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SHORELINE INVENTORY REPORT – Technical Appendix Volume I - Wetlands City of Bellevue's Shorelines: Lake Washington, Lake Sammamish, Phantom Lake, Kelsey Creek and Mercer Slough

Project: Shoreline Master Program Update

- **Task 1.3.3: Develop Shoreline Wetlands Inventory**

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1.0 INTRODUCTION

This report presents an assessment of key wetlands considered to be "associated" with Bellevue's shorelines: Lake Washington, Lake Sammamish, Phantom Lake, Kelsey Creek, and Mercer Slough (see maps in Appendix A). Associated wetlands are those that are "in *proximity* to and either *influence* or are *influenced by* … a lake or stream subject to the Shoreline Management Act".

It is generally acknowledged that wetlands perform the following eight functions: 1) flood/stormwater control, 2) base flow/groundwater support, 3) erosion/shoreline protection, 4) water quality improvement, 5) natural biological support, 6) general habitat functions, 7) specific habitat functions, and 8) cultural and socioeconomic values (Cooke Scientific Services 2000). Shoreline-associated wetlands, by virtue of their connection with or proximity to shoreline water bodies, have the potential to perform many of these functions at a higher level than wetlands outside of shoreline jurisdiction.

2.0 METHODS

The City of Bellevue (City) was consulted to identify target wetlands for assessment. Existing City of Bellevue wetland information and National Wetland Inventory (NWI) data were reviewed to identify associated wetlands. Ecology guidance states that the entire wetland is associated if any part of it lies within the area 200 feet from the OHWM (or floodway in riverine environments) of a state shoreline. Further guidance states that wetlands that are hydraulically connected to a Shoreline also would be considered associated, as well as wetlands within the 100-year floodplain. Wetlands that are separated by an obvious topographic break from the shoreline are not associated, provided they are outside the shoreland zone and provided that the break is not an artificial feature such as a berm or road. We used observations in the field to assess the hydrologic connectivity of wetlands to the City's Shoreline.

To the greatest extent possible, we identified wetland areas along the shoreline using aerial photography in addition to existing inventory information. Materials included oblique aerial photography of the shoreline from the Department of Ecology's Coastal Atlas website (https://fortress.wa.gov/ecy/coastalatlas/viewer.htm) and the Windows Live Local mapping program (http://local.live.com). Winter aerial photographs from Google maps (http://maps.google.com) were used to identify vegetation types in and around wetland areas. Information on the condition and size of the contributing basins in Bellevue was obtained through the City of Bellevue's online Mapping Service (http://www.ci.bellevue.wa.us/drainage_basin_maps.htm). Finally, topography and summer aerial photography were reviewed using King County's mapping site, iMAP (http://www.metrokc.gov/gis/Mapportal/iMAP_main.htm).

Fieldwork was conducted from March through May of 2008. Wetland boundaries were located at a reconnaissance level using a combination of topography, aerial photographs of vegetation, and field visits. Winter aerial photographs were used to determine the extent of two species that typically grow in wetlands, reed canarygrass (*Phalaris arundinacea*, FACW) and Douglas spirea (*Spiraea douglasii*, FACW). We preliminarily determined the wetland edge to be at the location

where one or the other of these species transitioned to predominantly non-hydric vegetation. The location of the wetland edge was confirmed during site visits. Where aerial photographs and topography did not provide sufficient clues to make the determination, hydrology and soils were also examined during the site visits.

Each wetland was rated using the *Washington State Wetland Rating System for Western Washington* (Rating System) (Ecology 2004) (see Appendix B for rating forms). Field observations and aerial and oblique photography were used to assess and rate the wetlands. A rating form for each wetland described below is included in Appendix B.

The boundary of wetland units described in this section were defined for the purposes of rating based on pages 12 to 19 of the Rating System. Several wetland complexes within the scope of this inventory are physically divided by man-made features (roads/trails) and were either rated as many units or as one depending on how water flowed across the bisecting feature (see section entitled "*Wetlands Bisected by Human-Made Features*"). The flow of water through the surface connection between wetland areas was assessed in the field to make this determination. Units were rated separately if water flowed only in one direction through the connection (e.g., between Phantom A and Phantom B Wetlands). They were grouped as one wetland if the water levels on each side of the man-made feature were the same, allowing movement of water in either direction (e.g., Phantom B is not divided by 156th Avenue SE as the bottom of the culvert is submerged beneath stagnant water).

Additionally, each wetland was assessed using the *Wetland and Buffer Functions Semi-Quantitative Assessment Methodology* (SAM) (Cooke Scientific Services 2000). SAM was used to evaluate each wetland based on the eight functions described above. Though the analysis has no regulatory implications, the information was used to more fully understand each wetland from a landscape, educational and cultural perspective. The SAM rating forms are included in Appendix C.

3.0 FINDINGS

The following six general areas along the City's shorelines were determined to contain wetlands:

- Meydenbauer Bay
- Mercer Slough
- Lower Kelsey Creek
- Newcastle Beach Park
- Phantom/Larsen Lakes
- Lake Sammamish

Table 1 provides information about the size, location, and classification of each of the assessment wetlands.

3.1 Meydenbauer Bay

Located west of downtown Bellevue, Meydenbauer Bay has a highly developed shoreline. Meydenbauer Beach Park and the mouth of Meydenbauer Creek contain wetlands.

Table 1. Summary of wetland size, location and classification.

Wetland	Approx. Size	Location (S/T/R)	HGM Class[1]	Ecology Wetland Rating				
				Category	WQ[2]	HYD	HAB	Total
Meydenbauer Beach A	2,500 SF	31 25 05	S	IV	0	2	8	**10**
Meydenbauer Beach B	<1,000 SF	31 25 05	D	IV	2	2	6	**10**
Meydenbauer Beach C	<1,000 SF	31 25 05	D	IV	2	2	6	**10**
Meydenbauer Creek A	5.5 acres	31 25 05	L	IV	0	0	11	**11**
Meydenbauer Creek B	3.7 acres	32 25 05	R	II	20	22	14	**56**
Mercer Slough Wetland	398 acres	04 24 05 05 24 05 08 24 05 09 24 05	DLR/D	II	20	7	29	**56**
Sturtevant Creek	12.2 acres	32 25 05 05 25 05	R	II	24	13	23	**60**
SE 40th Street Wetland	2,000 SF	08 24 05	L	IV	0	4	10	**14**
Coal Creek Wetland A	0.6 acres	17 24 05	L	III	14	8	14	**36**
Coal Creek Wetland B	<1,000 SF	17 24 05	D	IV	4	6	8	**18**
Coal Creek Wetland C	<1,000 SF	17 24 05	D	IV	8	10	11	**29**
Bellefield Park Lane	0.6 acres	05 24 05	D	IV	4	8	15	**27**
Kelsey A	5.1 acres	33 25 05	R	I	24	32	24	**80**
Kelsey B	>40 acres	03 24 05 04 24 05 33 25 05 34 25 05	R	I	20	26	27	**73**
Kelsey C	4 acres	04 24 05	R	II	16	18	18	**52**
Kelsey D	5.5 acres	04 24 05 33 25 05	R	I	32	22	21	**75**
Kelsey E	3.0 acres	33 25 05	D	II	22	16	16	**54**
Kelsey F	0.3 acres	04 24 04 33 25 05	R	III	20	9	17	**46**
Newcastle A	6.2 acres	17 24 05	LRSD/D	II	20	12	21	**53**
Newcastle B	2.0 acres	17 24 05	R	III	20	9	17	**46**

Wetland	Approx. Size	Location (S/T/R)	HGM Class[1]	Ecology Wetland Rating				
				Category	WQ[2]	HYD	HAB	Total
Phantom A	38 acres	01 24 05 02 24 05	LDR/D	II	16	20	24	**59**
Phantom B	39 acres	02 24 05	R	I	16	32	25	**73**
Larsen A	88 acres	02 24 05 34 25 05 35 25 05	RD/D	II	18	24	26	**68**
Larsen B	3.2 acres	34 25 05	RD/D	II	14	16	21	**51**

[1] D = Depressional; S = Slope; L = Lake fringe; R = Riverine; wetlands with multiple HGM classes were rated as Depressional per guidance in Ecology's *Washington State Wetland Rating System for Western Washington*.
[2] WQ = Water Quality Function, HYD = Hydrologic Function, HAB = Habitat Function

3.1.1 Meydenbauer Beach Park

Three small, low-functioning wetlands (Wetlands A, B, and C) are located in close proximity to each other at the south end of Meydenbauer Beach Park. Though they are separated by uplands, each wetland is likely fed by the same groundwater seep. A ditch and culvert run through the wetland areas. Soft rush (*Juncus effusus*, FAC), saw-beaked sedge (*Carex stipata*, FACW), and bluegrasses (*Poa* sp.) dominate the wetlands, which are all currently maintained by mowing. Some red clover (*Trifolium repens*) and curly dock (*Rumex crispus*, FACW) are scattered throughout each wetland. A large weeping willow (*Salix x pendulina*, FAC+), rooted in an adjacent upland area, provides cover.

Meydenbauer Park Wetland A is an approximately 2,500-square-foot Category IV wetland. Wetlands B and C are both Category IV wetlands smaller than 1,000 square feet. The wetlands near Meydenbauer Beach Park provide only minimal water quality improvement and erosion prevention functions, and add little habitat value to the shoreline, as they are separated from the lake by a rock bulkhead.

3.1.2 Meydenbauer Creek Area

Two wetlands are located near the mouth of Meydenbauer Creek, at the south end of Meydenbauer bay. Wetland A is an approximately 5.5-acre lake fringe wetland composed of mostly aquatic bed vegetation and a small fringe of emergent vegetation along the shoreline. The wetland lies at the south end of Meydenbauer Bay, near the mouth of Meydenbauer Creek, which drains the 927-acre Meydenbauer Creek basin. The basin contains 53 percent impervious surface. Pond lily (*Nuphar polycephalum*, OBL) dominates the aquatic bed stratum, with some waterweed (*Egeria densa*, OBL) also present. Cattail (*Typha latifolia*, OBL) dominates the emergent fringe, with lesser amounts of American speedwell (*Veronica americana*, OBL), small-fruited bulrush (*Scirpus microcarpus*, OBL) and creeping buttercup (*Ranunculus repens*, FACW) supported as well.

Wetland A scores low on Ecology's rating form. Its thin margin of emergent plants along the shoreline affords very low erosion protection for the shoreline, and only marginal water quality function. The wetland contained some native bird species at the time of the field visit. Overall, however, it scores low for habitat functions because it is isolated from other habitats and has few structural components that would attract perching birds, mammals or amphibians, according to the Rating System.

Wetland B is a riverine wetland along Meydenbauer Creek, upstream of Wetland A. The approximately 3.5-acre, scrub-shrub and forested wetland is separated from the shoreline by 101st Avenue SE and the Bay Shore Apartment buildings and is approximately 390 feet away from the Lake Washington shoreline. Meydenbauer Creek floods the wetland during storm events with enough frequency to qualify this wetland as riverine. However, during times of normal flow, most of the hydrology that supports the wetland vegetation and hydric soils comes from groundwater. Several habitat features are present, including a few small snags, large woody debris, and vegetation overhanging Meydenbauer Creek. Now bordered by development, Wetland B was likely once contiguous with Wetland A and the Meydenbauer Bay shoreline.

The two wetlands likely have very little mutual exchange of groundwater, due to this separation. The narrow surface connection between Wetlands A and B via Meydenbauer Creek is unidirectional only. Wetland B is not considered associated with the shoreline and thus not within shoreline jurisdiction.

3.2 MERCER SLOUGH COMPLEX

The Mercer Slough area contains a unique and large shoreline wetland system that currently extends from just north of Coal Creek to SE 6th Street near downtown Bellevue. Alterations to the watershed have fragmented the Mercer Slough Complex, though much of the wetland adjacent to the slough remains as one unit. Despite historic alterations, the Mercer Slough Complex's size, location, and composition provide important functions to the City's shoreline. Five distinct wetland areas within the complex are discussed in this section.

3.2.1 Mercer Slough Wetland

The Mercer Slough Wetland is approximately 400 acres in size and located immediately adjacent to the slough. A high water table associated with the level of Lake Washington provides most of the hydrology to the wetland. A thin margin of area adjacent to the shoreline is likely seasonally inundated due to the regulated fluctuation of Lake Washington. Most of the scrub-shrub and forested areas of the wetland receive no overbank flooding, as those areas are located higher than the zone of fluctuation. Kelsey and Sturtevant Creeks, which drain 5,848 urbanized acres, flow into Mercer Slough. The wetland contains elements of lake fringe, depressional, and riverine hydrogeomorphic wetland classes.

The Mercer Slough Wetland contains a variety of land uses, including roadways and agricultural land. A portion of Interstate 90 passes through the wetland on pilings. Additionally, several trails, radio towers, and an active blueberry farm are contained within the large wetland. The Bellefield Office Park, located within the Mercer Slough Wetland Complex, contains areas that meet wetland parameters. Plants typical of hydric conditions, such as European silver birch (*Betula pendula*, FACW), pacific and weeping willows, cattail, and reed canarygrass, are widespread in the parking medians and adjacent to buildings. Standing water was observed in parking medians throughout the complex during the site visit in spring 2008. Since wetland parameters are met throughout, and there is a hydrologic connection via groundwater to other portions of the wetland, areas meeting parameters within the Bellefield Office Park are included in the Mercer Slough Wetland unit.

Black cottonwood, Oregon ash, and European silver birch dominate the canopy in the forest stratum, with shore pine (*Pinus contorta*, FAC) and western hemlock (*Tsuga heterophylla*, FAC+) sub-dominating. Pacific crabapple (*Malus fusca*, FACW) is widespread throughout the forest understory, which also supports European mountain ash (*Sorbus aucuparia*, NI), lady fern, and skunk cabbage (*Lysitchiton americanus*, OBL). Douglas spirea (*Spiraea douglasii*, FACW), Sitka willow (*Salix sitchensis*, FACW) and cascara (*Frangula purshiana*, FAC-) make up the scrub-shrub areas. Reed canarygrass forms a monoculture through most of the emergent stratum. Cultivated blueberry (*Vaccinium sp.*) is the primary species within the active and former agricultural areas contained within the Mercer Slough Wetland.

Some plants unique to peat-based environments grow in the largely organic substrate that characterizes the area. Water birch (*Betula occidentalis*, FACW) and peat bog birch (*Betula pumila*, OBL) flourish north of the blueberry farm. Some bog wetlands qualify as Category I based on "special characteristics", according to guidance in the Rating System. However, the Mercer Slough Wetland does not meet the *70% cover of mosses at ground level* parameter required for special rating (Ecology 2004, p. 88).

Based on functions, the Mercer Slough wetland rates as Category II. The wetland scores high for water quality function due to its position at the base of two highly urbanized contributing basins. According to the Rating System, "the opportunity for wetlands to improve water quality in a watershed is related to the amount of pollutants that come into the wetland. Qualitatively, the level of pollutants can be correlated with the level of disturbance, development, and intensity of agriculture in the landscape" (Ecology 2004, p44).

The Mercer Slough Wetland has a moderate score for hydrologic function as it has little opportunity, low in the watershed and along Lake Washington to protect resources against flooding. According to the Rating System, "The opportunity for wetlands to reduce the impacts of flooding and erosion is based on the presence of human or natural resources that can be damaged by these processes" (Ecology 2004, p57). Lake Washington is not generally threatened by these processes a result of its level being regulated by the Corps of Engineers. The level of Mercer Slough is consistent with that of Lake Washington. Flooding from Kelsey and Sturtevant Creeks likely does not impact the level of the Slough. Processes measured by the Rating System do not threaten buildings and natural resources within the Complex. However, the thick vegetation along the Lake Washington shoreline buffers against wave-induced erosion, protecting resources located landward of the wetland. The sinuous edges between the various habitat types, abundant snags, and downed woody debris throughout the wetland are all features of high quality wildlife habitat. Also, abundant overhanging vegetation along the slough and interior stream channels creates habitat for salmonids using Kelsey Creek.

3.2.2 Sturtevant Creek Wetland

A large portion of the 12-acre Sturtevant Creek Wetland receives overbank flooding from Sturtevant Creek during flooding events. The riverine wetland is located north of the Mercer Slough Wetland, divided from it by SE 8th Street. An approximately 15-foot-wide metal culvert conveys the flow of Sturtevant Creek to the Mercer Slough. The Sturtevant Creek Wetland sits at the base of the highly urbanized 773-acre Sturtevant Creek basin. At times of normal flow groundwater provides most of the hydrology that supports the wetland vegetation and hydric soils within the unit.

Emergent, scrub-shrub, and forested wetland classes are present. Pacific willow and red alder dominate the canopy of the forested area, located at the south edge of the wetland. Salmonberry, Douglas spirea, and Sitka willow dominate the scrub-shrub stratum, with Himalayan blackberry scattered within. A reed canarygrass monoculture makes up the emergent areas in the north and west sections of the unit.

The Category II Sturtevant Creek wetland has the opportunity to improve water quality because floodwaters entering the system originate in a watershed containing the Bellevue's downtown

core. Douglas spirea and other rigid vegetation grow thickly along the banks of Sturtevant Creek. During flooding events, dense vegetation in frequently flooded riverine systems like this "…acts as a filter to trap sediments and associated pollutants" (Ecology 2004, p53). Habitat features such as snags and downed woody debris and complex edges between habitat types offer niches for birds and mammals. However, the moderate habitat function score reflects the wetland's isolation from other significant patches of habitat by buildings and roads. The wetland has potential to store and diffuse flood flow, but there are no resources threatened by flooding downstream, as water levels in the Mercer Slough are regulated and likely not affected by flooding in Sturtevant Creek.

The culvert connection between the Sturtevant Creek Wetland and the Mercer Slough Wetland conveys unidirectional surface flow, constituting a break between units for rating purposes. However, the likely significant mutual hydrologic exchange beneath SE 8th Street means the unit is an associated wetland, despite being just over 200 feet away from the OHWM of the Mercer Slough.

3.2.3 SE 40th Street Boat Launch Area

The SE 40th Street boat launch area contains one small lake fringe wetland composed of aquatic bed vegetation and a small emergent fringe along the lakeshore. Wetland vegetation and hydric soils are largely supported by hydrology from the lake.

The emergent fringe located north of the boat launch is part of a small mowed lawn adjacent to Lake Washington. The vegetation consists of reed canarygrass, slough sedge (*Juncus effusus*, FACW), and American speedwell. American white water lily (*Nymphaea odorata*, OBL) occurs in patches among the marina slips. This patchy aquatic bed vegetation in the marina was historically contiguous with the Mercer Slough Wetland described above. In accordance with the Rating System guidance, most of the aquatic bed was not included in the unit, as it is not all contiguous with the emergent vegetation along the shoreline.

The wetland is a low quality, Category IV wetland, providing poor water quality and erosion prevention function. The small emergent wetland has a degraded buffer, no snags or woody debris, and is largely composed of non-native reed canarygrass. Its low structural and compositional diversity provides little wildlife habitat.

3.2.4 Coal Creek Area

Three small wetlands are located near the mouth of Coal Creek. As with the SE 40th Street wetland, the Coal Creek wetlands are situated close to the summer high level of Lake Washington. A high water table, associated with the nearby lake, supports the wetland vegetation and hydric soil.

Wetland A, a Category III lake-fringe wetland, just over 0.5 acres, lies north of Coal Creek on the edge of Lake Washington. It has little opportunity to reduce flood flow at the bottom of the Coal Creek basin, though it does provide some water quality function as it buffers the shoreline from wave erosion. The wetland contains scrub-shrub and emergent vegetation. Sitka and pacific willows are thick along the shoreline, with reed canarygrass also dense in patches.

Two small depressional wetlands (Wetlands B and C) are located south of Coal Creek near the edge of Lake Washington. The wetlands, each smaller than 1,000 square feet in size, contain only sparse, non-rigid emergent vegetation. The wetlands score low for functions, as they have little potential or opportunity to improve water quality, reduce flood flow, or provide habitat.

3.2.5 Bellefield Park Lane Wetland

The Bellefield Park Lane Wetland is an approximately 0.6-acre depressional wetland surrounded by an apartment complex. It is located west of 112th Avenue SE, which separates the wetland from the Mercer Slough Wetland. Water drains from the wetland through a culvert beneath 112th Avenue SE and cascades approximately 10 to 15 vertical feet down a channel into the Mercer Slough. The wetland contains a large, permanently inundated pond, surrounded by saturated only areas. Reed canarygrass, buttercup, and lady fern grow along banks of the inundated area with some black cottonwood, weeping willow, and alder interspersed occasionally.

The wetland rates as a Category IV wetland. It has the opportunity to improve water quality, although it lacks the abundant persistent vegetation that serves to perform water quality functions most effectively. It provides a moderate level of hydrologic function, as its slightly constricted outlet helps slow flood flows during storm events. It contains few habitat features and is relatively isolated by roadways and apartment buildings from other non-wetland habitat areas, which reflects in a low habitat functions score.

Due to the significant (10- to 15-foot) topographic break, and distance from the Mercer Slough Shoreline, this wetland is not a shoreline-associated wetland.

3.3 LOWER KELSEY CREEK

Shoreline jurisdiction in the City of Bellevue includes the lower portion of Kelsey Creek, extending from the I-405 culverts to approximately 700 feet upstream of the Richards/Kelsey Creek confluence. Six high functioning wetlands are located along this section of Kelsey Creek. The wetlands were once likely a contiguous complex but are now divided by a series of roadways, including SE 8th Street, the north- and south-bound lanes of Lake Hills Connector, and SE 7th Place. Based on the Rating System guidance (Ecology 2004, p13), the wetlands were rated as separate units because of this division. Despite the historic alteration to the landscape, these units provide critical water quality, flood flow retention, and habitat functions for the City's shoreline. All units described below are within 200 feet of the OHWM of Kelsey Creek.

The wetland units are situated at the base of four moderately urbanized areas. The Kelsey Creek, Richards Creek, Sunset Creek, and East Creek basins cover a combined 5,075 acres, of which approximately 43 percent (2,168 acres) is covered by impervious surface. A high water table provides the wetlands with most of their hydrology, although overbank flooding from Kelsey and Richards Creeks and a small Kelsey Creek tributary provides a significant input to the wetlands during storm events.

Generally, the Lower Kelsey Creek wetlands score highly for functions, based on Ecology's Rating System. The wetlands rate high for water quality function due in part to their location at the base of urbanized watersheds. As with the Mercer Slough Wetland, flooding events bring

elevated levels of pollutants in contact with the wetlands. The thick, rigid vegetation that characterizes the wetlands helps slow floodwater, and encourages sedimentation of suspended particles. Also, with the exception of areas near I-405, the wide and flat shape of each unit diffuses and slows floodwater entering the complex. Natural and human resources downstream benefit from reduced flood intensity.

Habitat function, as measured by Ecology's Rating System, varies among the wetlands, although generally, they all rate fairly high. Each wetland unit generally has various vegetation types ranging from forest to emergent and aquatic bed. The high structural and composition diversity "increases the suitability for some wildlife guilds by increasing the number of ecological niches." (Ecology 2004, p 76). Overhanging vegetation along Kelsey Creek in several of the units improves habitat for fish and amphibians. High-quality upland forest habitat in nearby Kelsey Creek Park and Wilburton Hill Park provide foraging and dispersal areas for wildlife; however, some of the units in this system are isolated from these nearby habitats due to the bisecting roadways.

The following sections describe the six wetland units in the Lower Kelsey Creek shoreline area.

3.3.1 Kelsey A

Kelsey A is an approximately five-acre riverine wetland, classified as Category I. It lies at the lower end of Wilburton Hills Park between SE 7th Place and the International School. An unnamed, perennial tributary to Kelsey Creek flows through the wetland to a culvert beneath SE 7th Place before discharging to Kelsey Creek. The wetland has a broad surface connection over SE 7th Place to Kelsey Creek during severe flooding events, but otherwise is divided by the roadway.

A large portion of the wetland is forested, with pacific and Sitka willow widespread in the stratum and black cottonwood, red alder and Oregon ash (*Fraxinus latifolia*, FACW) intermittently present. Salmonberry and black twinberry (*Lonicera involucrata*, FAC+) form a thicket in the understory, with some lady fern, giant horsetail (*Equisetum telmateia*, FACW), skunk cabbage, and stinging nettle (*Urtica dioica*, FAC+). Thick Sitka willow forms a scrub shrub stratum south of the International School.

The wetland has a high concentration of habitat features, such as snags and downed woody debris, which provide habitat for birds, mammals, amphibians and insects. The wetland has a broad, relatively undisturbed vegetated connection to about 50-acres of Douglas-fir-dominated, upland forest in Wilburton Hills Park.

3.3.2 Kelsey B

This Category I riverine wetland extends eastward from the intersection of SE 7th Place and Lake Hills Connector through Kelsey Creek Community Park to the Glendale Country Club. Although the wetland is approximately 50 acres in size, only the lower portion is located within

shoreline jurisdiction[1]. Regular overbank flooding from Kelsey Creek provides some of the hydrology to the wetland, although the hydric vegetation and soils are supported primarily by groundwater during times of normal flow.

The wetland contains the highest variety of habitats among those in the complex, including forest, scrub-shrub, emergent, and a few small areas of aquatic bed vegetation. Pacific willow, red alder, and black cottonwood dominate the canopy of the forest, with black twinberry and salmonberry dominant in the understory. Sitka willow and Douglas spirea dominate the scrub-shrub vegetation, with some Himalayan blackberry. Reed canarygrass dominates most of the emergent areas, with some patches of cattail present near Lake Hills Connector.

Kelsey Creek B, the largest wetland unit in the Lower Kelsey Creek complex, contains several important habitat types ranging from snag-rich forest to areas of thin-stemmed emergent vegetation. The later, according to Ecology's Rating System, provides places for amphibians to lay their eggs (Ecology 2004, p 81). The abundance of other habitat features, such as downed woody debris and overhanging vegetation along Kelsey Creek provides niches for wildlife, including the salmon that depend on the Creek for spawning and rearing. Kelsey Creek B has relatively high connectivity to other habitat types in nearby Kelsey Creek Park, which allows for important dispersal and foraging for mammals, amphibian and birds (Ecology 2004, p 81).

3.3.3 Kelsey C

Kelsey C, an approximately 3.5-acre riverine wetland located in the median of Lake Hills Connector, includes the confluence of Kelsey and Richards Creeks. Groundwater input accounts for the wetland hydrology, with some overbank flooding during storm events. The small, forested area is dominated by black cottonwood and contains some mature red alder. Pacific and Sitka willow dominate the scrub-shrub areas surrounding the stream, with some stinging nettle and reed canarygrass in the understory. Reed canarygrass monocultures form patches along the banks of Kelsey Creek.

Because this Category II wetland is narrow in relation to the widths of Richards and Kelsey Creeks, its potential to store and diffuse flood flow is low compared to other wetlands in the complex. It exhibits much of the same habitat suitability and structural complexity as the other wetlands nearby, but is isolated from other habitats by the north and south lanes of Lake Hills Connector.

3.3.4 Kelsey D

Kelsey D is located downstream of Kelsey C, just across the southbound lanes of Lake Hills Connector. The 5.5-acre riverine wetland lies southwest of the intersection of Lake Hills Connector and SE 8th Street. Kelsey Creek runs through the center of the scrub-shrub and forested wetland. Typical hydrologic input to the wetland is from groundwater, runoff from nearby roads, with occasional overbank flooding.

[1] The U.S. Geological Survey has identified the upper extent of shoreline jurisdiction by modeling the point where stream flow reaches 20 cubic feet per second (cfs). Any associated wetlands upstream of the 20cfs point would not be considered part of shoreline jurisdiction.

The vegetation in the forested and scrub-shrub strata contains similar species composition, including willows, black cottonwood and red alder, as within Kelsey A and Kelsey C. Thick vegetation was noted along the banks of Kelsey Creek in the wetland.

The riverine wetland contains many of the same habitat features common throughout the complex, including forest habitat and structural diversity that increases the suitability for a wide variety of wildlife. The overhanging vegetation along Kelsey Creek creates important niches for salmonids. As with Wetland C, it is fairly isolated from other non-wetland habitats because of the nearby roadways.

3.3.5 Kelsey E

A depressional system, in a complex of mostly riverine systems, Kelsey E is located north of SE 8th Street. The approximately 3.5-acre wetland has a seasonally flowing, constricted outlet through a culvert that discharges to Kelsey Creek. Groundwater and runoff from the surrounding roads provide most of the hydrology to the wetland, which is mostly seasonally and occasionally flooded, with one small permanently ponded area in the interior.

The Category II contains mostly emergent vegetation, though has a small scrub-shrub and aquatic bed component. Sitka willow and Douglas spirea line the edge of the wetland, with cattail, small-fruited bulrush, soft rush, and buttercup vegetating the interior.

The wetland scores high for water quality function as it has a large, seasonally ponded area, where the chemical processes that remove phosphorus and nitrogen are thought to occur (Ecology 2004, p 43). Its constrictive outlet to Kelsey helps diffuse flood intensity in the short stretch of Kelsey Creek below it. The wetland scores slightly lower than some of the other large wetland in the Lower Kelsey Creek Complex as it is located away from Kelsey Creek and is highly isolated from other wetlands and non-wetland habitat by the surrounding roads.

3.3.6 Kelsey F

Kelsey F is an approximately one-acre riverine wetland south of SE 8th Street, between 121st Avenue SE and Interstate 405 along the lower stretch of Kelsey Creek. Hydrologic input to the wetland is from groundwater and occasional overbank flooding.

Forest and scrub-shrub vegetation classes typical of the riverine wetlands in the complex are present. Pacific and Sitka willow dominate the forested class, with some black cottonwood and red alder also present. Salmonberry and black twinberry dominate the understory, with some lady fern and skunk cabbage.

The Category III wetland is fairly small compared to other five wetlands, limiting its ability to improve water quality or store floodwaters during storm events. A few small snags, woody debris, and overhanging vegetation provide some wildlife habitat, but, as with Wetland E, the wetland is somewhat isolated from nearby wetlands and upland habitat by roadways.

3.4 NEWCASTLE BEACH PARK

Newcastle Beach Park contains two wetlands that lie at the downstream end of an unnamed stream that drains an approximately 35-acre sub-basin on the west side of I-405. Wetland A lies on the shoreline of Lake Washington, divided from Wetland B by SE 50th Street.

3.4.1 Wetland A

Wetland A is an approximately 6.2-acre wetland situated along the shoreline of Lake Washington. Groundwater from seeps and a high water table supports hydric conditions throughout most of the wetland. Some areas close to the shoreline are seasonally ponded when the level of Lake Washington rises in the summer. Occasional overbank flooding also provides some hydrology to areas adjacent to the small stream.

Wetland A, Category II, rates high for water quality and habitat function, and moderate for hydrologic function. A thicket of pacific and Sitka willow and Oregon ash trees help protect the shoreline against wave-induced erosion. This reflects in the moderate hydrologic function score. Thick emergent vegetation along the edge of the stream, consisting of reed canarygrass, skunk cabbage and stinging nettle helps slow water velocity and trap particulate matter during flooding events. Thirty- to fifty-year-old black cottonwood trees dominate the forest canopy away from the shoreline. Beneath the canopy, small depressions help trap pollutants in surface water. Twinberry, salmonberry, and slough sedge dominate this area, along with stinging nettle, skunk cabbage, and scouring rush (*Equisetum hymenale*, FACW). Abundant downed logs and standing snags in the forest and along the shoreline provide potential breeding and foraging area for amphibians and birds.

3.4.2 Wetland B

Wetland B is an approximately 2-acre riverine wetland upstream of Wetland A. At 600 feet from the shoreline, the wetland is located outside of the standard “shorelands area”. But because it is located near Wetland A (a wetland adjacent to the shoreline), we evaluated it within our study to assess its functions and determine whether a hydrologic connection to Wetland A warranted its inclusion in the City’s shoreline jurisdiction.

The small stream floods the wetland area during storm events, although the high water table supports the wetland vegetation and hydric soils under normal circumstances. The small stream flows into Wetland A via a culvert beneath SE 50th Street. Red alder trees that once cast a canopy over the stream appear to have recently died, leaving several snags within the wetland. Aside from some remaining live red alder and black cottonwood trees along the fringe, Sitka and pacific willows form low, thick cover in places. Cattail and other low emergents grow near the banks of the stream.

The wetland scores high for water quality, moderate for habitat function, and relatively low for hydrologic function. We found that this wetland has no significant mutual hydraulic interaction with Wetland A, and is therefore not an “associated wetland” and not considered to be within the City’s shoreline jurisdiction.

3.5 PHANTOM LAKE/LARSEN LAKE

Included in the shoreline jurisdiction is an approximately 170-acre wetland complex adjacent to Phantom and Larsen Lakes. The complex extends north about 1.8 miles from the south edge of Phantom Lake to Sammamish High School, adjacent to Main Street northwest of Larsen Lake. Similar to the Lower Kelsey Creek system, the wetland complex is now divided by roads, buildings, and altered by ditches and various land use practices. Per Ecology's guidance, the system contains four distinct wetland units that are considered to be hydrologically associated with the Phantom Lake shoreline jurisdiction.

A distinguishing feature of the Phantom/Larsen Lake complex is its position near the headwaters of the Kelsey Creek and Phantom Creek basins. Other shoreline wetlands in the City are located at lower end of their respective basins. Approximately 80 percent of the complex lies in the headwater area of the 2,816-acre Kelsey Creek basin. The Phantom A wetland lies in the upper third of the 529-acre Phantom Creek basin. Wetlands located in headwaters are generally thought to be "…important in reducing peak flows because they slow down and 'desynchronize' the initial peak flows from a storm…" (Ecology 2004, p 48). Flood flow reduction is especially important for Kelsey Creek, where sockeye, Coho and Chinook salmon and cutthroat trout habitat can be damaged by flooding. Indeed, the high functional scores for most of the units in this complex reflects their unique position in the watershed, as well as for other factors including size and habitat types.

The wetland complex contains widespread organic soils, an "indicator that [the] wetlands can remove a wide range of pollutants from surface water" (Ecology 2004, p 39). Generally, the unit's significant structural and physical diversity, which increases the suitability for various types of wildlife, is reflected in the high habitat function score. Also notable are the two large stands of coniferous forest south of Larson Lake, which provide perching and nesting sites for raptors, and refuge for other wildlife, and significant cultural and aesthetic value. Moreover, high structural diversity and complex interspersion of habitat increases the suitability for wildlife. Roads and development, however, have moderately isolated this complex from other upland habitat areas, important for wildlife recruitment and movement.

3.5.1 Phantom A

Phantom A is an approximately 38-acre wetland located along the shoreline of Phantom Lake with an arm extending north to SE 16th Street. This arm spans the boundary between the Kelsey/Phantom basins. The wetland contains lake-fringe, riverine, and depressional hydrogeomorphic elements.

Much of the wetland is located within the Lake Hills Greenbelt Park that extends from Phantom Lake to Larsen Lake. A black cottonwood, red alder, and Pacific willow forest patch is located near the northwest edge of Phantom Lake. Thick Sitka willow, Douglas spirea and black twinberry vegetation lines the edge of Phantom Lake here and surrounds the forest patch. The scrub-shrub stratum gives way to reed canarygrass near the meandering headwaters of Kelsey Creek, north of the lake, with some lady fern and giant horsetail plants also in the riparian corridor. Himalayan blackberry patches punctuate the reed canarygrass monoculture in the northern extent of the wetland, close to NE 16th Street.

The portion of the shoreline outside of the Lake Hills Greenbelt Park is largely privately owned and consists of lawn, some shrubs and trees adjacent to the shoreline. The aquatic bed, water ward of the shoreline is dominated by American white water lily and yellow pond lily.

The Category II wetland scores moderately for water quality function and high for habitat and hydrologic function. The area of seasonal ponding, an important indication of the wetland's water quality improvement ability, is slightly smaller relative other neighboring units. The live storage of Phantom Lake helps to diffuse flooding in both Kelsey and Phantom Creeks. Phantom A, as with the greater complex, contains several vegetative and structural components. The scrub-shrub and forest strata along the Phantom Lake shoreline provide structural complexity. Snags located along the Phantom Lake shoreline, downed woody debris in the forest stratum, and the undulating vegetation along the shoreline provide abundant niches for birds, mammals and amphibians.

3.5.2 Phantom B

This approximately 39-acre Category I wetland is bordered by SE 16th Street to the south and SE Lake Hills Boulevard to the north. 156th Ave SE runs through the middle of the wetland but does not divide it into separate units, as water velocity through the culvert is very low. The upper reach of Kelsey Creek flows through the wetland in a low-gradient ditch.

Phantom B, also within the Lake Hills Greenbelt Park, contains a variety of land uses. Active farm fields adjacent to 156th Street SE comprise approximately 10 percent of the wetland area. A trail extends the length of the wetland from north to south. The remaining area is largely open space characterized by forest, scrub-shrub, and emergent vegetation.

Notable is the three acres of coniferous forested located along the wetland's west edge. Two late-succession species, western red cedar and western hemlock, dominate the closed canopy of the forest, beneath which lady fern, giant horsetail and sword fern carpet the understory. The wetland forest provides significant wildlife habitat as reflected on the rating form. This area contains snags and downed woody debris that typically provide foraging and nesting sites for birds, amphibians and mammals. The coniferous forest transitions to a pacific- and Sitka willow-dominated deciduous forest, and then to a scrub-shrub layer of Douglas spirea and Sitka willow closer to the Kelsey Creek. The creek is bordered by a reed canarygrass monoculture.

Phantom B scores high on Ecology's Rating Form due in part to the diverse vegetation strata described above. Additionally, this unit contains an abundance of smaller seasonally and occasionally flooded depressions that improve its ability to store and diffuse flood flow during storm events. As with other units in the complex, the widespread organic soils indicate an ability to remove pollutants from surface water.

3.5.3 Larsen A

Larsen A, an approximately 88-acre wetland, contains Larsen Lake, a portion of Kelsey Creek, and an unnamed tributary. The wetland extends from SE Lake Hills Boulevard to the south edge of the Kmart shopping center. The wetland is composed of riverine and depressional hydrogeomorphic classes.

Land uses in the wetland include blueberry farming, trails open to the public, and open space. 148th Avenue SE bisects the wetland just west of Larsen Lake, but does not warrant a division into separate units. The wetland contains forest, scrub-shrub, emergent, aquatic bed, and open water habitat types. The agricultural area is made up of 4- to 6-foot-tall blueberry plants that generally provide higher year-round structural complexity than the other farms contained within the complex.

An approximately 1-acre patch of forested wetland, dominated by Sitka spruce (*Picea sitchensis*, FACW) and western red cedar, is located at the south end of the Category II wetland. Himalayan blackberry and lady fern carpet the understory. As with the coniferous forest component in Phantom B, this grove contains snags, downed woody debris and a structural complexity desirable for wildlife, which is reflected in the high habitat function score for Larson A. The wetland contains another forested stratum, north of Larson Lake. European silver birch, pacific, and Sitka willow, black cottonwood and red alder exhibit an array of habitat features including snags, downed woody debris and overhanging vegetation. The forest transitions to Douglas spirea, blueberry bushes, and eventually Larsen Lake. The various vegetation types, from aquatic bed, to coniferous forest, provide complex structural and compositional diversity that increase suitability for amphibians, birds and mammals. The organic soil found throughout most of the wetland area, as mentioned above, has the ability to remove dissolved phosphorus and nitrogen from surface water (Ecology 2004, p 39). Additionally, the emergent vegetation along Kelsey Creek slows surface water velocity during storms, and may filter out particles that otherwise would flow downstream.

3.5.4 Larsen B

The 3.5-acre Larsen B wetland lies west of 145th Place SE and Larsen A, and is located along a small tributary to Kelsey Creek. Groundwater and occasional surface flow from Main Street provide the depressional component of the wetland a significant portion of its hydrology. Overbank flooding from the tributary provides some wetland hydrology along the banks of the stream. The wetland is largely open space, though its western edge lies within the maintained grounds of Sammamish High School.

The Category II wetland contains a pacific- and Sitka willow-dominated forest with black cottonwood and red alder interspersed along the edge. Although this wetland contains fewer habitat types than areas in the other portion of the Phantom/Larsen complex, it scores relatively high on habitat function due high structural diversity. A Salmonberry and black twinberry thicket fill in beneath the forest canopy along with some stinging nettle and piggyback plant (*Tolmiea menziesii*, FAC+). Some small snags and large woody debris may provide a few nesting and foraging sites for reptiles and amphibians. However, roadways and buildings isolate the wetland from other habitat types. The Category II wetland provides a moderate level of flood storage, and water quality improvement function. The thick vegetation along the shores of the small tributary slows the velocity of water during storm events, helping also to filter particles from the water. The occasionally flooded depression diffuses flood flow and sequesters pollution during storm events.

3.6 LAKE SAMMAMISH WETLANDS

No major wetland areas have been identified along the Lake Sammamish shoreline within the City of Bellevue. However, there are likely many small lake-fringe wetlands along the edge of the lake where bulkheads are not present. Wetland areas observed consists of narrow, emergent vegetation fringes waterward of the OHWM of Lake Sammamish.

After a review of the shoreline with aerial maps, a site visit was made to Vasa Creek Park, in the southeast corner of the City of Bellevue. The portion of Vasa Creek within shoreline jurisdiction does not contain wetlands. A very narrow riverine wetland exists along the creek west of West Lake Sammamish Parkway. However, this riverine wetland is located beyond 200 feet from the OHWM of Lake Sammamish and thus outside of shoreline jurisdiction. A red alder/salmonberry/lady fern association typical of riparian wetlands characterizes the area.

4.0 REFFERENCES

Cooke, S. 2000. Wetland and Buffer Functions Semi-Quantitative Assessment Methodology. Cooke Scientific Services, Inc. Seattle, WA.

Hruby, T. 2004. Washington State wetland rating system for western Washington – Revised. Washington State Department of Ecology Publication # 04-06-025

APPENDIX A

MAP OF SHORELINE-ASSOCIATED WETLANDS

APPENDIX B

ECOLOGY WETLAND RATING FORMS

APPENDIX C

SEMI-QUANTITATIVE FUNCTION ASSESSMENT