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MEMORANDUM

To: Michael Nelson, Diane Buckshnis, Kristiana Johnson, Shane Hope, Kernen Lien, and Maureen Judge, City of Edmonds

From: Jennifer Love and Ron Gouguet

Subject: Description of Edmonds Marsh for inclusion in the 2019 Shoreline Master Program periodic review DRAFT

Date: November 2, 2018

INTRODUCTION

The Edmonds Marsh (Marsh) is a tidally influenced[1] wetland occupying approximately 27 acres in the heart of Edmonds, Washington (Figure 1); it is the remnant of a much larger estuarine wetland that was once located along the shores of Puget Sound (Sea-Run Consulting et al. 2007). Historically, the Marsh was a pocket estuary more than 100 acres in size and protected by a barrier sand spit (Shannon & Wilson 2015). It extended from Point Edmonds (located at the southern end of Marina Beach Park) north to Brackett's Landing near the Washington State Department of Transportation ferry terminal.

The purpose of this memorandum is to provide updated information regarding the Marsh, its tributary creeks, and Shellabarger Marsh to be included with the 2019 Shoreline Master Program (SMP) periodic review. A great deal of data and other information has been collected regarding the Marsh and its tributary creeks since 2007, when the last shoreline inventory and characterization document was published (Sea-Run Consulting et al.).

[1] The Marsh is tidally influenced when the tide gate downstream of the Marsh is open, typically in the spring and summer months (April through September) (Sea-Run Consulting et al. 2007).

The western portion of the Marsh contains mudflat habitat and tidal channels and supports saltmarsh plants (Figure 2). This area is understood to be brackish in the winter months, when the tide gate downstream of the Marsh typically is closed, and saline in the spring and summer months, when the tide gate typically is open (Sea-Run Consulting et al. 2007). The eastern portion of the Marsh is a predominantly freshwater system fed by two tributary creeks—Willow Creek and Shellabarger Creek (Figure 1).

Shellabarger Marsh is an approximately 5-acre freshwater wetland located on the east side of State Route (SR) 104 (Figure 1). It was once part of the Marsh, but the two areas were separated when SR 104 was constructed. The two marshes are still hydraulically connected via a pair of culverts that run under SR-104 (Sea-Run Consulting et al. 2007). Both marshes provide valuable habitat to birds and other wildlife, in addition to conveying large quantities of stormwater and surface water.

The Marsh is connected to Puget Sound via Willow Creek, which currently flows out of the Marsh into an approximately 2,200-ft-long system of ditches, pipes, culverts, and flood gate infrastructure prior to discharging into Puget Sound via a submerged outfall. The City of Edmonds (City) plans to daylight (i.e., bring aboveground) Willow Creek, a project that will improve hydraulic and habitat connectivity between the Marsh and Puget Sound (Shannon & Wilson 2015). As the Marsh is the only remaining salt marsh within the nearshore habitat zone of Watershed Resources Inventory Area (WRIA) 8 (the Lake Washington/Cedar/Sammamish Watershed), daylighting Willow Creek is ranked as a high priority restoration project (SRFB 2014, 2018).

SITE SETTING AND DRAINAGE BASIN

The Marsh is surrounded by commercial development, as well as transportation rights-of-way (ROWs) and a former (now vacant) industrial site. The Burlington Northern Santa Fe (BNSF) railroad ROW runs northeast to southwest along the western boundary of the Marsh, and SR 104 runs north to south along the eastern boundary of the Marsh, as shown on Figure 1. The Port of Edmonds's Harbor Square property, which contains buildings, paved areas, and recreational facilities (e.g., tennis courts and a paved trail), is adjacent the Marsh to the north. Two properties are adjacent to the Marsh to the south: the Willow Creek Fish Hatchery (Hatchery) property, which is owned by the City, and a former bulk fuel terminal known as the Unocal property, which is owned by the Chevron Corporation (Chevron). Shellabarger Marsh is surrounded primarily by residential developments, both single-family homes and apartment and condominium buildings (Figure 1).

The drainage basin of Willow Creek is approximately 393 acres in size and encompasses residential land to the south and east of the Marsh (Shannon & Wilson 2015; SAIC and Herrera 2013). Willow Creek enters the Marsh as two separate branches, flowing into the southeastern side of the Marsh via the Hatchery property (Figure 1). The drainage basin of Shellabarger Creek is approximately 378 acres in size and encompasses dense residential developments to the north, east, and south of the Marsh (SAIC and Herrera 2013). Shellabarger Creek flows through Shellabarger Marsh and other privately owned

residential properties to the south of Shellabarger Marsh before passing through the SR 104 culverts into the Marsh. Upon exiting the culverts, Shellabarger Creek flows in an unconfined path (i.e., it is not contained within a distinct channel) through the dense Marsh vegetation (predominantly cattails [*Typha latifolia*]). Including the two creeks and other areas that discharge surface water to the Marsh, the drainage basin of the Marsh is approximately 900 acres in size.

Other smaller areas also contribute surface water flows to the Marsh. Stormwater enters the Marsh from the Harbor Square property and Dayton Street via two stormwater outfalls on the northern edge of the Marsh (Figure 1). After exiting the outfalls, the stormwater flows into patches of cattail and other emergent vegetation at the Marsh perimeter. Stormwater from a portion of SR 104 also discharges directly to the eastern portion of the Marsh.

Water flowing out of the Marsh enters the lower, channelized portion of Willow Creek. Just downstream of the primary tidal channel of the Marsh, Willow Creek makes a sharp turn to the south and runs through a 600-ft-long open ditch parallel to and alongside the BNSF railroad tracks (Shannon & Wilson 2015) (Figure 1). The creek then flows into double culverts that run underneath the railroad tracks before entering a 1,600-ft-long series of underground pipes and other drainage infrastructure, including a tide gate (Shannon & Wilson 2015). The tide gate is made of steel and has a top-hinged flap gate within a large storm drain vault. It is chained open in spring and summer (from March until October), allowing tidal flow into the Marsh. It is closed in fall and winter (from October until March), although it is not totally watertight when closed. After passing through the underground drainage system, Willow Creek discharges to the Puget Sound via a submerged outfall located approximately 200 ft offshore from Marina Beach Park (Shannon & Wilson 2015).

The current drainage system through which Willow Creek passes prior to discharging to the Puget Sound limits both tidal flow and fish passage into and out of the Marsh and its tributary creeks (Shannon & Wilson 2015). Even with the existing tide gate open, tidal flow into the portion of Willow Creek adjacent to the Unocal property detention basin is muted (i.e., reduced) by 1 to 2 ft of elevation owing to the seaward pipes and other drainage infrastructure that Willow Creek passes through before connecting to Puget Sound.

The City is planning a project to daylight and otherwise restore the portion of Willow Creek downstream of the Marsh. The project would restore a more natural, aboveground creek channel in this portion of Willow Creek, removing the creek from the subsurface pipes, culverts, and other drainage infrastructure through which it currently flows. A few alternatives for the creek alignment are being considered, but ultimately the creek would flow to the Puget Sound by way of Marina Beach Park (Shannon & Wilson 2015, 2017). The daylighting project would also include the excavation of channels through the Marsh in order to improve the flow of Shellabarger Creek downstream of the SR 104 culverts and through the eastern portion of the Marsh,

re-establish connections between Willow and Shellabarger Creeks, and increase the extent of saltwater influence within the Marsh. Extending saltwater influence would allow native salt marsh vegetation to re-occupy some of the areas that are currently dominated by cattail, and opening up the creek channels would allow fish to access the stream habitat (Shannon & Wilson 2015).

MARSH HABITAT AND WILDLIFE

The US Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) Internet soil survey lists Mukilteo muck as the dominant soil type within the Marsh (USDA 2011). Mukilteo muck is typically found in depressions, and its parent material is herbaceous organic material. It is very poorly drained soil with a moderately high to high capacity to transmit water. The NRCS rates Mukilteo muck as hydric. Minor soil types are also present on the margins of the Marsh, including Alderwood-Everett gravelly sandy loams and Everett very gravelly sandy loam. Urban land, consisting of level areas where structures and altered soils are present, is also present on the Marsh's margins. Alderwood-Everett and Everett soil types are found on terraces and outwash plains formed by glacial outwash. These soil types drain moderately well, and their surface layer is gravelly sandy loam.

As part of a baseline study being conducted within the Marsh in 2018 and 2019, water depth and salinity data are being collected from five monitoring stations within the Marsh using conductivity, temperature, and depth (CTD) recorders. An additional CTD recorder is being used in the fenced basin west of the BNSF tracks, which receives outflow from the Marsh and Willow Creek. CTD data from July 17 through October 11, 2018, are currently available; the network of CTD recorders will be maintained for a total of one year as part of the baseline study. To date, salinity within the Marsh has ranged from 0 to 25 (+) parts per thousand (ppt).[2] Maximum salinityrecorded was 25 ppt, but the absolute peak has not been determined due to "high pegging" of the conductivity sensor; a higher conductivity range was selected on October 22, 2018, in order to better evaluate the higher salinity range. Absolute tide (referenced to the geoid) will be calculated after a real-time kinematic (RTK) GPS survey is completed toward the end of the baseline monitoring period. The earliest CTD records (July and August 2018) indicate a constriction in tidal exchange, but records from September and early October 2018 suggest a reduction in that restriction, as salinity and water depth over the sensor values have increased substantially.

[2] In 1978, the Practical Salinity Scale, which uses a ratio of measured conductivity to the conductivity of a standard potassium chlorine solution to determine salinity, was adopted by oceanographers (Thermo Scientific 2011). This scale is referred to as PSS-78 and has no units, as it measures ratios, but it does report salinity in "practical salinity units" (psu). One psu is virtually equivalent to 1 ppt, and salinity is often still reported in ppt. The salinity measurements being taken in the Marsh are calculated from conductivity and temperature in psu, but are reported here as ppt for comparison with regulatory standards.

Vegetation in the eastern portion of the Marsh is dominated by cattail, with some patches of alder and willow intermixed (Figure 2). The western portion of the Marsh contains tidal channels, mudflat habitat, and a greater diversity of Marsh plants, several of which are salt-tolerant, such as pickleweed (*Salicornia depressa*), saltgrass (*Distichlis spicata*), American three-square (*Schoenoplectus pungens*), and seaside arrowgrass (*Triglochin maritima*). Figure 2 shows the existing boundary between the cattail-dominated eastern portion of the Marsh and the western portion, which is tidally influenced.

A diverse mix of both native and non-native vegetation is also present within the Marsh's buffer areas. Native species observed along the northern portion of the Marsh within the Harbor Square property include Pacific willow (*Salix lucida* ssp. *lasiandra*), Scouler's willow (*Salix scouleriana*), red alder (*Alnus rubra*), paper birch (*Betula papyrifera*), western red cedar (*Thuja plicata*) seedlings, common snowberry (*Symphoricarpos albus*), red-flowering currant (*Ribes sanguineum*), and red-osier dogwood (*Cornus sericea*), among other species. The diversity of native plants in this area has been enhanced by recent restoration efforts. Invasive species, including reed canarygrass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus armeniacus*), are also present, as are ornamental plantings along the northern side of the paved pedestrian path.

The Hatchery property contains relatively high-quality, forested upland and wetland habitat with a diversity of native species, including red alder, bigleaf maple (*Acer macrophyllum*), Douglas fir (*Pseudotsuga douglasii*), western red cedar, and western hemlock (*Tsuga heterophylla*). The understory contains a variety of native shrub and ground cover species, including salmonberry (*Rubus spectabilis*), osoberry (*Oemleria cerasiformis*), red-osier dogwood, red-flowering currant, vine maple (*Acer circinatum*), western red cedar seedlings and saplings, red elderberry (*Sambucus racemosa*), stink currant (*Ribes bracteosum*), lady fern (*Athyrium filix-femina*), fringecup (*Tellima grandiflora*), youth-on-age *(Tolmiea menziesii)*, lily-of-the-valley (*Convallaria majalis*), western bleeding heart (*Dicentra formosa*), and a good number of skunk cabbages (*Lysichitum americanum*) beneath the tree canopy along Willow Creek. Invasive species, including Himalayan blackberry, English ivy (*Hendra helix)* and a few scattered seedlings of English holly (*Ilex aquifolium*), have also been observed within the Hatchery property, but for the most part these exist in sparse and non-dominant patches. A very dense patch of bittersweet nightshade (*Solanum dulcamara*) is present near the transition from the forested wetland habitat of the Hatchery to the emergent area of the Marsh interior.

Forest vegetation along the southwestern portion of the Marsh, located on the Unocal property, appears to be similar to that of the Hatchery property. Vegetation growing between SR 104 and the Marsh consists of a narrow but dense strip of red alder, Himalayan blackberry, Scotch broom (*Cytisus scoparius*), and Pacific willow. Near the location where Shellabarger Creek passes through the double culverts to enter the Marsh, cattails extend from the Marsh all the way to the sidewalk along the highway. The invasive species bittersweet nightshade, Himalayan blackberry, and reed

canarygrass are also present in this area. The strip of trees and shrubs between the highway and the Marsh widens as it extends south from the Shellabarger Creek culverts. The forest here is a mix of native trees, including red alder, water birch (*Betula occidentalis*), Douglas fir, bigleaf maple, and western hemlock.

Edmonds Marsh and its adjacent buffer areas are home to 190 bird species, including waterfowl, shorebirds, herons, raptors, and passerines (Riddell and Peterson 2016). Eastern cottontail rabbits, coyotes, and deer are some of the mammal species that have been observed in the Marsh and its buffer areas.

While fish are not currently known to use the Marsh's tidal channels, coho salmon (*Oncorhynchus kisutch*), chum salmon (*Oncorhynchus keta*), resident and sea-run cutthroat trout (*Oncorhynchus clarkii*), sculpins, and threespine stickleback (*Gasterosteus aculeatus*) were observed in Willow Creek historically (Sea-Run Consulting et al. 2007; Shannon & Wilson 2015).[3] Prior to the early 2000s (when the Willow Creek outfall pipe was lengthened and submerged deeper into the Puget Sound), small numbers of adult coho salmon were known to return to Willow Creek and migrate into Upper Willow Creek (Shannon & Wilson 2015). After the early 2000s, very small numbers of adult salmon or sea-run cutthroat trout were reportedly able to find the submerged pipe and migrate up into Willow Creek, but none have been observed for the past several years (Shannon & Wilson 2015). In 2008, more than 5,500 threespine stickleback, a pair of prickly sculpin (*Cottus asper*), and a single starry flounder (*Platichthys stellatus*) were captured in the lower portion of Willow Creek adjacent to the Unocal property and the BNSF railway line (Arcadis 2010).[4] No salmonids were observed in this portion of the creek in 2008. One of the goals of the Willow Creek daylighting project is to promote the use of the Marsh and its tributary creeks by juvenile Chinook salmon (*Oncorhynchus tshawytscha*).

Additional data and information regarding the habitat value and other ecological functions provided by the Marsh and its adjacent buffer areas are being collected as part of the Edmonds Marsh Baseline Study. This study started in the summer of 2018 and will continue for one year. Additional information generated by the study will be available in the future to help inform the SMP periodic review process.

REFERENCES

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Riddell C, Peterson T. 2016. 190 bird species of Edmonds Marsh. Edmonds, WA.

[3] Fish were observed within Willow Creek; it is not clear whether they were also observed in the Marsh's tidal channels or in Shellabarger Creek.

[4] The fish were captured and removed from this portion of Willow Creek because it was undergoing remediation by Chevron.

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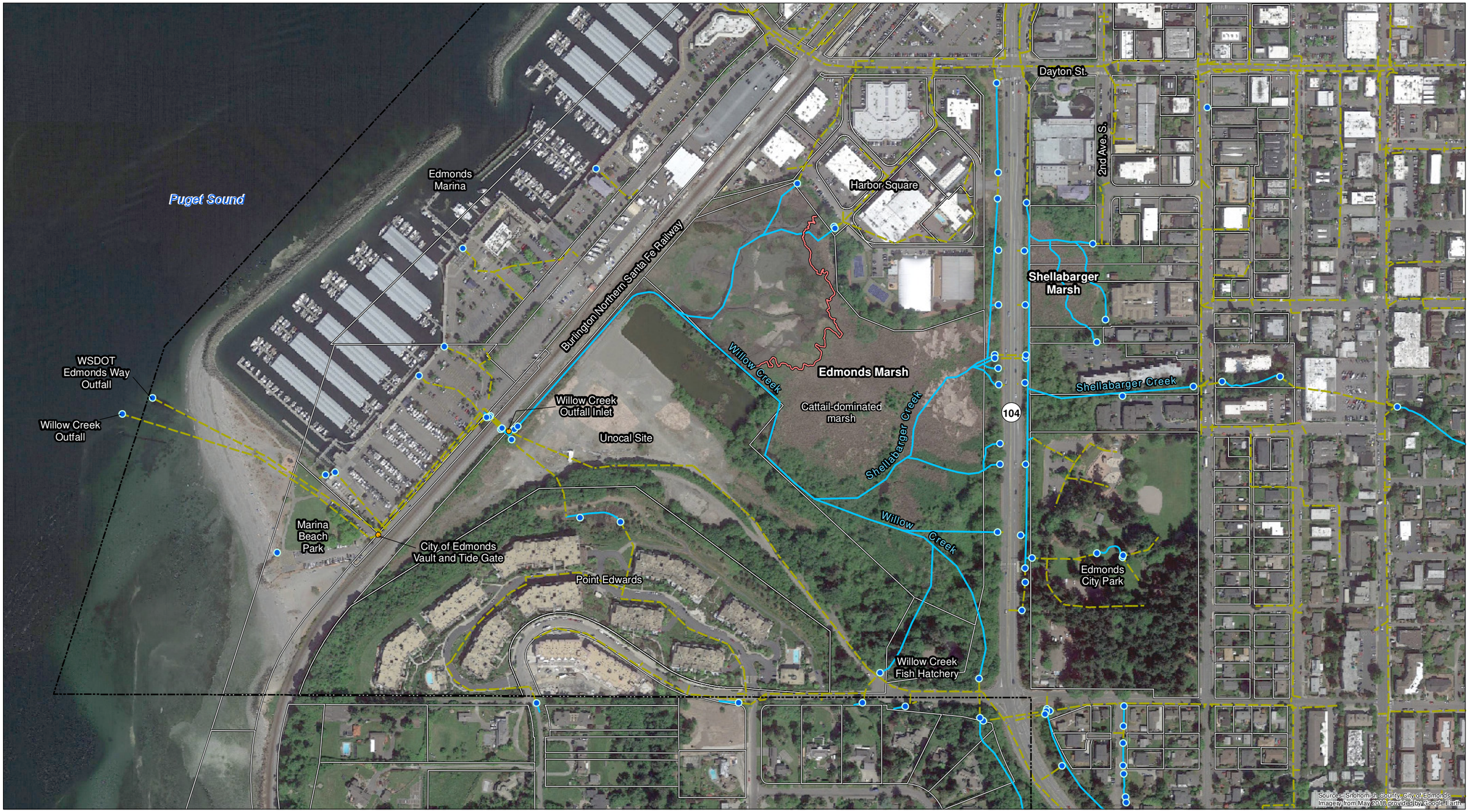

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N

0 0.1 0.2 Miles

0 500 1,000 Feet

- Major vegetation transition line
- Storm culvert
- Storm line
- Storm ditch/creek*
- Parcel
- City of Edmonds boundary

*Note: Shellabarger and Willow Creeks no longer flow through defined channels in the eastern portion of the marsh; however, their previous flow paths are shown.

Figure 1. Site setting and stormwater structures

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Patch ID No.	Species Present Within Patch
1	seaside arrowgrass and American three-square
2	brass buttons growing along mudflat perimeter
3	Lyngbye's sedge
4	cattail and hardstem bulrush; American three-square growing along mudflat perimeter
5	hardstem bulrush
6	hardstem bulrush
7	common reed
8	saltgrass, potentilla
9	saltgrass
10	American three-square
11	American three-square, seaside arrowgrass
12	baltic rush, saltgrass, potentilla, meadow barley
13	potentilla
14	narrow band of reed canarygrass and Himalayan blackberry along wooden boardwalk
15	cattail and bittersweet nightshade
16	native shrub buffer (e.g., snowberry, roses, red-flowering currant) - planted
17	Japanese knotweed, hops, reed canarygrass, small-fruited bulrush growing adjacent to boardwalk
18	American three-square, potentilla, saltgrass
19	saltgrass
20	cattail and common reed (common reed in western portion of patch)
21	saltgrass, potentilla, baltic rush, Lyngbye's sedge, small patch American three-square, brass buttons, spear saltbush and pickleweed along mudflat perimeter
22	spear saltbush, saltgrass
23	spear saltbush, saltgrass, meadow barley
24	spear saltbush, saltgrass, meadow barley
25	hardstem bulrush, creeping bentgrass
26	cattail

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N

0 0.01 0.02 Miles

0 50 100 Feet

Unique vegetation patches

Major vegetation transition line

Figure 2. Marsh interior vegetation

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