach designation is characterized by single and multi-family residential development, and limited commercial development within the northern portion of the reach. Future redevelopment of this reach is likely to be limited to areas outside of steep and unstable bluff slopes. Exhibit P-2 (below), and Exhibits D-2, F, G, H, M, and Q-2 provide a visual representation of the data provided below in Table 11 pertaining to this reach.

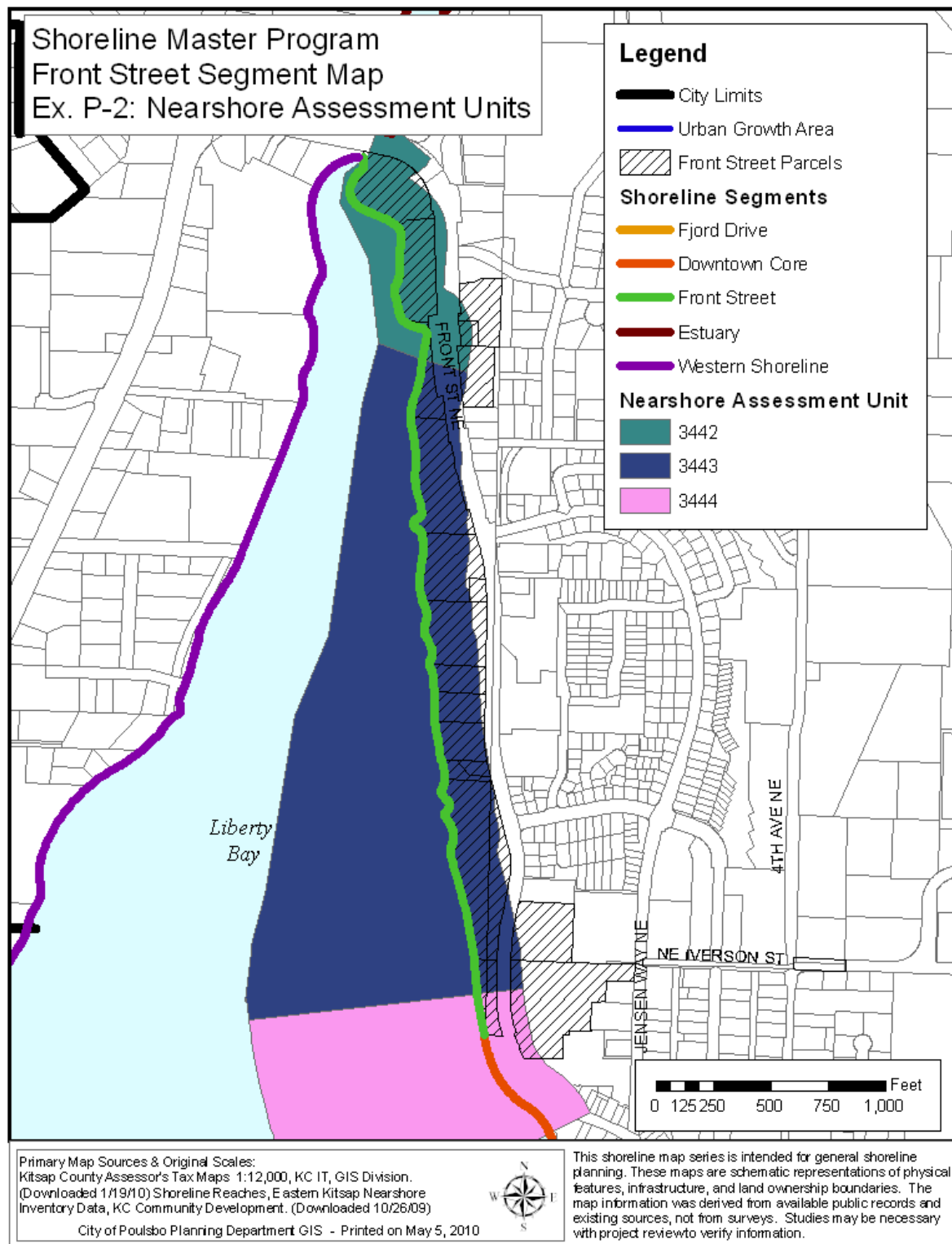


Table 11. MR3 Summary.

Total Acreage / Land Use¹	Shoreline Indicators	Public Shoreline Access³	Hazard Areas⁴	Habitat⁵
Total: 23.61 acres Commercial: 10.90 acres (46.18 % of reach) Park: 4.18 acres (17.71% of reach) Multifamily: 5.08 acres (21.51% of reach) Single Family: 1.08 acres (4.58% of reach) Undeveloped: 2.37 acres (10.02% of reach)	Shoreline Armoring – 27% (14% below OHWM) Piers/Docks/Overwater Structures – 3 Road length within 200 feet of shoreline – 1523.229 feet	Church Pedestrian Path Easement American Legion Park	The majority of this reach is mapped as a potential geological Hazard area (See Table 2).	Majority of reach adjacent to the shoreline is vegetated and appears to provide the necessary components for quality intertidal habitat.

¹ Data derived from City of Poulsbo GIS analysis. Percentages may not total 100 percent due to rounding during GIS analysis.

² Data derived from City of Poulsbo GIS analysis and Water Outfalls identified for the Eastern Kitsap Nearshore Data, Kitsap County Community Development GIS division

³ Data derived from City of Poulsbo GIS analysis.

⁴ Data derived from City of Poulsbo GIS Analysis

⁵ Data derived by aerial review conducted by Grette Associates.

Current Land Use

Existing land uses designations within this reach include commercial/retail and offices, multifamily residential, and single-family residential. American Legion Park is also located within this reach. In addition, there are three undeveloped properties mapped within this reach (Exhibit D-2). The first column of Table 10 provides a detailed summary of land use for this reach. Current zoning designations within this reach include Commercial, Park, Residential High (>10 to 14 units per acre) and Residential Low (4 to 5 units per acre) (Exhibit E-2). The 2025 Land Use Map found in the City of Poulsbo Comprehensive Plan indicates that zoning designations will remain similar to the current zoning designations. Based upon current zoning designations, it is anticipated that future land use within this reach will likely include development of the undeveloped parcels as single family or multifamily structures, and redevelopment of previously developed properties as property value increases. This development may be limited by physical conditions and shoreline buffer/setbacks.

The majority of the transportation infrastructure serving the parcels within this reach is located outside of the Shoreline Management Zone. However, the two northernmost parcels within this reach do have parking areas situated within the shoreline management zone.

Public sanitary sewer is located landward of Liberty Bay in the southern portion of this reach (Exhibit L). A sanitary sewer force main is mapped within Liberty Bay directly adjacent to the shoreline for the majority of the reach. This line had a number of leakage problems in the past. With the completion of improved landward infrastructure, including the Bond Road Lift Station in November 2008, it has been relegated to emergency backup status. It is on the City's current

Capital Improvements Plan to be fully repaired (slip-lined) within six years, although it will remain a backup line. In addition, a lift station that connects to sewer pipes extending to the north, east and west is located in the northernmost portion of this reach. There are five stormwater outfalls mapped within this reach (Exhibit M). The largest of the stormwater systems connect to an outfall in Liberty Bay appears to collect stormwater from development located along NE Torval Canyon Road. The public water lines within this reach are located upland and are primarily adjacent to the western side of Front Street NE (Exhibit J).

There are no mapped water dependent uses, such as ports, marinas, direct public water access points or water-related industrial uses, within this reach. There are four water dependent/in-water structures identified within this reach as identified within the Eastern Kitsap Nearshore Assessment (Exhibit T). The water dependent/in-water structures within this reach include a single instance of each of the following: pilings, tidal construction, and an overhanging structure. The water dependent/in-water structures mapped within this reach also include a boat launch. However, the mapping of a boat launch is in conflict with the mapping of no water dependent uses within this reach. Aerial photographs were reviewed to address this discrepancy. There appears to be the remnants of a previously utilized boat launch that is no longer in use. Water related/enjoyment uses for this reach include view access from American Legion Park as well as the adjacent Gran Kirk pedestrian path easement.

Existing public access points within MR3 include American Legion Park and the Gran Kirk pedestrian path easement.

The Poulsbo Trails committee is in the process of conducting a review of all existing and planned trail connections within Poulsbo. Their study indicates that there is an existing sidewalk connection located landward of the shoreline jurisdiction in the northern portion of the MR3 as well as an existing trail through American Legion Park. It is anticipated that these trails may provide view access to the shoreline. In addition, the Poulsbo Trails committee identified a possible future off-street trail connection located parallel to the existing sidewalk access located in the northern portion of this reach (Exhibit Q).

Hydrologic Function

All of the reaches within the City of Poulsbo are adjacent to Liberty Bay. General information about the water quality of Liberty Bay is located in Section 3 of this document. This section provides information regarding hydrologic function and associated impacts specific to reach MR3.

Although the majority of the properties within this reach are developed, the East Kitsap Nearshore assessment identifies seven units of shoreline armoring comprising approximately 27 percent of the shoreline. Of these, 5 units (14 percent of the shoreline) are below the OHWM. Only the northern portion of the reach has mapped shoreline armoring (Exhibit V). The shoreline armoring types utilized are primarily bulkheads and rip rap however a small portion of the reach also includes an alternative armoring type. Aerial photo review indicates that the alternative armoring type is a log jam but does not confirm whether this structure is held in place

by natural processes or by constructed methods. These structures may affect the hydrological functions of the shoreline, altering the transportation of sediment to and from the shoreline reach.

However, any impact to sediment transport would be highly localized as MR3 is located within drift cell 67, which is an area of no appreciable drift. Sediment is deposited within the reach from Dogfish Creek.

Water outfalls in this reach include two unnamed natural flows entering Liberty Bay from the uplands adjacent to the shoreline. In addition, several small culverts or pipe outfalls drain freshwater into Liberty Bay from the upland areas associated with this reach (Exhibit M).

The entire length of this reach is mapped as 100-year floodplain associated with Liberty Bay (Exhibit I). However due to marine bluff heights within the majority of this reach, it appears that only the northernmost portion of this reach may have flood impacts that extend landward of the mapped extents of the shoreline.

Due to the relatively low levels of shoreline armoring and outfalls, the hydrologic function of this reach is considered to be medium.

Vegetation Function

The natural shoreline located within the MR3 reach has been somewhat altered by development. However, the level of impact to shoreline vegetation is lower than that found in MR1 and MR5. The majority of the land directly adjacent to the shoreline within this reach contains native vegetation including evergreen and deciduous trees and vegetation. Lower growing vegetation such as grass and shrubs is located on some of the residential parcels. However, review of aerial photographs indicates that all parcels maintain at least a small area of trees and shrubs adjacent to the shoreline. The portions of vegetated shoreline and downed trees within this reach provide shading and vegetative inputs that are necessary components of quality intertidal habitat.

The northernmost two parcels within the reach are more developed than the remainder of the reach as described. These parcels are primarily impervious, contain shoreline armoring, and have minimal associated vegetation. In addition, these two parcels contain driving/parking lot areas that are directly adjacent to the shoreline.

Due to the lower level of alteration to the vegetation as well as the existence of trees and shrubs adjacent to the shoreline throughout the majority of the reach, the vegetation function of this reach is considered to be medium.

Habitat Function

The entire reach contains saltwater shorelines. Saltwater shorelines are considered Fish and Wildlife Habitat Conservation Areas, a Critical Area type. In addition, site specific studies may yield information regarding the, as yet unknown, critical areas.

There are no mapped wetlands within this reach.

The northern most and central portions of this reach are mapped as unstable within the Washington State Coastal Zone Atlas, a Critical Area type. In addition, City of Poulsbo mapping indicates that the majority of the reach is a potential geologic hazard (Exhibit H).⁴ Removal of shoreline vegetation, such as that resulting from development, can lead to erosion of the shoreline and may contribute to landslide activity.

Due to the minimal levels of mapped habitat and in consideration of the existing level of hydrologic and vegetation function, the habitat function rating for this reach is medium.

4.4 MARINE REACH 4

Marine Reach 4 (MR4) corresponds to the City of Poulsbo's Estuary planning segment. MR 4 is located to the north of Lindvig Way and includes the tidally influenced mouth of Dogfish Creek at the head of the bay and associated stream and wetland areas. The reach is approximately 0.60 miles in length. This area has historically had limited development due to the Dogfish Creek flood zone and extensive marshy areas. Past uses have included agricultural pasture, orchard, and a landfill. Currently, the majority of the shoreline of this reach coincides with Fish Park but the reach also includes single-family residential development, and limited commercial development near the intersection of Bond Rd and Lindvig Way. Exhibit P-5 (below) and Exhibits D-5, F, G, H, M, and Q-5 provide a visual representation of the data provided below in Table 12.

⁴ Pursuant to the Poulsbo Municipal Code 16.20.155 a geologic hazard area refers to areas, as defined in WAC [365-190-030](#)(8) and [365-190-080](#)(4), that because of their susceptibility to erosion, sliding, earthquake, or other geological events, are not suited to siting commercial, residential or industrial development consistent with public health or safety concerns. Development in geologic hazard areas may be permitted when an approved geotechnical or geological report indicates that the development can be engineered to pose no significant threat to public health or safety

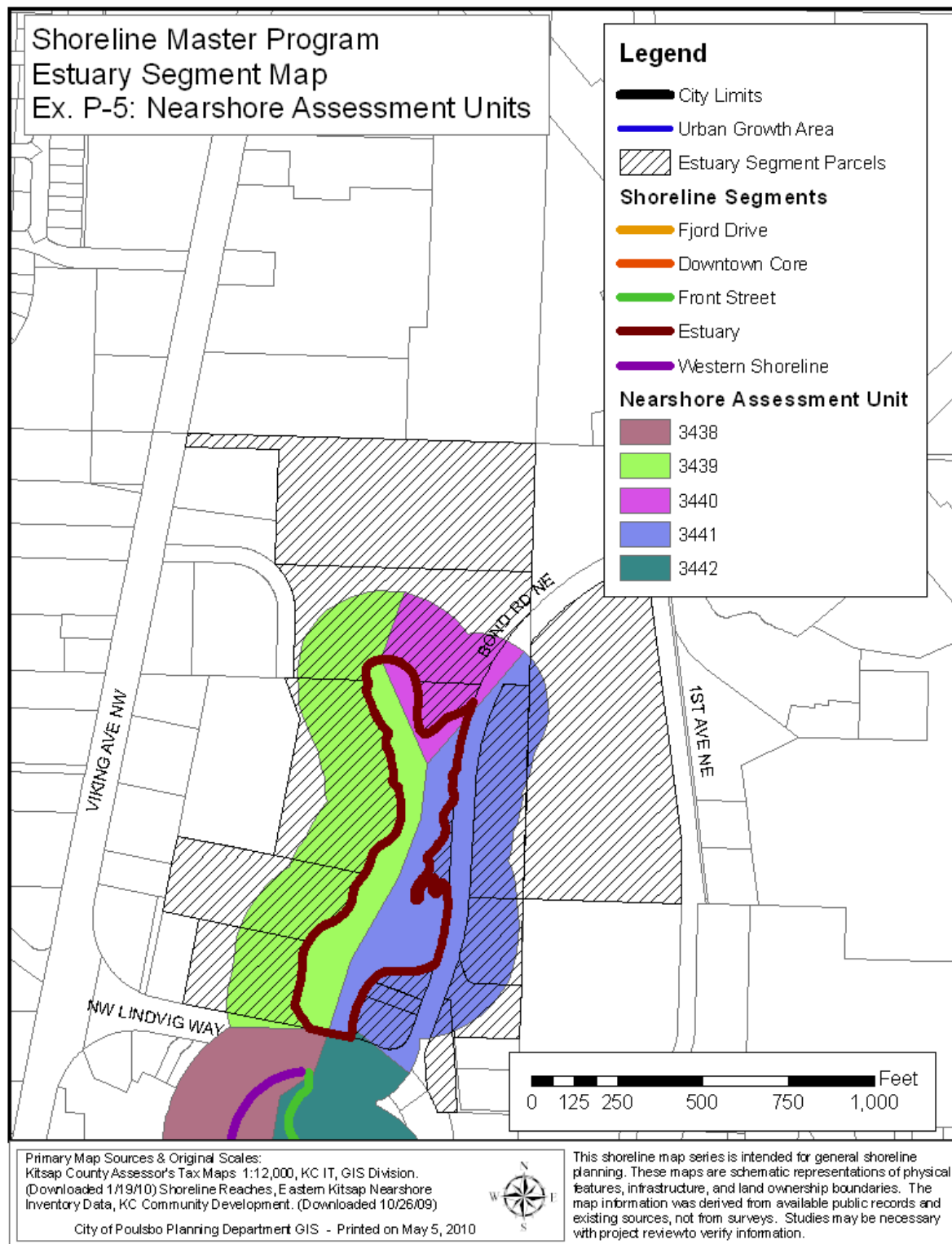


Table 12. MR4 Summary.

Total Acreage / Land Use¹	Shoreline Indicators	Public Shoreline Access³	Hazard Areas⁴	Habitat⁵
54.87 acres Single Family: 18.18 acres (33.13% of reach) Multifamily: 8.46 acres (15.42% of reach) Commercial: 4.30 acres (7.84 % of reach) Park: 12.82 acres (23.37% of reach) Undeveloped: 11.11 acres (20.25% of reach)	Shoreline Armoring – 0% (0% below OHWM) Piers/Docks/Overwater Structures – 0 ⁵ Road length within 200 feet of shoreline – 1318.454 feet	Fish Park	Northern and western portions of the reach are mapped as potential geological hazard areas (See Table 2).	Reach is the Liberty Bay estuary. Majority of reach is located within a designated park. Amounts of impervious surfaces and landscaped areas are lower for this reach than any other reach within the City of Poulsbo.

¹ Data derived from City of Poulsbo GIS analysis. Percentages may not total 100 percent due to rounding during GIS analysis.

² Data derived from City of Poulsbo GIS analysis and Water Outfalls identified for the Eastern Kitsap Nearshore Data, Kitsap County Community Development GIS division

³ Data derived from City of Poulsbo GIS analysis.

⁴ Data derived from City of Poulsbo GIS Analysis

⁵ Data derived by aerial review conducted by Grette Associates.

Current Land Use

Existing land use within this reach includes commercial/retail and offices, multifamily residential, single-family residential, and Fish Park. In addition, there are three undeveloped properties mapped within this reach (Exhibit D-5). The first column of Table 11 provides a detailed summary of land use for this reach. Current zoning designations within this reach include Commercial, Park, Residential High (>10 to 14 units per acre) and Residential Low (4 to 5 units per acre) (Exhibit E). The 2025 Land Use Map found in the City of Poulsbo Comprehensive Plan indicates that zoning designations will remain similar to the current zoning designations. It is anticipated that future land use within this reach will likely be limited by the presence of extensive Critical Areas (stream and wetlands) and associated buffers/setbacks.

There are multiple points where transportation infrastructure serving the parcels within this reach is in close proximity to the Shoreline Management Zone. Bond Street parallels the eastern portion of the reach and is directly adjacent to the shoreline for approximately 200 feet of shoreline. In addition, Lindvig Way NW crosses the southern end of the reach. In addition, the southernmost parcel on the eastern side of the reach contains a parking facility within the Shoreline Management Zone.

Public sanitary sewer lines are mapped on the eastern side of this reach parallel to Bond Street and may extend into the estuary. Stormwater lines are mapped along the southern edge of this

⁵ Although the East Kitsap Nearshore Assessment does not identify any overwater structures in this reach, Lindvig way which is located on the southern end of the reach is considered by the City of Poulsbo to be located within this reach.

reach. Similar to the mapped sanitary sewer pipes, public water lines are mapped on the eastern side of the reach parallel to Bond Street and may extend into the estuary.

There are no known water dependent uses, such as ports, marinas, direct public water access points or water-related industrial uses, identified within this reach. There were no water dependent/in-water structures identified within this reach within the data gathered for the Eastern Kitsap Nearshore Assessment (Exhibit T-5). Water related/enjoyment uses in this reach include view access from Fish Park as well as the trails associated with this park. In addition, view access may also be provided to motorists, pedestrians, and cyclists traveling along Lindvig Way.

Existing public access points within MR4 include Fish Park.

The Poulsbo Trails Committee is in the process of conducting a review of all existing and planned trail connections within Poulsbo. Their study indicates that the trail access within this reach is located in Fish Park. In addition to the trails located in Fish Park, there is an existing sidewalk located on the western side of the reach that is likely to provide view access.

Hydrologic Function

All of the reaches within the City of Poulsbo are adjacent to Liberty Bay. General information about the water quality of Liberty Bay is located in Section 3 of this document. This section provides information regarding hydrologic function and associated impacts specific to reach MR4.

There are no bulkheads or overwater structures identified within this reach (Exhibits U and V).⁶ However, any impact to sediment transport would be highly localized as MR4 is located within drift cell 67, which is an area of no appreciable drift. Sediment is deposited within the reach from Dogfish Creek.

Water outfalls in this reach include one pipe/tubing that enters Liberty Bay from a parcel located on the southwest portion of the reach (Exhibit M).

The entire length of this reach is mapped as 100-year floodplain associated with Liberty Bay and Dogfish Creek (Exhibit I). Given the low banks within this reach, it is likely the 100-year flood plain impacts adjacent shoreline parcels to a greater extent than is experienced in other reaches within city jurisdiction.

⁶ As noted within the footnote on the previous page, Lindvig Way which is located on the southern end of the reach is considered by the City of Poulsbo to be located within this reach. However, no overwater structures are identified by the East Kitsap Nearshore Assessment. As the overwater structure dataset from that document was utilized to identify overwater structures for all of the reaches, no overwater structures are identified within the main text to maintain consistency in the methodology utilized to generate the document.

The majority of the parcels within the shoreline jurisdiction on the eastern side of this reach are located in an aquifer recharge area of concern due to soils with a high infiltration potential.⁷

Due to the low levels of shoreline armoring and outfalls, the hydrologic function of this reach is considered to be high.

Vegetation Function

MR4 is characterized by the Liberty Bay Estuary. This area bridges the Liberty Bay and Dogfish Creek ecosystems. The extent of the reach is vegetated and is the most vegetated of the reaches within the city of Poulsbo. Portions of the reach have been notably modified including single family residential and limited commercial development with grass and other ornamental landscaping. The majority reach includes upland areas of multiple canopied vegetation as well as areas of overhanging vegetation including deciduous trees and shrubs. It is anticipated that the addition of habitat area and function within the reach will continue as the Fish Park restoration plan, which includes the Dogfish Creek estuary, is implemented.

Due to the reduced level of alteration to the vegetation, the vegetation function of this reach is considered to be medium.

Habitat Function

Saltwater shorelines are considered Fish and Wildlife Habitat Conservation Areas, a Critical Area type. This reach contains the estuarine intertidal portion of Liberty Bay as identified by the Washington State Department of Fish and Wildlife, and the tidally-influenced portion of Dogfish Creek. Estuarine wetlands associated with the marine aquatic bed and tidal creek are likely to be considered Category 1 wetlands. Upland areas may provide valuable habitat that has not yet been determined and mapped.

This reach is located adjacent to an estuarine intertidal portion of Liberty Bay as identified by the Washington State Department of Fish and Wildlife. Estuarine wetlands associated with the marine aquatic bed are likely to be considered Category 1 wetlands.

The entire reach contains saltwater shorelines. Saltwater shorelines are considered Fish and Wildlife Habitat Conservation Areas, a Critical Area type. In addition, site specific study may yield information regard as yet unknown critical areas.

This reach has minimal levels of mapped habitat. However, the hydrologic and vegetative functions within this reach are relatively undisturbed. As such, this reach does have the ability to provide habitat and improvement to adjacent reaches may result in the opportunity to provide said habitat. As such, the habitat function rating for this reach is medium.

⁷ Data source is City of Poulsbo , Aquifer Critical Areas Map, dated July 18, 2007. In turn, this map sites the Shallow Aquifer and watershed, Kitsap Public Utility District.

4.5 MARINE REACH 5

Marine Reach 5 (MR5) corresponds to the City of Poulsbo's Western Shoreline planning segment. MR5 is located on the western side of Liberty Bay and extends from Lindvig Way south to the end of the Poulsbo City/UGA boundary. The reach is approximately 1.02 miles in length. The development of this area reflects more recent annexations into the City, and/or incorporations into the designated Urban Growth Area, than the older development on the east side of Liberty Bay, and the reach also includes a higher percentage of undeveloped parcels. Historically, land uses have been rural or semi-rural, with shellfish farming and other agriculture being interspersed with large single-family lots until the mid-20th century. Currently, this reach is characterized by single-family and multi-family residential development as well as some limited commercial uses. Exhibit P-6 (below), and Exhibits D-6, F, G, H, M, and Q-6 provide a visual representation of the data provided below in Table 13.

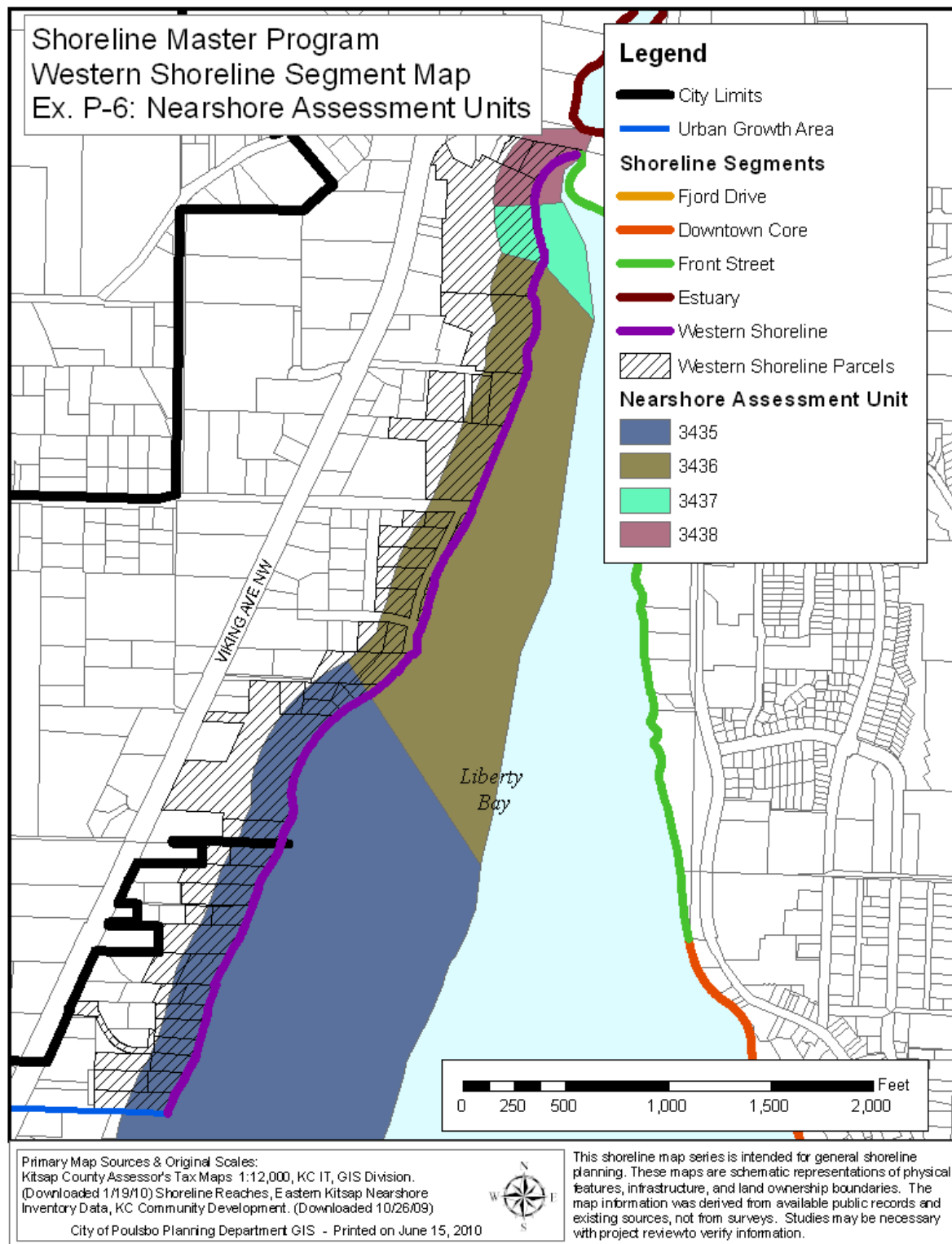


Table 13. MR5 Summary.

Total Acreage / Land Use¹	Shoreline Indicators	Public Shoreline Access³	Hazard Areas⁴	Habitat ⁵
41.51 acres Commercial: 1.08 acres (2.59% of reach) Park: 10.81 acres (26.03% of reach) Multifamily: 11.09 acres (26.71% of reach) Single Family: 11.22 acres (27.02% of reach) Private Parking/Easement: 0.52 acres (1.26% of reach) Undeveloped: 6.80 acres (16.38% of reach)	Shoreline Armoring – 56% (34% below OHWM) Piers/Docks/Overwater Structures – 6 Road length within 200 feet of shoreline – 1821.572 feet	Liberty Shores public beach and picnic area Bay Street road end Old Country Road Trail Liberty Road end Nelson Park JRO pedestrian path easement.	Current data resources do not map geological hazard areas within this reach (See Table 2).	Majority of the reach has been developed as residential. Habitat and landscape within this reach has been modified and reflects residential use.

¹ Data derived from City of Poulsbo GIS analysis. Percentages may not total 100 percent due to rounding during GIS analysis.

² Data derived from City of Poulsbo GIS analysis and Water Outfalls identified for the Eastern Kitsap Nearshore Data, Kitsap County Community Development GIS division

³ Data derived from City of Poulsbo GIS analysis.

⁴ Data derived from City of Poulsbo GIS Analysis

⁵ Data derived by aerial review conducted by Grette Associates.

Current Land Use

Existing land use within this reach includes two parcels of commercial/retail and offices, three multifamily residential parcels, multiple single-family residential parcels, and park land. In addition, there are eleven undeveloped properties mapped within this reach (Exhibit D-6). The first column of Table 12 provides a detail summary of land use for this reach. Current zoning designations within this reach include Commercial, Park, Residential High (>10 to 14 units per acre), Residential Medium (>5 to 10 units per acre) and Residential Low (4 to 5 units per acre) (Exhibit E-6). The 2025 Land Use Map found in the City of Poulsbo Comprehensive Plan indicates that zoning designations will remain similar to the current zoning designations. Based upon current and future zoning designations, it is anticipated that future land use within this reach will likely include development of the undeveloped parcels as single family residences, followed by redevelopment of previously developed properties as property value increases.

The majority of the transportation infrastructure serving the parcels in this reach is located outside of the Shoreline Management Zone. However, two of the multifamily parcels located in the central portion of the reach have parking areas situated within the shoreline management zone.

There are three properties that rely upon septic systems within this reach as identified by the City of Poulsbo mapping resources. Available metadata does not provide information to provide date and or source. In general, utility impacts to this reach appear to be much lower than the other reaches within the City. Sanitary sewer is currently available through the central part of the reach (Exhibit L), but this will be extended by the end of 2010 to the end of the City limits on South Viking Avenue. A lift station is mapped at the terminus of NW Liberty Road. There are three

city stormwater outfalls mapped within this reach (Exhibit M). Water pipes are mapped primarily along Viking Ave NW and are located outside of the Shoreline Management Zone (Exhibit J); these will also be extended to the south City limits by the end of 2010.

There are no mapped water-dependent uses, such as ports, marinas, direct public water access points or water-related industrial uses, identified within this basin. There are eleven water dependent/ in-water structures identified within this reach as identified within the Eastern Kitsap Nearshore Assessment Data (Exhibit T-6). The water dependent/ in- water structures within this reach include the following: three areas of pilings, four Piers/Docks/Floats, two boat launches, and two overhanging structures. Water related/enjoyment use within this reach includes view access from Nelson Park, the Liberty Shores public beach and Picnic area as well as the existing shoreline trails within this reach. In addition, Bay Street and Liberty Road ends located within this reach may also provide public view access.

Existing public access points within MR5 include the following: Liberty Shores public beach and picnic area, Bay Street Road end, Old County Road trail, Liberty Road end, Nelson Park and the JRO pedestrian path easement.

There are two public access points via pedestrian easements. These are the Liberty Shores retirement center and the JRO commercial/office development.

The Poulsbo Trails Committee is in the process of conducting a review of all existing and planned trail connections within Poulsbo. Their study indicates that there are two existing shoreline trails within this reach. One is located in Nelson Park, and the other is the Old County Road trail. The committee is studying the feasibility of providing a connection between these trail points.

Due to the high levels of shoreline armoring and outfalls, the hydrologic function of this reach is considered to be low.

Hydrologic Function

All of the reaches within the City of Poulsbo are adjacent to Liberty Bay. General information about the water quality of Liberty Bay is located in Section 3 of this document. This section provides information regarding hydrologic function and associated impacts specific to reach MR5.

Bulkheads and other forms of shoreline armoring are sparse within the northern portions of the reach. Bulkheads become more prevalent within the southern portion of the reach. The seven southernmost parcels within this reach provide an almost continuous bulkhead (Exhibit V). The East Kitsap Nearshore Assessment identifies 11 units of shoreline armoring comprising approximately 30 percent of the shoreline within this reach. Of these, 8 units (-23 percent of the shoreline) are below OHWM. Most of MR5 is included within drift cell 67, which is an area of no appreciable drift as such any impact to sediment transport for this reach is likely to be highly localized. However, the southern part of the reach is included within drift cell 66, which is a right to left drift cell with sediment transport moving north toward the head of Liberty Bay. Sediment

is also deposited within the reach from Dogfish Creek. Therefore there is the opportunity for some of these bulkheads to modify sediment transport outside of the reach.

Water outfalls in this reach include 22 identified instances of pipe/tubing outfalls, 5 natural outfalls and one designated as “other”. The designation of “other” indicates that a stormwater outfall was found that did not fit into the following subcategories: Pipe/Tubing; Natural; and/or Culvert. It is assumed that the majority of the 22 pipe/tubing outfalls direct stormwater into liberty bay.

The entire length of this reach is mapped as 100-year floodplain associated with Liberty Bay (Exhibit I). However due to marine bluff heights within the majority of this reach, it appears that very little if any of this reach may have flood impacts that extend landward of the mapped extents of the shoreline.

Vegetation Function

MR5 is primarily characterized by residential development. Vegetation within this reach is primarily comprised of landscaped vegetation associated with single family residences including maintained yards with grass, gardens and ornamental shrubs. Within this reach, Nelson Park provides a multi-tier upland habitat area as well as overhanging vegetation that is likely to be most indicative of the historic vegetative structure of the reach.

Due to the level of alteration to the vegetation, the vegetation function of this reach is considered to be low.

Other Habitat Function

WDFW maps a portion of a Bald Eagle habitat polygon on the southern end of this reach (WDFW 2008). However, the upland portions of this reach are developed as residences and do not appear to provide adequate habitat.

There are no mapped wetlands within this reach. However, the shoreline located at Nelson Park as well as the terminus of NW Liberty Road may contain portions of wetland habitat.

The entire reach is comprised of saltwater shorelines. Saltwater shorelines are considered Fish and Wildlife Habitat Conservation Areas, a Critical Area type. In addition, site specific studies may yield information regarding, as yet unknown, critical areas.

Due to the minimal levels of mapped habitat and in conjunction with the habitat disturbance presented by the reduced hydrologic and vegetation functions, the habitat function rating for this reach is low.

4.6 SHORELINE FUNCTION SUMMARY

Table 14 provides a qualitative summary of relative hydrology, vegetation, and habitat function for each reach based on the detailed reach assessment provided for the specified reach in the

above text, comparison to function of other reaches within the City, as well as the anticipated function of an undeveloped reach. Designations of high, medium, or low are assigned for each reach function followed by a brief supporting narrative. In the final column, an overall qualitative score, also based upon high/medium/low designations, is provided. The overall qualitative score is determined based upon the qualitative ratings of the three separate functions as well as the quantitative assessment provided in the specific reach assessments. In general, as is typical in urban areas within the Puget Sound, the quality of habitat, hydrologic, and vegetative function within the City is diminished by the concentrated level of development. However, specific levels of impact to function for each reach of the City shoreline is closely tied to development patterns and landforms. For example, existing function is generally more intact in areas where land use and shoreline condition (e.g., steep slopes) limit or entirely exclude development adjacent to shoreline areas, as in MR 3 and MR 4.

Table 14. Ecological Function Assessment Summary for City shorelines.

Reach (Planning Segment)	Hydrologic	Vegetation	Habitat	Overall Function
Marine Reach 1 (Fjord Drive)	Low – High amounts of shoreline armoring, as well as observed impervious surfaces and residential lawns within this reach interfere with water storage. In addition, the shoreline armoring interferes with sediment transport and attenuation of wave energy. Adjacent roadways may serve as a source for metals, sediments, hydrocarbons and other pollutant inputs into Liberty Bay. The limited vegetation reduces the opportunity for storage and treatment of stormwater flows.	Low – Available aerial photographs reflect that shoreline vegetation within this reach is highly modified and reflective of residential development. Shading of shallow nearshore area by overhanging vegetation is limited to non-existent within the reach. In addition, residential landscape maintenance including the use of fertilizers, herbicides, and pesticides may serve as a source of contaminants.	Low – Increased amounts of shoreline development including shoreline armoring as well as reduced amounts of natural shoreline vegetation limit the habitat within this reach. Shoreline armoring generally results in increased wave energy that is inhospitable to small fish. Use by terrestrial species is also likely limited by the lack of shoreline vegetation and associated food, cover, nesting sites, etc.	Low - High amounts of modification to the natural shoreline in this reach through residential development, including shoreline armoring and removal of native vegetation have resulted in low hydrologic, vegetation, and habitat functionality.
Marine Reach 2 (Downtown Core)	Low – Majority of reach contains shoreline armoring which interferes with sediment transport and attenuation of wave energy. Visual estimations based upon available aerial photography indicate that the majority of upland area of the reach is impervious surface which interferes with water storage functions. Adjacent roadways may serve as a source for metals, sediments, hydrocarbons, and other pollutant inputs into Liberty Bay.	Low – Visual estimations based upon aerial photography indicate that the majority of upland areas within this reach are impervious surfaces. Areas of vegetation include grass within the Liberty bay park and a narrow strip of land supporting a mix of native and invasive plant species along the three northernmost parcels within this reach.	Low - High amounts of impervious surface coverage and shoreline armoring as well as low amounts of native vegetation limit the amount of habitat area that is provided within this reach.	Low – High amounts of modification generated by commercial development of the downtown, including impervious surfaces and shoreline armoring have resulted in low hydrologic, vegetation, and habitat functionality.

Reach (Planning Segment)	Hydrologic	Vegetation	Habitat	Overall Function
Marine Reach 3 (Front Street)	Medium – Reach contains only moderate amounts of shoreline armoring. As such, attenuation of wave energy and sediment transport is relatively less impacted than that found in other reaches. In addition, the majority of the upland within this reach contains multiple-canopied vegetation allowing for higher amounts of water storage/treatment as compared to the other reaches.	Medium – The majority of upland area within reach contains native plant species including evergreen and deciduous trees, shrubs and understory. The two northernmost parcels within this reach are primarily impervious, contain shoreline armoring, and have minimal associated vegetation.	Medium - The portions of vegetated shoreline and downed trees within this reach provide shading and vegetative inputs that are necessary components of quality intertidal habitat. This reach is likely to be relatively more hospitable to small fish and terrestrial species when compared to other reaches.	Medium – Portions of the reach are modified including shoreline armoring however amount of remaining native vegetation within this reach provides higher levels of functionality when compared to other reaches within the jurisdiction.
Marine Reach 4 (Estuary)	High – Aerial photography and on-site review indicate that this reach contains only small amounts of shoreline armoring on its southern portions (although no areas of shoreline armoring have been formally identified or digitized for GIS mapping purposes). The majority of the portion of Bond Road NE adjacent to the shoreline on the eastern side is separated from the shoreline by trees and vegetation that may serve to reduce pollutant inputs. Development is relatively distanced from the shoreline allowing	Medium – The majority of upland area within this reach contains native plant species including evergreen and deciduous trees, shrubs, and understory. In addition, Fish Park, with associated trees and grassy pasture areas, comprises the majority of the western side of this reach. The shoreline vegetation of approximately three parcels within the reach has been modified by development.	Medium - The portions of vegetated shoreline and downed trees within this reach provide shading and vegetative inputs that are necessary components of quality intertidal habitat. This reach is likely to be the most hospitable to small fish and terrestrial species when compared to other reaches.	Medium High – This reach is the least modified reach within the jurisdiction. Although, indication of modification to the shoreline vegetation is present this reach is also closest, when compared to the other reaches,

Reach (Planning Segment)	Hydrologic	Vegetation	Habitat	Overall Function
	for natural variations to the Dogfish Creek channel and estuary location.			
Marine Reach 5 (Western Shoreline)	Low – The majority of the upland portion of the reach contains residential lawns that are likely to impact water storage and may also act as point sources for contaminants such as fertilizers, herbicides, and pesticides. This reach contains moderate amount of shoreline armoring.	Low – The upland area within this reach is characterized by residential development. Vegetation within this reach is primarily comprised of landscaped vegetation associated with single family residences including maintained yards with grass, gardens and ornamental shrubs.	Low – The lack of shoreline vegetation and moderate amounts of shoreline armoring within this reach limit the amount of habitat area that is provided within this reach.	Low - High amounts of modification to the natural shoreline in this reach through residential development, including shoreline armoring and removal of native vegetation have resulted in low hydrologic, vegetation, and habitat functionality.

5 OPPORTUNITIES FOR SHORELINE PROTECTION, RESTORATION, PUBLIC ACCESS AND USE

5.1 SHORELINE PROTECTION AND RESTORATION OPPORTUNITIES

This section of the Inventory and Characterization document describes opportunities within the City to advance the goals of shoreline protection and restoration. Shoreline protection and restoration opportunities were primarily identified by utilizing the baseline watershed processes and reach characterization and functions information provided in Sections 3 and 4 of this document. In addition to the information contained within this Inventory and Characterization, the East Kitsap Nearshore Assessment was also utilized to identify various protection and restoration opportunities. It should be noted that all of the protection and recommendation opportunities identified in this section of the document, including the measures recommended within the East Kitsap Nearshore Assessment, will be considered by the City and associated stakeholders. The City may ultimately choose to incorporate and/or implement any or all of the restoration measures as identified in the text below based upon community visioning, stakeholder comments and guidance from the Department of Ecology. Further refinement of the proposed restoration goals, policies and activities will occur during Task 4.1 – *Restoration Planning* of the update process.

Similar to the goals set forth by Washington State for the Inventory and Characterization process of the Shoreline Master Program update, the purpose of the East Kitsap Nearshore Assessment was to summarize baseline shoreline conditions, evaluate impacts of nearshore disturbances to shoreline controlling factors and physical processes, and provide a framework for prioritizing shoreline management and restoration options. The entire shoreline of Eastern Kitsap County was reviewed for this assessment and included the shoreline with the City of Poulsbo jurisdiction. The following paragraph provides a brief summary of the components of the Assessment.

The Assessment began with a baseline evaluation of shoreline conditions including field and map review of shoreline modifications for each Nearshore Assessment Unit (NAU)⁸ including but not limited to armoring, boat launches, outfalls, marinas, and piers/docks and floats. Geographic Information Systems (GIS) software was utilized to document and analyze the baseline data. The baseline data was then utilized to determine the amount of disturbance to shoreline controlling factors and physical processes. The evaluation of disturbance to controlling factors included evaluation of substrate type, wave energy, depth/slope, light, frequency of disturbance, and water quality. The evaluation of disturbance to physical processes included evaluation of sediment transport, wave erosion, fluvial deposition, tidal erosion and wave deposition. Restoration recommendations were generated for each NAU by comparing the level of disturbance to the controlling factors and physical processes by stressors (inventoried shoreline modifications, including water quality), to the amount of disturbance within a drift cell

⁸ For the East Kitsap Nearshore Assessment, Nearshore Assessment Units (NAUs) are site level expanses of shoreline. As identified in the Assessment, the NAUs were created based initially on Washington State Department of Natural Resources Shorezone classifications and further subdivided and grouped based on updated geomorphology classification.

(e.g., modifications/impacts to sediment, fluvial, and tidal processes). The prioritization framework and management recommendations within the assessment rely on restoration of controlling factors and physical processes as the key to successful and long-term sustainability of the nearshore. For further information regarding this assessment and the associated scoring please refer to the East Kitsap Nearshore Assessment.

The remainder of Section 5.1 is divided into subsections that provide information on shoreline protection and restoration opportunities for each reach. Each reach subsection begins with a summary of the functional assessment provided in Section 4 of this document as well as a summary of the restoration results for NAUs within the subject reach as identified within the East Kitsap Nearshore Assessment. The summary information for the East Kitsap Nearshore Assessment is provided in table format and includes the controlling factors score and level of disturbance, dominant site processes score and level of disturbance and subsequent recommendation action. The summary table is followed by a concluding statement as to whether the assessment and recommendations of the East Kitsap Nearshore Assessment are consistent or inconsistent with the information provided in this Inventory and Characterization document. Each reach section is then concluded with recommendations for improvement to hydrologic, vegetative and habitat function in the reach as well as reach specific opportunities to improve shoreline function.

5.1.1 Marine Reach 1

As identified in Section 4.1 of this document, development of MR1 has resulted in the modification of natural shoreline processes and the subsequent rating of low for hydrologic, vegetation and habitat functions indicating that these functions have experienced a medium to high level of disturbance. The disturbance to shoreline function within this reach is primarily driven by the high amounts of modification to the natural shoreline in this reach through residential development, including shoreline armoring and removal of native vegetation have resulted in low hydrologic, vegetation, and habitat functionality. The restoration elements identified below have been provided to address the primary/driving sources of the disturbance to the reach.

The results of the East Kitsap Nearshore Assessment are as follows:

Table 15. East Kitsap County Nearshore Assessment results for MR1.

Site ID Number	Shorezone ID Numbers	Drift Cell ID	All Controlling Factors Score	All Dominant Processes Site Score	Recommended Management Action
310	3446	67	0.365 (high disturbance)	0.415 (high disturbance)	Enhance and Create and Restore site processes
311	3447	95	0.133 (medium disturbance)	0.267 (medium disturbance)	Enhance and Create and Restore site processes

312	3448	95	0.364 (high disturbance)	0.560 (high disturbance)	Enhance and Create and Restore site processes
313	3449	95	0.149 (medium disturbance)	0.415 (high disturbance)	Enhance and Create and Restore site processes
314	3450	95	0.383 (high disturbance)	0.538 (high disturbance)	Enhance and Create and Restore site processes
315	3451	68	0.227 (high disturbance)	0.292 (medium disturbance)	Restore and Restore Site Processes

The assessments and recommendations completed as a result of the East Kitsap Nearshore Assessment are generally consistent with the functional assessment in this document.

Recommendations for improvement to hydrologic, vegetative and habitat functions in this reach include:

- Promote restoration and creation of multiple canopied native shoreline vegetation to restore vegetation function; this will also benefit both hydrologic (water quality) and habitat (input of organics, structure) functions.
- Discourage the building of new bulkheads and promote the replacement of existing bulkheads with soft armoring alternatives to restore and protect hydrologic (sediment supply and transport) and habitat (structure) functions.
- Prevent flow of untreated stormwater from adjacent transportation and stormwater infrastructure to flow directly into Liberty Bay to restore and protect hydrologic (water quality) functions.

Reach specific opportunities to improve shoreline function include:

- Restoration of water quality and habitat function through removal of identified abandoned pilings (Exhibit S).
- Restoration of water quality and habitat function through removal of identified wood scraps/old dock (Exhibit S).

- Restoration of water quality and habitat function through clean-up of documented soil contamination (Exhibit S).
- Promote yard care techniques that protect water quality to the residents of this reach.

5.1.2 Marine Reach 2

As identified in Section 4.2 of this document, development of MR2 has resulted in the modification of natural shoreline processes and the subsequent rating of low for hydrologic, vegetation and habitat functions indicating that these functions have experienced a medium to high level of disturbance. The disturbance to shoreline function within this reach is primarily driven by the High amounts of modification generated by commercial development of the downtown, including impervious surfaces and shoreline armoring have resulted in low hydrologic, vegetation, and habitat functionality. The restoration elements identified below have been provided to address the primary/driving sources of the disturbance to the reach.

The results of the East Kitsap Nearshore Assessment are as follows:

Table 16. East Kitsap County Nearshore Assessment results for MR2.

Site ID Number	Reach ID Numbers	Drift Cell ID	All Controlling Factors Score	All Dominant Processes Site Score	Recommended Management Action
308	3444	67	0.360 (high disturbance)	0.234 (medium disturbance)	Enhance and Create and Restore site processes
309	3445	67	0.410 (high disturbance)	0.579 (high disturbance)	Enhance and Create and Restore site processes

The assessments and recommendations completed as a result of the East Kitsap Nearshore Assessment are generally consistent with the functional assessment provided in this document.

Recommendations for improvement to hydrologic, vegetative and habitat functions in this reach include:

- Prevent flow of untreated stormwater from adjacent transportation and stormwater infrastructure to flow directly into Liberty Bay to restore and protect hydrologic (water quality) functions.
- Promote restoration of multiple canopied native shoreline vegetation for those parcels with vegetation to restore native vegetation function; this will also benefit both hydrologic (water quality) and habitat (input of organics, habitat structure) functions.

- This reach has limited opportunity for restoration relative to the other shoreline reaches within the City. Its function as the Downtown Core as well as the proximity of existing
- buildings to the armored shoreline prevents opportunities to generally restore the shoreline habitat in this area.

Reach specific opportunities to improve shoreline function include:

- Restoration of water quality and habitat function through removal of identified abandoned pilings (Exhibit S).
- Restoration of upland water storage and water quality through reduction to existing impervious surfaces as redevelopment occurs. Utilize low impact development standards as applicable.
- MR2 contains a boardwalk along the northern portion of the reach. This boardwalk provides great shoreline viewing opportunities, but is constructed with treated wood and shades the nearshore. If this boardwalk is ever in need of repair, it is recommended that the solid wood walk portion be replaced with grating to reduce shading of nearshore habitat.

5.1.3 Marine Reach 3

As identified in Section 4.3 of this document, development of MR3 has resulted in the modification of natural shoreline processes and the subsequent rating of medium for hydrologic, vegetation, and habitat functions indicating that these functions have experienced a medium level of disturbance. The disturbance to shoreline function within this reach is primarily driven by the small portions of the reach that are modified, including areas of shoreline armoring. However the amount of remaining native vegetation within this reach provides higher levels of functionality when compared to other reaches within the jurisdiction, and is only exceeded in quality by MR 4. The restoration elements identified below have been provided to address the primary/driving sources of the disturbance to the reach as well as to provide protection for the intact functionality identified within this reach.

The results of the East Kitsap Nearshore Assessment are as follows:

Table 17. East Kitsap County Nearshore Assessment results for MR3.

Site ID Number	Reach ID Numbers	Drift Cell ID	All Controlling Factors Score	All Dominant Processes Site Score	Recommended Management Action
306	3444	67	0.152 (medium disturbance)	0.498 (high disturbance)	Enhance and Create and Restore site processes
307	3445	67	0.054 (low disturbance)	0.023 (low disturbance)	Enhance

The assessments and recommendations completed as a result of the East Kitsap County Nearshore Habitat Assessment are generally consistent with the functional assessment provided in this document.

Recommendations for improvement to hydrologic, vegetative and habitat functions in this reach include:

- Promote restoration and enhancement of multiple canopied native shoreline vegetation in areas where it has been disturbed to restore vegetation function; this will also benefit both hydrologic (water quality) and habitat (input of organics, structure) functions.
- Prevent flow of untreated stormwater from adjacent transportation and stormwater infrastructure to flow directly into Liberty Bay to restore and protect hydrologic (water quality) functions.
- Discourage the building of new bulkheads and promote the replacement of existing bulkheads with soft armoring alternatives to restore and protect hydrologic (sediment supply and transport) and habitat (structure) functions.
- Promote yard care techniques that are protective of water quality to the residents of this reach to restore and protect hydrologic function.

Reach specific opportunities to improve shoreline function include:

- Restoration of water quality and habitat function through removal of identified abandoned pilings. (Exhibit S)
- Restoration of water quality and habitat function through removal of identified wood scrap (Exhibit S)

5.1.4 Marine Reach 4

As identified in Section 4.4 of this document, development of MR4 has resulted in the modification of natural shoreline processes and the subsequent rating of high for hydrologic function, and medium for vegetation and habitat function indicating that these functions have experienced a relatively low level of disturbance. The restoration elements identified below have been identified to provide protection for the intact functionality identified within this reach as well as address any sources of disturbance within the reach.

The results of the East Kitsap Nearshore Assessment are as follows:

Table 18. East Kitsap County Nearshore Assessment results for MR4.

Site ID Number	Reach ID Numbers	Drift Cell ID	All Controlling Factors Score	All Dominant Processes Site Score	Recommended Management Action
303	3439	67	0.020 (low disturbance)	0.035 (low disturbance)	Enhance
304	3440	67	0.013 (low disturbance)	0.000 (low disturbance)	Enhance
305	3441	67	0.035 (low disturbance)	0.035 (low disturbance)	Enhance

The assessments and recommendations completed as a result of the East Kitsap Nearshore Assessment are generally consistent with the functional assessment in this document.

Recommendations for improvement to hydrologic, vegetative and habitat functions in this reach include:

- Protect/maintain existing habitat
- Promote re-establishment or enhancement of multiple canopied shoreline habitat in areas where it has been disturbed to restore vegetation function; this will also benefit both hydrologic (water quality) and habitat (inputs of organics, structure) functions.
- Maintain existing channel migration zone to avoid avulsion, erosion, or flooding impacts by discouraging/preventing development in these areas.
- Prevent flow of untreated stormwater from adjacent transportation and stormwater infrastructure to flow directly into Liberty Bay to restore and protect hydrologic (water quality) functions.
- Promote low impact development standards within the areas of this reach that can be developed to reduce development impacts to existing habitat, vegetation, and hydrologic function.

Promote yard care techniques that are protective of water quality to the residents to restore and protect hydrologic function.

Reach specific opportunities to improve shoreline function include:

- The Fish Park Master Plan identified a number of restoration efforts to be implemented in both the shoreline and upland areas of Fish Park, such as restoration of natural stormwater flows over the site including feeder channels into Dogfish Creek, wetland and native vegetation restoration and maintenance throughout the site, removal of hazardous materials in old landfill areas, and addition of woody debris and timber falls to restored creek areas.

5.1.5 Marine Reach 5

As identified in Section 4.5 of this document, development of MR5 has resulted in the modification of natural shoreline processes and the subsequent rating of low for hydrologic, vegetation and habitat function indicating that these functions have experienced a medium to high level of disturbance. The disturbance to shoreline function within this reach is primarily driven by the high amounts of modification to the natural shoreline in this reach through residential development, including shoreline armoring and removal of native vegetation have resulted in low hydrologic, vegetation, and habitat functionality. The restoration elements identified below have been provided to address the primary/driving sources of the disturbance to the reach.

The results of the East Kitsap Nearshore Assessment are as follows:

Table 19. East Kitsap County Nearshore Assessment results for MR5.

Site ID Number	Reach ID Numbers	Drift Cell ID	All Controlling Factors Score	All Dominant Processes Site Score	Recommended Management Action
299	3435	66	0.086 (low disturbance)	0.218 (medium disturbance)	Protect and Conserve and Restore and Restore Site Processes
300	3436	67	0.072 (low disturbance)	0.086 (low disturbance)	Enhance
301	3437	67	0.069 (low disturbance)	0.177 (low disturbance)	Enhance
302	3438	37	0.215 (medium disturbance)	0.345 (medium disturbance)	Enhance and Create and Restore Site Processes

The assessments and recommendations completed as a result of the East Kitsap Nearshore Assessment are somewhat inconsistent with the functional assessment provided in this document. The differing assessments are likely the result of different weight structures given to residential

disturbance of shoreline vegetation for each of the assessments. However, this document concurs with the recommended management actions as generated by the East Kitsap Nearshore Assessment.

Recommendations for improvement to hydrologic, vegetative and habitat functions in this reach include:

- Promote restoration/enhancement of multiple canopied native shoreline vegetation where it has been disturbed to restore vegetation function; this will also benefit both hydrologic (water quality) and habitat (input of organics, structure) functions.
- Discourage the building of new bulkheads and promote the replacement of existing bulkheads with soft armoring alternatives to restore and protect hydrologic (sediment supply and transport) and habitat (structure) functions.
- Prevent flow of untreated stormwater from adjacent transportation and stormwater infrastructure to flow directly into Liberty Bay to restore and protect hydrologic (water quality) functions.
- Promote yard care techniques that are protective of water quality to the residents to restore and protect hydrologic function.

Reach specific opportunities to improve shoreline function/quality include:

- Restoration of water quality and habitat function through removal of identified abandoned. (Exhibit S)
- Restoration of water quality and habitat function through removal of identified scrap metal. (Exhibit S)

General Recommendations

In addition to the specific recommendations to improve hydrologic, vegetative and habitat functions for each reach. The following general recommendations are provided for the entire jurisdiction:

The City of Poulsbo shoreline jurisdiction is composed primarily of highly modified shoreline areas almost entirely consisting of privately-owned uplands, as well as tidelands in some cases. Citizen outreach to provide education resources regarding the effects of lawn care practices on water quality within the marine waters have potential to improve citizen involvement in shoreline protection and restoration.

Other non-specific restoration opportunities along the marine reaches include bulkhead modification, where appropriate, to reduce the effects of hardened vertical structures on sediment transport and nearshore habitat. These modifications include removal, beach reshaping,

installing woody debris along the shoreline, and restoring connection of the beach to sediment input systems, including eroding bluffs.

Installing nearshore vegetation, where appropriate, can provide nearshore water quality protection functions to shallow intertidal areas.

5.2 PUBLIC ACCESS OPPORTUNITIES

Shoreline public access is the ability of the general public to reach and touch the water and the ability to view the water and the shoreline from upland locations. Public access facilities include public parks, boat launches, trails, improved street ends and overlooks. On Poulsbo shorelines, public access is provided by multiple parks, marinas, and shoreline trails and path easements (Exhibit Q-1). Each reach contains at least one public access point.

As the majority of the parcels adjacent to the shoreline are developed, potential new public access opportunities to Poulsbo's shoreline area would likely entail expanding and improving facilities at existing sites. For example, estuary viewing points were constructed recently within Fish Park, and additional trails connecting Fish Park to Viking Avenue and a larger network of pedestrian and bicycle paths are planned for the near future.

5.3 SHORELINE USE ANALYSIS AND IDENTIFICATION OF POTENTIAL CONFLICTS

Planned shoreline use for the City of Poulsbo includes residential use, parks, and commercial space and is consistent with implemented zoning adopted Comprehensive Plan (City of Poulsbo 2009). There are relatively few undeveloped properties remaining and future development will likely involve the redevelopment of existing parcels.

The residential use of property as well as the development of parks is a priority use according to the SMA (RCW 90.58.020). In addition, three of the commercially zoned lots adjacent to the shoreline represent functional marinas which are also a priority use pursuant to the SMA.

The only potential for shoreline use conflict within the City of Poulsbo may occur if redevelopment occurs within the commercial lots directly adjacent to the shoreline that are not shoreline dependent. City of Poulsbo staff must ensure that development is consistent with the goals and policies outlined in the SMA, the Shoreline Master Program, and does not result in ecological harm.

6 DATA GAPS

This section of the Inventory and Characterization describes data gaps or limitations identified during document development. Identification of data gaps uncovered during the Shoreline Master Program Update is a necessary part of the Inventory and Characterization process pursuant to WAC 173-26-201(3)(c)(viii). These data gaps generally represent elements of the report where the analysis may be limited, relevant data cannot be found, and/or the City will continue to obtain information on beyond the completion of this document. -This section is not intended to provide an exhaustive list of all of the items the City should address. However, the items listed within this section are provided to serve as the initial development of possible directions the City may wish to pursue to facilitate future code updates and/or amendments to the Shoreline Master Program.

Regional Information

As noted in Section 2 of this document, Kitsap County is conducting its SMP update concurrent with the City effort, and will prepare a county-wide assessment of regional conditions including watershed processes and shoreline functions. Additionally, Ecology is preparing analyses of watershed processes for Puget Sound marine shorelines that will become available in 2010. This information should be utilized for this update process, as it becomes available, as well as for future updates.

Movement of Sediment

As noted in Section 3.2 of this document, the City replaced a historically constrained culvert at the mouth of Dogfish Creek underneath Lindvig Way with a bridge in 2003. The replacement of the culvert with a bridge substantially increased the channel width at this location (Lund, pers. comm.). Based on anecdotal observations by City staff, the increase in channel width has resulted in a modification to sediment transport out of the upper estuary and into Liberty Bay. This modification of sediment transport could be studied quantitatively to determine what, if any, effects sediment movement have had, or may have, on the Liberty Bay environment.

Cultural Resources

No cultural resources were identified within Department of Archaeology and Historic Preservation or City of Poulsbo data resources during the inventory process. However as the City of Poulsbo is developed around Liberty Bay and was based primarily on fishing and boat transport, some cultural resources may exist in the shoreline.

Utility Planning

Although this document does address the locations of major utilities within the reach, such as sewer, stormwater and water lines, it does not describe the City's goals and objectives for long-term management. Of specific concern to the Shoreline Master Program would be the long-term management plans for all utility lines within Liberty Bay or directly adjacent to the shoreline.

Land Cover/Impervious Surfaces

This document does not contain quantitative data regarding the percent or acreage of impervious land cover, which is the common metric utilized for obtaining baseline land cover information. The City does not have access to GIS layers that would make this information easy to obtain. However, during the inventory and Characterization process, the City of Poulsbo completed an initial review of land cover and impervious surface data. As a result of this review, it was determined that only one parcel within the shoreline area of the City and associated UGA was anticipated for further development. As such, a substantial increase of impervious surface over the current baseline is not anticipated.

Site Specific Critical Area Information

As noted within some of the reach assessments within Section 4 of this document, site specific studies may yield information regarding critical areas that are currently unknown and unmapped.

Shoreline Indicators

During the Inventory and Characterization process, the Washington State Department of Ecology identified specific no net loss indicators that can be utilized by jurisdictions as a means to provide a quantifiable demonstration of no net loss. These indicators include: acres of converted forest cover, linear length of shoreline stabilization, linear measurement of mature native riparian vegetation (or percent of vegetation cover within a specific class, areas of permanently protected areas, square footage of new and/or replacement docks/floats/piers, road lengths within 200 feet of a water body, number of road crossings of water bodies, 303(d) water quality listings, Linear feet of levees/dikes, and acres of floodplain. Based upon existing data, the city was able to provide quantified data on shoreline armoring, piers/docks/overwater structures, and road lengths within 200 feet of a water body. As such the City may choose to develop mapping and/or gather information on these indicators to inform future updates.

East Kitsap Nearshore Assessment Data

While the quality of the East Kitsap Nearshore Assessment data is generally very good, there are some discrepancies based on aerial photo review. In MR1, this includes the shoreline at the Liberty Bay Marina, which is not mapped as being armored. In MR2, this includes some shoreline at Port of Poulsbo Marina immediately north of the boat ramp, which is not mapped as being armored. No discrepancies were noted for the other reaches identified within this report, however, the city is aware that some may exist. While data and figures in this report reflect East Kitsap Nearshore Assessment data as presented, the City acknowledges that some errors and omissions exist and will capture corrections on a parcel-by-parcel basis as it continues to track shoreline conditions through land use review and other efforts.

Table 20. Summary of Recommendations for Protection and Restoration of City shoreline function

Reach (Planning Segment)	Overall Function	East Kitsap Recommendations ⁹	SMP Recommendations, General	SMP Recommendations, Specific
Marine Reach 1 (Fjord Drive)	<p>Low - High amounts of modification to the natural shoreline in this reach through residential development, including shoreline armoring and removal of native vegetation have resulted in low hydrologic, vegetation, and habitat functionality.</p> <p>This assessment generally correlates with the medium to high levels of disturbance to both controlling factors (high, medium) and dominant processes (high, medium) as assessed in the EKNA (Refer to Table 15).</p>	For most of the shoreline, enhance, create, and restore site processes; south of S 9 th Street restoration is specifically called out.	<ul style="list-style-type: none">• Promote restoration and creation of multiple canopied native shoreline vegetation to restore vegetation function; this will also benefit both hydrologic (water quality) and habitat (input of organics, structure) functions.• Discourage the building of new bulkheads and promote the replacement of existing bulkheads with soft armoring alternatives to restore and protect hydrologic (sediment supply and transport) and habitat (structure) functions.• Prevent flow of untreated stormwater from adjacent transportation and stormwater infrastructure to flow directly into Liberty Bay to restore and protect hydrologic (water quality) functions.	<ul style="list-style-type: none">• Restoration of water quality and habitat function through removal of identified abandoned pilings (Exhibit S).• Restoration of water quality and habitat function through removal of identified wood scraps/old dock (Exhibit S).• Restoration of water quality and habitat function through clean-up of documented soil contamination (Exhibit S).• Promote yard care techniques that protect water quality to the residents of this reach.

⁹ Please refer to the Battelle Marine Sciences Laboratory (BMSL) 2009 document, East Kitsap County Nearshore Habitat Assessment and Restoration Prioritization Framework, for further information on how these recommendations were developed.

Reach (Planning Segment)	Overall Function	East Kitsap Recommendations ⁹	SMP Recommendations, General	SMP Recommendations, Specific
Marine Reach 2 (Downtown Core)	<p>Low High amounts of modification to the natural shoreline in this reach through residential development, including shoreline armoring and removal of native vegetation have resulted in low hydrologic, vegetation, and habitat functionality.</p> <p>This assessment generally correlates with levels of disturbance to both controlling factors (high) and dominant processes (medium, high) as assessed in the EKNA (Refer to Table 16).</p>	Recommendation for the entire shoreline is to enhance, create, and restore site processes.	<ul style="list-style-type: none">• Prevent flow of untreated stormwater from adjacent transportation and stormwater infrastructure to flow directly into Liberty Bay to restore and protect hydrologic (water quality) functions.• Promote restoration of multiple canopied native shoreline vegetation for those parcels with vegetation to restore native vegetation function; this will also benefit both hydrologic (water quality) and habitat (input of organics, habitat structure) functions.• This reach has limited opportunity for restoration relative to the other shoreline reaches within the City. Its function as the Downtown Core as well as the proximity of existing buildings to the armored shoreline prevents opportunities to generally restore the shoreline habitat in this area.	<ul style="list-style-type: none">• Restoration of water quality and habitat function through removal of identified abandoned pilings (Exhibit S).• Restoration of upland water storage and water quality through reduction to existing impervious surfaces as redevelopment occurs. Utilize low impact development standards as applicable.• MR2 contains a boardwalk along the northern portion of the reach. This boardwalk provides great shoreline viewing opportunities, but is constructed with treated wood and shades the nearshore. If this boardwalk is ever in need of repair, it is recommended that the solid wood walk portion be replaced with grating to reduce shading of nearshore habitat.

Reach (Planning Segment)	Overall Function	East Kitsap Recommendations ⁹	SMP Recommendations, General	SMP Recommendations, Specific
Marine Reach 3 (Front Street)	<p>Medium - Portions of the reach are modified including shoreline armoring however amount of remaining native vegetation within this reach provides higher levels of functionality when compared to other reaches within the jurisdiction.</p> <p>This assessment generally correlates with the levels of disturbance to both controlling factors (low, medium) and dominant processes (low, high) as assessed in the EKNA (Refer to Table 17).</p>	For most of the shoreline enhancement is recommended; near Lindvig Bridge where disturbance is somewhat higher recommendation is to enhance, create, and restore site processes.	<ul style="list-style-type: none"> Promote restoration and enhancement of multiple canopied native shoreline vegetation in areas where it has been disturbed to restore vegetation function; this will also benefit both hydrologic (water quality) and habitat (input of organics, structure) functions. Prevent flow of untreated stormwater from adjacent transportation and stormwater infrastructure to flow directly into Liberty Bay to restore and protect hydrologic (water quality) functions. Discourage the building of new bulkheads and promote the replacement of existing bulkheads with soft armoring alternatives to restore and protect hydrologic (sediment supply and transport) and habitat (structure) functions. Promote yard care techniques that are protective of water quality to the residents of this reach to restore and protect hydrologic function. 	<ul style="list-style-type: none"> Restoration of water quality and habitat function through removal of identified abandoned pilings. (Exhibit S) Restoration of water quality and habitat function through removal of identified wood scrap (Exhibit S)
Marine Reach 4 (Estuary)	<p>Medium High – This reach is the least modified reach within the jurisdiction. Although, indication of modification to the shoreline vegetation is present this reach is also closest, when compared to the other reaches,</p> <p>This assessment generally correlates with the levels of disturbance to both controlling factors (low) and dominant processes (low) as assessed in the EKNA (Refer to Table 18).</p>	For the entire shoreline enhancement is recommended.	<ul style="list-style-type: none"> Protect/maintain existing habitat Promote re-establishment or enhancement of multiple canopied shoreline habitat in areas where it has been disturbed to restore vegetation function; this will also benefit both hydrologic (water quality) and habitat (inputs of organics, structure) functions. Maintain existing channel migration zone to avoid avulsion, erosion, or flooding impacts by discouraging/preventing development in these areas. 	<ul style="list-style-type: none"> The Fish Park Master Plan identified a number of restoration efforts to be implemented in both the shoreline and upland areas of Fish Park, such as restoration of natural stormwater flows over the site including feeder channels into Dogfish Creek, wetland and native vegetation restoration and maintenance throughout the site, removal of hazardous materials in old landfill areas, and addition of woody debris and timber falls to restored creek areas.

Reach (Planning Segment)	Overall Function	East Kitsap Recommendations ⁹	SMP Recommendations, General	SMP Recommendations, Specific
			<ul style="list-style-type: none">• Prevent flow of untreated stormwater from adjacent transportation and stormwater infrastructure to flow directly into Liberty Bay to restore and protect hydrologic (water quality) functions.• Promote low impact development standards within the areas of this reach that can be developed to reduce development impacts to existing habitat, vegetation, and hydrologic function.• Promote yard care techniques that are protective of water quality to the residents to restore and protect hydrologic function.	

Reach (Planning Segment)	Overall Function	East Kitsap Recommendations ⁹	SMP Recommendations, General	SMP Recommendations, Specific
Marine Reach 5 (Western Shoreline)	<p>Low High amounts of modification to the natural shoreline in this reach through residential development, including shoreline armoring and removal of native vegetation have resulted in low hydrologic, vegetation, and habitat functionality.</p> <p>This assessment differs somewhat from the levels of disturbance to both controlling factors (low, medium) and dominant processes (low, medium) as assessed in the EKNA (Refer to Table 18 and Section 5.1.5). However, resulting management recommendations are still similar.</p>	<p>For much of the shoreline enhancement or enhancement, creation, and restoration is recommended. South of NW Bay St protection, conservation, and restoration are recommended.</p>	<ul style="list-style-type: none">• Promote restoration/enhancement of multiple canopied native shoreline vegetation where it has been disturbed to restore vegetation function; this will also benefit both hydrologic (water quality) and habitat (input of organics, structure) functions.• Discourage the building of new bulkheads and promote the replacement of existing bulkheads with soft armoring alternatives to restore and protect hydrologic (sediment supply and transport) and habitat (structure) functions.• Prevent flow of untreated stormwater from adjacent transportation and stormwater infrastructure to flow directly into Liberty Bay to restore and protect hydrologic (water quality) functions.• Promote yard care techniques that are protective of water quality to the residents to restore and protect hydrologic function.	<ul style="list-style-type: none">• Restoration of water quality and habitat function through removal of identified abandoned pilings (Exhibit S)• Restoration of water quality and habitat function through removal of identified scrap metal (Exhibit S)

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