CONFLUENCE
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# Marymoor Park Stormwater Facility Improvements
# CRITICAL AREAS STUDY

*Prepared for:*

King County
June 17, 2022

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# Marymoor Park Stormwater Facility Improvements
# CRITICAL AREAS STUDY

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# 1.0 INTRODUCTION

King County proposes to construct 2 stormwater treatment facilities within the western portion of Marymoor Park to provide stormwater treatment for existing impervious surfaces in the park to improve water quality. While a number of alternatives were evaluated, two alternatives were proposed to be constructed (HDR 2020). This project proposes installation of an infiltrating bioretention channel and a rain garden (rain garden) and improvements to the existing east–west drainage collector channel (channel improvements). The project sites are located north of NE Marymoor Way on tax parcels 1125059016 and 1225059037 in Redmond, Washington (Figure 1). Confluence Environmental Company (Confluence) prepared this report to assist with permitting the project. On November 29, 2021, and January 24, 2022, Confluence conducted site investigations to determine the presence and extent of critical areas on and adjacent to the project sites. The effort focused on wetlands and streams. Critical areas such as erosion hazard areas, steep slopes, and landslide hazard areas were not evaluated in this study. This report discusses the results of the critical areas study.

# 2.0 PROJECT DESCRIPTION

The rain garden project install storm drainage diversion/conveyance piping, a pre-treatment vortex separator, a vegetated bioretention channel and planted rain garden (bioretention cell) and associated overflow outlet improvements to provide retrofit water quality treatment and infiltration of contributing impervious and pervious surfaces runoff in the southern study area (Figure 1). The drainage area to be intercepted includes the Marymoor Office Access Drive, Parking Lot area, Art Barn, Maintenance Building/Yard, and local access drives to those facilities. In total, the improvements will intercept runoff from about 8.7 acres of contributing park surfaces, of which, about 2.8 acres are currently impervious. The overall proposed design area of the rain garden is approximately 25,000 sf (0.57 ac). The maximum depth of storage impoundment in the rain garden will be less than 2.5 feet, although for frequent storms through the water quality event, the depth of short-duration water impoundment has been simulated to be less than 1 foot, with draw-down time expected to be less than 12 hours..

The channel improvements project would provide improvements to the existing ditch located within the northern study area (Figure 1) to create a larger infiltrating bioretention channel that would provide supplemental treatment and infiltration. Existing undersized culverts at trail and road crossings would be replaced with larger box culverts for reduced channel flow depth and improved hydraulic function. This would reduce known existing operational water quality impacts (e.g., seasonal standing water temperature effects, heavy waterfowl use and fecal coliform contributions). The existing channel section between the culverts would be regraded and restored for water quality and enhancement habitat benefits. The channel bed substrate would be excavated and replaced with a streambed gravel/topsoil mix that would be planted with water tolerant native species to enhance seasonal filtration treatment and infiltration as

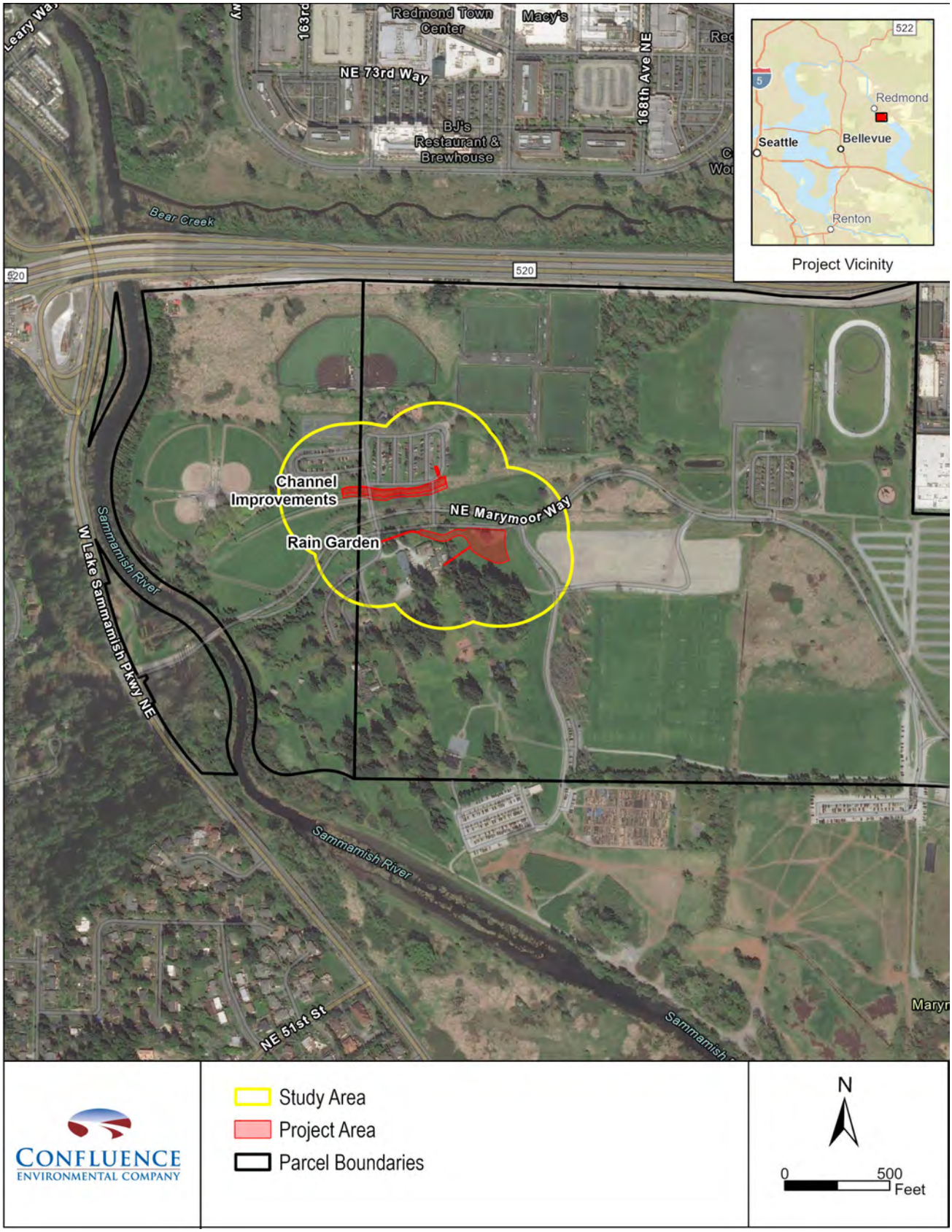


Figure 1. Site Vicinity

collective water quality benefits. The channel banks would be regraded at 3:1 side slopes, with soil amendment provided, and would be restored with native plantings. Beyond the channel banks, trees would be added along the south channel bank to provide added shading for water temperature reduction water quality benefits.

# 3.0 METHODS

Confluence conducted both a wetland and an ordinary high water mark (OHWM) delineation on the property. This section describes the methods used to identify the presence or absence of wetlands and delineate the OHWM.

## 3.1 Desktop Analysis

Confluence evaluated the study areas for the documented presence of critical areas by reviewing the following GIS databases:

- King County GIS (King County 2021)King County Comprehensive Plan (King County 2020)
- U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) (USFWS 2021)
- Natural Resources Conservation Service (NRCS) Soil Survey (NRCS 2021a)
- Washington Department of Fish and Wildlife (WDFW) SalmonScape (WDFW 2022)
- WDFW Priority Habitat and Species (PHS) (WDFW 2021)
- Washington Department of Natural Resources (WDNR) Water Type GIS (WDNR 2021)
- Wetlands of High Conservation Value (WDNR 2022)

Results of the GIS database searches are in Appendix A.

## 3.2 Site Investigation

On November 29, 2021, and January 24, 2022, Confluence conducted site investigations to determine the presence or absence of critical areas within 300 feet of the rain garden and channel improvements project areas (study area).

### *3.2.1 Wetlands*

#### Wetland Identification and Delineation

Confluence identified wetlands and delineated their boundaries using the methods described by the U.S. Army Corps of Engineers (Corps) in the Corps of Engineers Wetlands Delineation Manual (Corps 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Corps 2010). The Corps typically requires that the following 3 characteristics be present for an area to be identified as a wetland: (1) hydrophytic vegetation, (2) hydric soil, and (3) wetland hydrology. For each

criterion, there are several possible indicators that can be used to determine whether the criterion has been met. The indicators were established so that if a wetland were present on-site, sufficient indicators would be observed at any time of the year, including the driest months, to identify the wetland. Since "normal circumstances," as defined by the Corps (1987), exist on the site, all 3 criteria must be present for an area to be determined a wetland. A more detailed description of delineation methodology is provided in Appendix B. Wetland delineation data forms completed during the site investigation are provided in Appendix C.

To confirm the presence or absence of a wetland, data were collected from representative test plots within and outside of potential wetlands. The locations of the test plots were based on the presence of visual wetland indicators (e.g., wetland vegetation, evidence of standing water) or were chosen to represent vegetative, topographic, or hydrologic features in the vicinity. Within these test plots, vegetation, soils, and hydrology were examined to determine whether wetland characteristics were present (see Appendix B for details). Plots that met all 3 wetland criteria were determined to be wetland plots; plots that did not meet all 3 wetland criteria were determined to be upland plots.

Once the presence of a wetland was confirmed, visual wetland indicators, such as topographic and vegetative shifts, were used to delineate the remainder of the wetland boundary. In areas with a lack of visual wetland indicators (i.e., areas with monoculture vegetation and no clear topographic break), Confluence used soil probes to determine the wetland boundary between test plots. Confluence evaluated the presence or absence of hydric soil and wetland hydrology indicators at soil probe locations to determine whether the area represented by the soil probe was wetland or upland. Soil probe locations and presence or absence of hydric soil and wetland hydrology indicators were recorded using GPS.

Confluence used the PLANTS Database (NRCS 2021b) to provide consistency in scientific naming and the 2020 National Wetland Plant List (Corps 2020) to determine the wetland indicator status of plants.

#### Wetland Rating

Confluence determined wetland ratings using the Washington State Wetland Rating System for Western Washington (Hruby 2014) to assess the resource value of the wetlands identified on the site. This rating system is based on the wetland functions and values, sensitivity to disturbance, rarity, and irreplaceability.

Wetland rating forms are in Appendix D.

### *3.2.2 Ordinary High Water Mark Delineation*

An unnamed drainage ditch begins east of the channel improvements project area, flows west through the study area, and discharges into the Sammamish River. The Washington State Code

defines the OHWM as follows: "On all lakes, streams, and tidal water [the OHWM] is that mark that will be found by examining the bed and banks and ascertaining where the presence and action of waters are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland, in respect to vegetation as that condition exists on June 1, 1971, as it may naturally change thereafter, or as it may change thereafter in accordance with permits issued by a local government or the department" (RCW 90.58.030).

Washington State Department of Ecology has published guidance (Anderson et al. 2016) to interpret the code and provide methods for field OHWM determinations. Confluence used this guidance to determine the OHWM of unnamed, man-made ditch in the vicinity of the study area.

On November 29, 2021, Confluence identified discrete locations on the right (north) and left (south) banks of the ditch in the channel improvements project area to delineate the OHWM. Locations were chosen based on presence of field indicators of OHWM identified in Anderson et al. (2016) and shape of the channel. The locations of the OHWMs within the study area were marked with pin flags and recorded using a differential GPS with sub-meter accuracy.

Confluence conducted a second site investigation on January 24, 2022, to evaluate the surface flow connection between the ditch and the Sammamish River.

#### *3.2.3 Wildlife Habitat*

King County regulates both wildlife habitat conservation areas and wildlife habitat networks as critical areas that are important for the conservation of sensitive plant and wildlife species or those species and habitats that are of local importance. The types of habitats protected as wildlife habitat conservation areas and wildlife habitat networks are defined in the King County Comprehensive Plan (King County 2020). Confluence reviewed the regulated habitats, in addition to the available online data, and evaluated whether any of the observed habitats on-site met the criteria of wildlife habitat conservation areas and wildlife habitat networks defined in King County 2020.

# 4.0 RESULTS

## 4.1 Desktop Analysis

Available GIS databases were searched for the documented presence of wetlands, hydric soils, streams, lakes, or species listed under the Endangered Species Act as threatened or endangered ("listed species"). Results of the GIS database search are in Appendix A. In summary, wetlands have not been identified within the study area by King County (King County 2021), but the NWI mapped the ditch located in the northern study area as a freshwater emergent wetland (USFWS 2021). Soils in the study area were mapped as Indianola loamy sand (non-hydric) and

Earlmont silt loam (hydric). These sils were historically ditched and rained for agriculture. The SalmonScape and PHS databases did not identify any salmon species as occurring in the ditch but have identified bull trout (*Salvelinus confluentus*), coho salmon (*Oncorhynchus kisutch*), Chinook salmon (*O. tshawytscha*), kokanee and sockeye (*O. nerka*), steelhead and rainbow trout (*O. mykiss*), and resident coastal cutthroat trout (*O. clarkii*) as occurring in the Sammamish River (WDFW 2021, 2022). PHS identified the park as a biodiversity area with freshwater wetlands (WDFW 2021). Marymoor Park is a 640-acre park with more than 200 bird species that use the park at some time during the year (Audubon 2022). No wildlife habitat conservation areas or wildlife habitat networks were identified within the study area in online data or in King County 2020.

Photographs of the site are in Appendix E.

## 4.2 Test Plots

During the November 29, 2021, site visit, 8 test plots were established, 1 in wetland and 7 in uplands. Weather conditions during the site visit, high overcast with no precipitation, were good for conducting the wetland determination. The site visit was conducted outside of the growing season, however, which typically begins in March. Precipitation for the prior 2 months was approximately 12.3 inches, 2.8 inches above the normal precipitation of 9.5 inches for the same period (NWS 2022). Test plots are shown in Figure 2. Test plot characteristics are detailed below. Appendix B provides explanation of technical terms.

Test Plot 1 (TP-1) was located in the channel improvements project area, in a mowed lawn area of the park. Grass species could not be identified to species and thus were lumped together as "mowed lawn" and given a conservative indicator status of facultative. Vegetation within TP-1 passed the Dominance Test and therefore met the wetland vegetation criterion. Soil in the top layer (0-3 inches) was a dark brown (10YR 3/3) sandy silt loam. Soil in the second layer (3-16 inches) was a very dark grayish brown (2.5Y 3/3) sandy loam with 6% gray (10YR 5/1) depletions in the matrix and 10% dark yellowish brown (10YR 4/6) redoximorphic concentrations in the matrix. The soils did not meet any hydric soil indicator; therefore, the hydric soil criterion was not met. Two primary hydrology indicators—High Water Table (A2) and Saturation (A3)—were observed. The presence of at least 1 primary or 2 secondary indicators meets the wetland hydrology criterion. The observed hydrology indicators may have been a result of recent heavy rains and are generally not good indicators of wetland conditions during the wet season. The absence of oxidized rhizospheres in the upper soil horizon together with the absence of hydric soil indicators suggests that the observed saturation likely does not persist long enough during the growing season for wetland conditions to develop. Since TP-1 did not meet all 3 criteria, the area represented by TP-1 is not a wetland.

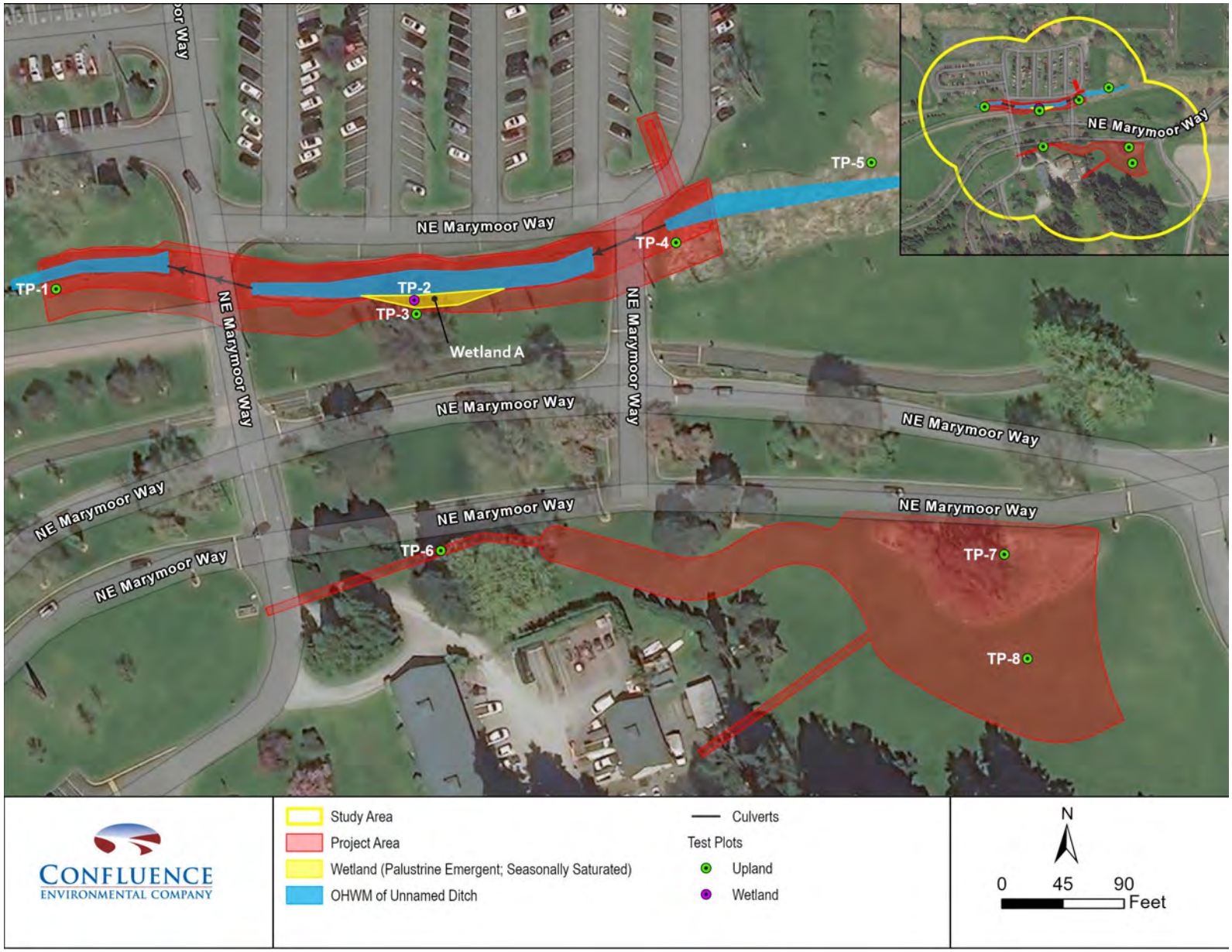


Figure 2. Wetland, Ditch, and Test Plots

TP-2 was located in the channel improvements project area, in an area dominated by mowed lawn and creeping buttercup (*Ranunculus repens*). Vegetation within TP-2 passed the Dominance Test and therefore met the wetland vegetation criterion. Soil in the top layer (0-6 inches) was a very dark grayish brown (10YR 3/2) loam. Soil in the second layer (6-10 inches) was a very dark grayish brown (10YR 3/2) loam with 1% dark yellowish brown (10YR 3/4) redoximorphic concentrations in the matrix. Soils in the third layer (10-16 inches) was a gray (10YR 5/1) silty clay with 10% dark yellowish brown (10YR 4/6) redoximorphic concentrations in the matrix. Soils met the Depleted Matrix (F3) and Depleted Below Dark Surface (A11) hydric soil indicators; therefore, the hydric soil criterion was met. Two primary hydrology indicators—High Water Table (A2) and Saturation (A3)—were observed. The presence of at least 1 primary or 2 secondary indicators meets the wetland hydrology criterion. Since TP-2 met all 3 criteria, the area represented by TP-2 is a wetland, identified as Wetland A.

TP-3 was located in the channel improvements project area, south of TP-2. Dominant vegetation within TP-3 included mowed lawn and a non-native sycamore tree (*Platanus* sp.). Vegetation within TP-3 passed the Dominance Test and therefore met the wetland vegetation criterion. Soil in the top layer (0-13 inches) was a very dark brown (10YR 2/2) loam and gravel. Soil in the second layer (13-16+ inches) was a grayish brown (10YR 4/2) silty clay and gravel with a less than 1% dark yellowish brown (10YR 4/4) redoximorphic concentrations in the matrix. Soils in the second layer did not meet the depleted matrix indicator because the redoximorphic concentrations were too faint and their concentration not high enough; therefore, the hydric soil criterion was not met. No primary or secondary hydrology indicators were observed. Since TP-3 did not meet all 3 criteria, the area represented by TP-3 is not a wetland.

TP-4 was located in the channel improvements project area. Dominant vegetation within TP-4 included reed canarygrass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus armeniacus*). Vegetation within TP-4 passed the Dominance Test and therefore met the wetland vegetation criterion. Soil in the top layer (0-6 inches) was a very dark grayish brown (10YR 3/2) silt loam. Soil in the second layer (6-14 inches) was a dark brown (10YR 3/3) silt loam. Soil in the third layer (14-16+ inches) was a gray (5Y 5/1) silty clay with 8% dark yellowish brown (10YR 4/6) redoximorphic concentrations in the matrix. The soils did not meet any hydric soil indicator; therefore, the hydric soil criterion was not met. No primary or secondary hydrology indicators were observed. Since TP-4 did not meet all 3 criteria, the area represented by TP-4 is not a wetland.

TP-5 was located adjacent to the channel improvements project area. Dominant vegetation within TP-5 included reed canarygrass. Vegetation within TP-5 passed the Dominance Test and therefore met the wetland vegetation criterion. Soil in the top layer (0-10 inches) was a very dark grayish brown (10YR 3/2) silt loam. Soil in the second layer (10-16+inches) was a very dark grayish brown (2.5Y 3/2) sandy loam with 2% olive brown (2.5Y 4/4) redoximorphic concentrations in the matrix. The soils did not meet any hydric soil indicator; therefore, the

hydric soil criterion was not met. Two primary hydrology indicators—High Water Table (A2) and Saturation (A3)—and one secondary indicator—FAC-Neutral Test (D5)—were observed. However, the presence of primary hydrology indicators with the presence of non-hydric soils indicated the hydrology indicators observed were likely a result of the recent heavy rains and would not likely persist into the growing season. Since TP-5 did not meet all 3 criteria, the area represented by TP-5 is not a wetland.

TP-6 was located in the rain garden project area. Dominant vegetation within TP-6 included mowed lawn. Vegetation within TP-6 passed the Dominance Test and therefore met the wetland vegetation criterion. Soil in the top layer (0-7 inches) was a very dark grayish brown (10YR 3/2) loam. Soil in the second layer (7-15 inches) was a very dark brown (10YR 2/2) loam. Soil in the third layer (15-18+ inches) was a dark brown (7.5YR 3/3) sandy loam. The soils did not meet any hydric soil indicator; therefore, the hydric soil criterion was not met. No primary or secondary hydrology indicators were observed. Since TP-6 did not meet all 3 criteria, the area represented by TP-6 is not a wetland.

TP-7 was located east of TP-6 in the rain garden project area. Dominant vegetation within TP-7 included mowed lawn and reed canarygrass. Vegetation within TP-7 passed the Dominance Test and therefore met the wetland vegetation criterion. Soil in the top layer (0-18 inches) was a very dark brown (10YR 2/2) silt loam. Soil in the second layer (18-20+ inches) was a dark brown (7.5YR 3/4) silt loam. The soils did not meet any hydric soil indicator; therefore, the hydric soil criterion was not met. No primary or secondary hydrology indicators were observed. Since TP-7 did not meet all 3 criteria, the area represented by TP-7 is not a wetland.

TP-8 was located south of TP-7 in the rain garden project area. Dominant vegetation within TP-8 included mowed lawn. Vegetation within TP-8 passed the Dominance Test and therefore met the wetland vegetation criterion. Soil in the top layer (0-13 inches) was a very dark grayish brown (10YR 3/2) silt loam. Soil in the second layer (13-16 inches) was a dark yellowish brown (10YR 3/6) sandy loam. The soils did not meet any hydric soil indicator; therefore, the hydric soil criterion was not met. No primary or secondary hydrology indicators were observed. Since TP-8 did not meet all 3 criteria, the area represented by TP-8 is not a wetland.

## 4.3 Wetland

TP-2 met all 3 wetland criteria; the area represented by TP-2 was identified as Wetland A. This wetland is described below, summarized in Table 1, and shown in Figure 2.

Table 1. Wetland Summary

| Wetland Name | Cowardin Classification[1] | Size (sq ft) | Wetland Rating | | | | |
|---|---|---|---|---|---|---|---|
| | | | Water Quality | Hydrology | Habitat | Total | Category |
| Wetland A | PEM—palustrine emergent | 626 | 6 | 5 | 3 | 14 | IV |

[1] FGDC 2013

Wetland A is located in the central portion of the channel improvements project area (Figure 2) and is 626 square feet. According to the Cowardin classification (FGDC 2013), Wetland A is a palustrine emergent wetland. Wetland A is dominated by reed canarygrass and mowed lawn. The boundary of Wetland A was determined by a distinct topographic break and evidence of standing water. According to the 2014 Wetland Rating System (Hruby 2014), Wetland A was rated as a Category IV wetland, with a water quality score of 6, hydrology score of 5, and habitat score of 3.

## 4.4 Unnamed Ditch

An unnamed drainage ditch begins east of the channel improvements project area, flows west through the study area, and discharges into the Sammamish River. WDNR's Water Type GIS mapped this ditch as a non–fish-bearing watercourse (WDNR 2021). WDFW's SalmonScape mapped it as having no salmonid fish use (WDFW 2022).

Within the study area, the bank of unnamed ditch was unarmored. The OHWM of the unnamed ditch was delineated by Confluence and is shown in Figure 2. The primary indicators used to delineate the OHWM were top of bank and exposed roots/root scour.

The ditch contained standing water at the time of the November 29, 2021, site visit, with minor surface flow from the downgradient culvert to the Sammamish River. However, this flow went subsurface 20 feet or more before the confluence with the Sammamish River. Precipitation for the prior 2 months was approximately 12.3 inches, 2.8 inches above the normal precipitation of 9.5 inches for the same period (NWS 2022). Despite the recent heavy rains, there was no surface water connection to the Sammamish River. During the January 24, 2022, site visit, the ditch again contained standing water, but water was not flowing out of the downgradient culvert. Precipitation for the prior 2 months was approximately 11.2 inches, 0.5 inches above the normal precipitation of 10.7 inches for the same period (NWS 2022).

The lack of surface flow from the ditch into the Sammamish River during periods of above normal precipitation indicates that it does not have sufficient duration of flow or groundwater inputs to provide suitable salmonid habitat. Topographic survey data indicate that it may be accessible to fish during periods of Sammamish River flows with water surface elevations exceeding approximately 31 feet (NAVD 1988), but this happens very infrequently. Based on the Sammamish River KC Gage 51M data, Sammamish River water levels would come close to

the 2-year flood elevation of 30.5 feet (NAVD 1988) and backwater into the ditch as far as the downgradient culvert only about 1% of the time. Flood water would backwater upstream of the downgradient culvert (i.e., potentially into the study area) about 0.01% of the time (TetraTech 2018). While topographic surveys and gage data indicate the ditch may backwater and be accessible to fish during periods of high flows in the Sammamish River, based on the observed lack of flow in the ditch during periods of above normal precipitation, the potential for fish access likely occurs very rarely and for very short durations. It is unlikely that flow elevations allowing access to the ditch during spring outmigration periods for juvenile salmonid rearing or high flow refuge occur in most years given the gage data noted above. Additionally, the current ditch grade and elevation of the downgradient culvert may pose a stranding hazard.

Habitat conditions in the ditch for fish are very low quality. Salmonid spawning habitat and access to upstream spawning habitat do not exist. The upstream extent of the ditch lacks a defined channel or scour line, is choked with vegetation, and terminates within 170 meters of the eastern culvert; therefore, it does not constitute a significant reach of potential salmonid habitat. The lack of habitat complexity or cover, in addition to primary hydrologic contributions from pollutant-generating impervious surfaces, qualifies this habitat as very low quality, if not adverse, for potential rearing.

In addition, review of historical topographic maps and aerial imagery indicated that portions of the ditch may have been excavated in a relic channel of Bear Creek many years after Bear Creek had been relocated, but the ditch does not align with the historical main channel of Bear Creek. A detailed description of the historical analysis is in Appendix F.

Based on historical data and mapping, the current ditch is a wholly artificial channel, not used by salmonids. It does not represent an anthropogenic alteration and loss of historical stream channel habitat since Bear Creek has been relocated and provides fish access to the upper watershed. The anthropogenically altered stream channel in this case is represented by the current alignment of Bear Creek to the north[1]. For this reason, the ditch should be considered exclusively an artificial feature distinct from an altered stream channel. Though "physical fish use potential" exists per the criteria outlined in the Fish Passage Inventory, Assessment, and Prioritization Manual (WDFW 2019), it is negligible at best, and the criteria under WAC 220-660-190 for water crossing structures in fish-bearing waters are not justified given the conditions described. During the January 24, 2022, site visit, WDFW Area Habitat Biologist Miles Penk confirmed that the ditch has negligible fish access and habitat. Based on Mr. Penk's assessment, the ditch is an artificial feature that appears to have a surface water connection with the Sammamish River during low frequency recurrence interval flood events.

[1] Incidentally, the historically straightened alignment of the relocated Bear Creek reach has been recently enhanced with greater sinuosity, large woody material complexes, off-channel backwater habitat, and a woody riparian zone.

## 4.5 Sammamish River

The Sammamish River is located approximately 1,000 feet west of the study area. The Sammamish River originates at the north end of Lake Sammamish and ends at the river mouth at the northern tip of Lake Washington. The Sammamish River is a Type S stream and has two shoreline management designations in the vicinity of the study area: aquatic shoreline and conservancy shoreline. Neither of these shoreline designations extends to the channel improvements project area.

## 4.6 Wildlife Habitat

As noted above, no wildlife habitat networks are designated in the study area. No terrestrial habitats with which sensitive plants or animals have a primary association were identified. Available PHS data do not indicate suitable habitat for species of local importance identified in King County 2020. Aside from a few large conifers in the southern portion of the study area that will not be affected by the project, the site conditions are devoid of priority habitats or suitable habitat for species of local importance.

# 5.0 REGULATORY IMPLICATIONS

According to King County Code (KCC) 21A.24, the following standard buffers apply:

- Wetland A is a Category IV wetland in a high intensity land use; thus, the standard buffer is 50 feet.
- The unnamed ditch, a wholly artificial channel, has no buffer.
- The Sammamish River, a Type S stream, has two shoreline management designations, aquatic shoreline and conservancy shoreline. The standard buffer for a Type S stream with a low basin condition is 115 feet. The standard buffer does not encroach into the study areas.

Figure 3 shows Wetland A and its standard buffer. Development within this buffer or within the wetland itself requires compliance with KCC 21A.24.

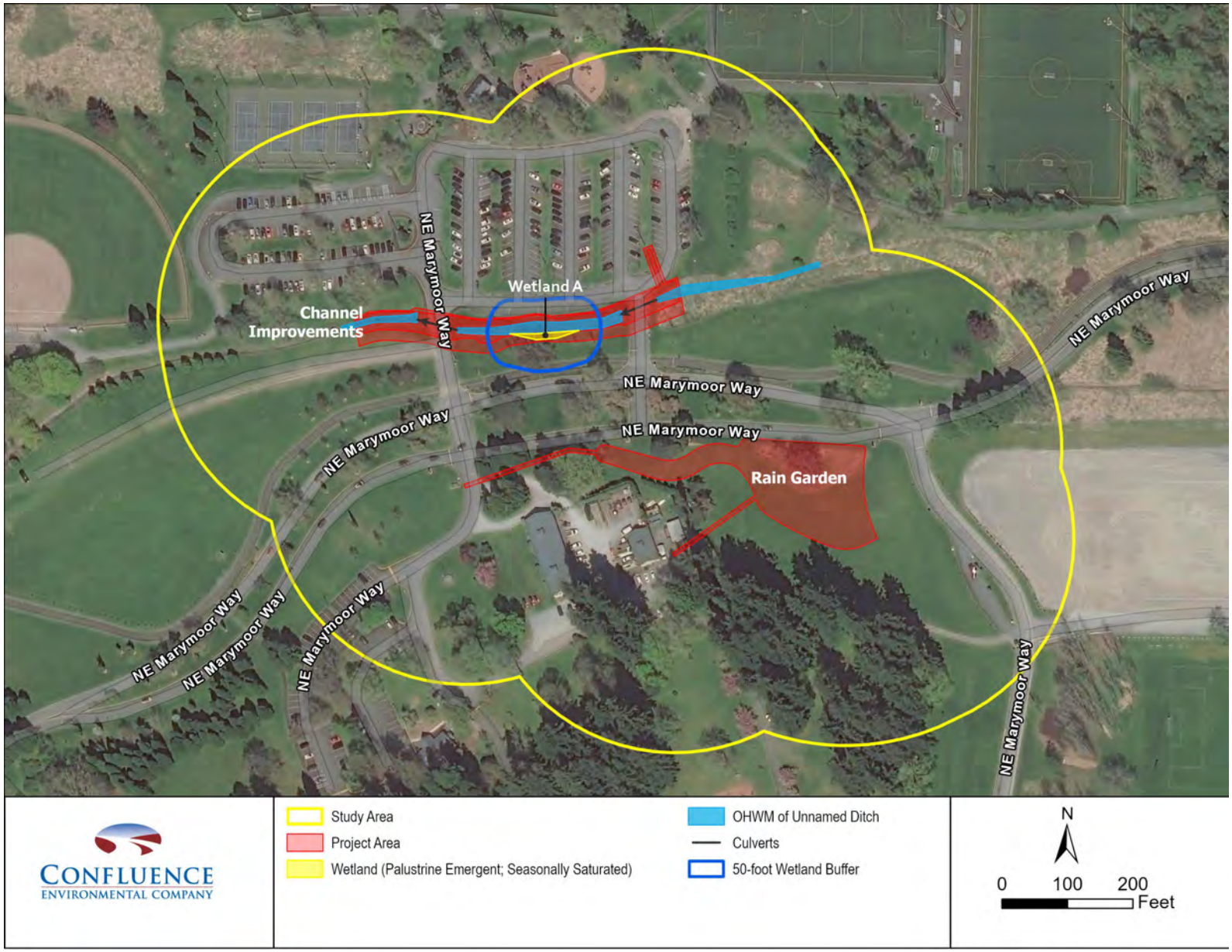


Figure 3. Wetland A 50-foot Buffer

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WDFW. 2022. SalmonScape interactive mapping [online database]. Washington Department of Fish and Wildlife, Olympia, Washington. Available at: http://apps.wdfw.wa.gov/salmonscape/map.html (accessed on January 10, 2022).

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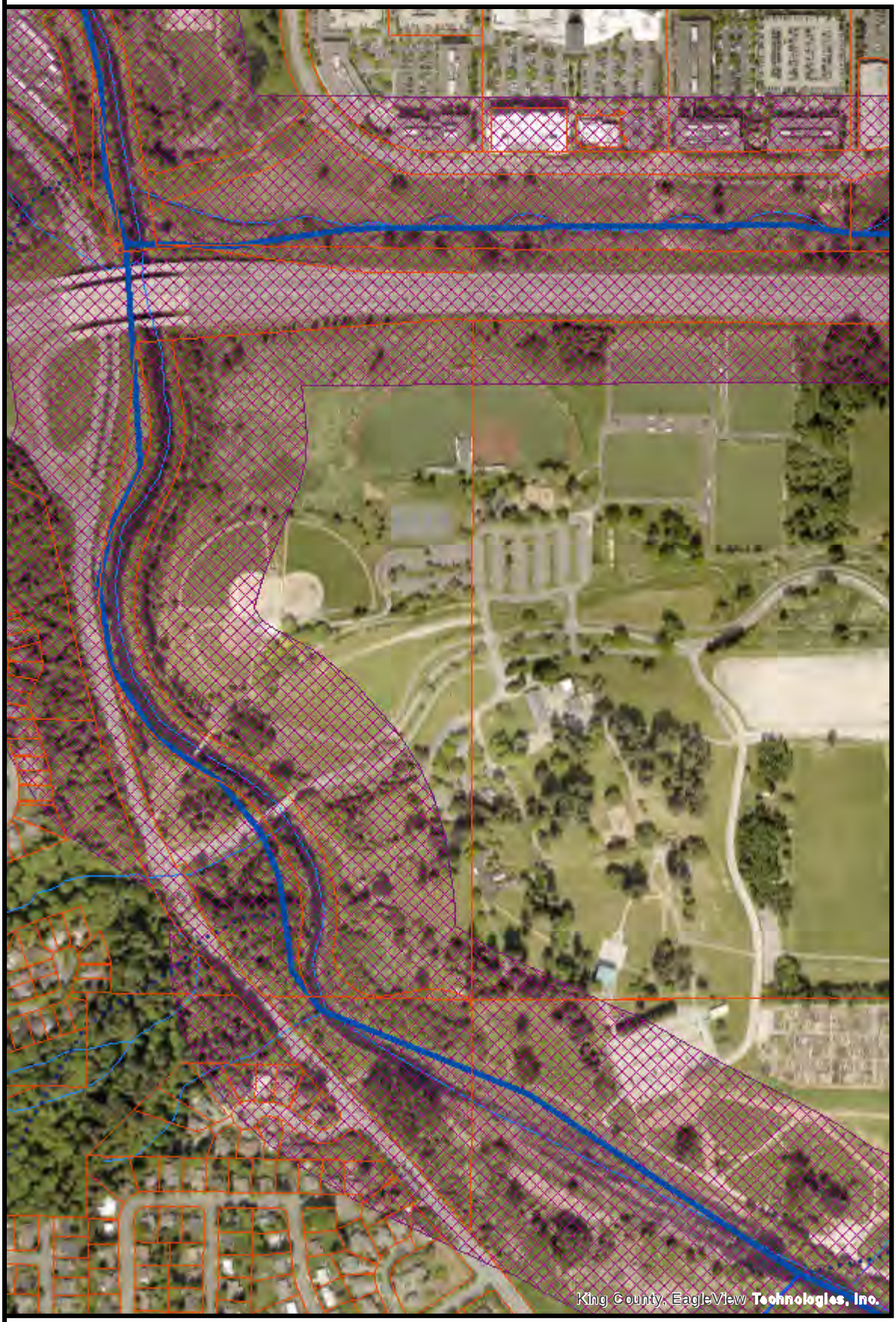
WDNR. 2022. Wetlands of high conservation value map viewer. Olympia, Washington. Available at: https://www.dnr.wa.gov/NHPwetlandviewer (accessed on January 10, 2022).

# Appendix A
## GIS Database Search Results

# King County iMap




## Legend

- Parcels

**Stream (1990 SAO)**

- class 1
- class 2 perennial
- class 2 salmonid
- class 3
- unclassified
- Wetland (1990 SAO)
- Chinook distribution
- Streams



N

King County

Date: 11/29/2021 Notes:

U.S. Fish and Wildlife Service

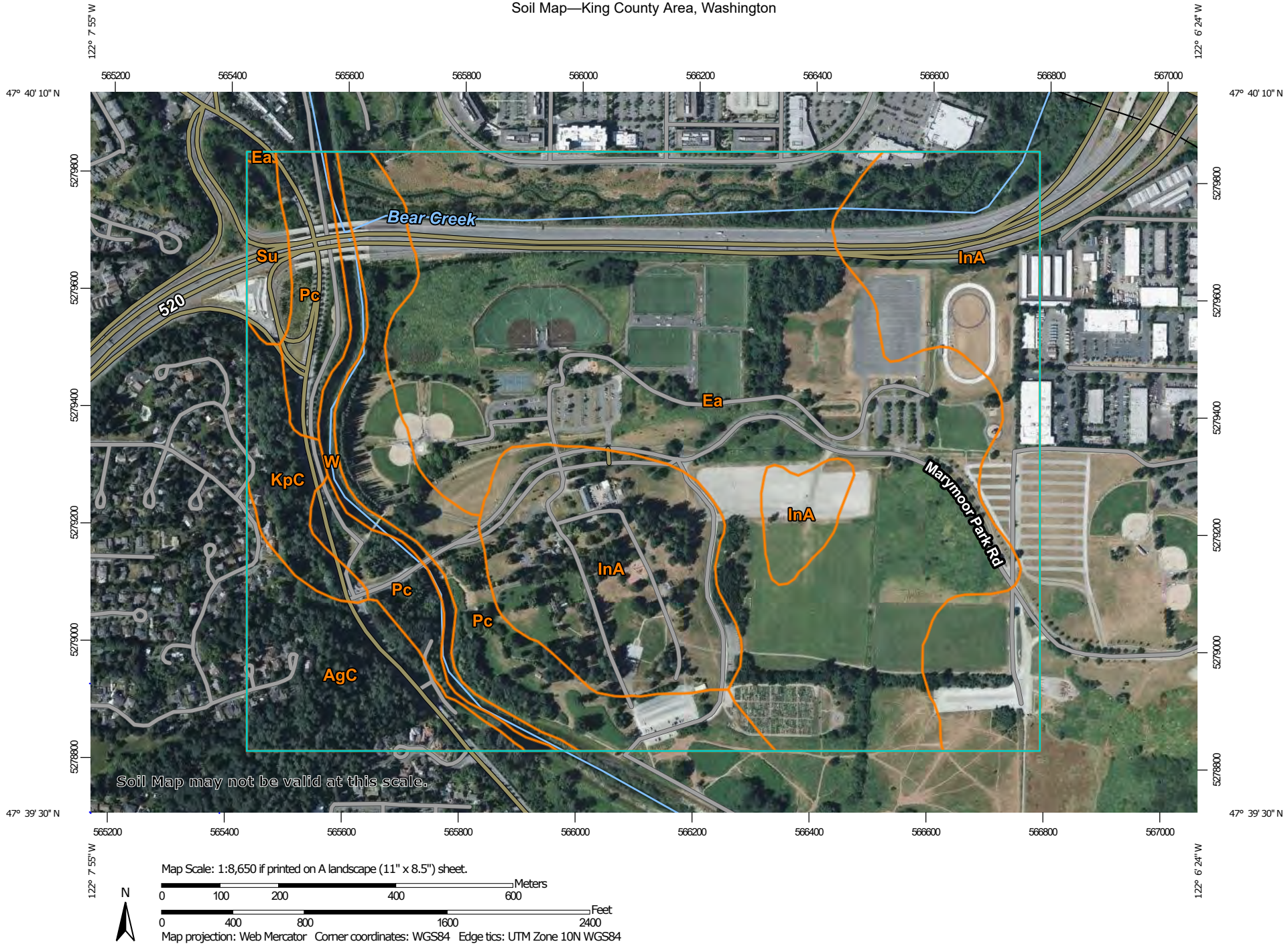
National Wetlands Inventory

# Wetlands


December 17, 2021

**Wetlands**

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine




Map Scale: 1:8,650 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

## MAP LEGEND

**Area of Interest (AOI)**

- Area of Interest (AOI)

**Soils**

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**

- Streams and Canals

**Transportation**

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**

- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: King County Area, Washington
Survey Area Data: Version 17, Aug 23, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 25, 2020—Jul 27, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| AgC | Alderwood gravelly sandy loam, 8 to 15 percent slopes | 23.6 | 6.9% |
| Ea | Earlmont silt loam | 157.7 | 45.9% |
| InA | Indianola loamy sand, 0 to 5 percent slopes | 89.0 | 25.9% |
| KpC | Kitsap silt loam, 8 to 15 percent slopes | 10.1 | 2.9% |
| Pc | Pilchuck loamy fine sand | 51.5 | 15.0% |
| Su | Sultan silt loam | 5.0 | 1.5% |
| W | Water | 6.9 | 2.0% |
| **Totals for Area of Interest** | | **343.9** | **100.0%** |


January 10, 2022

1:9,028

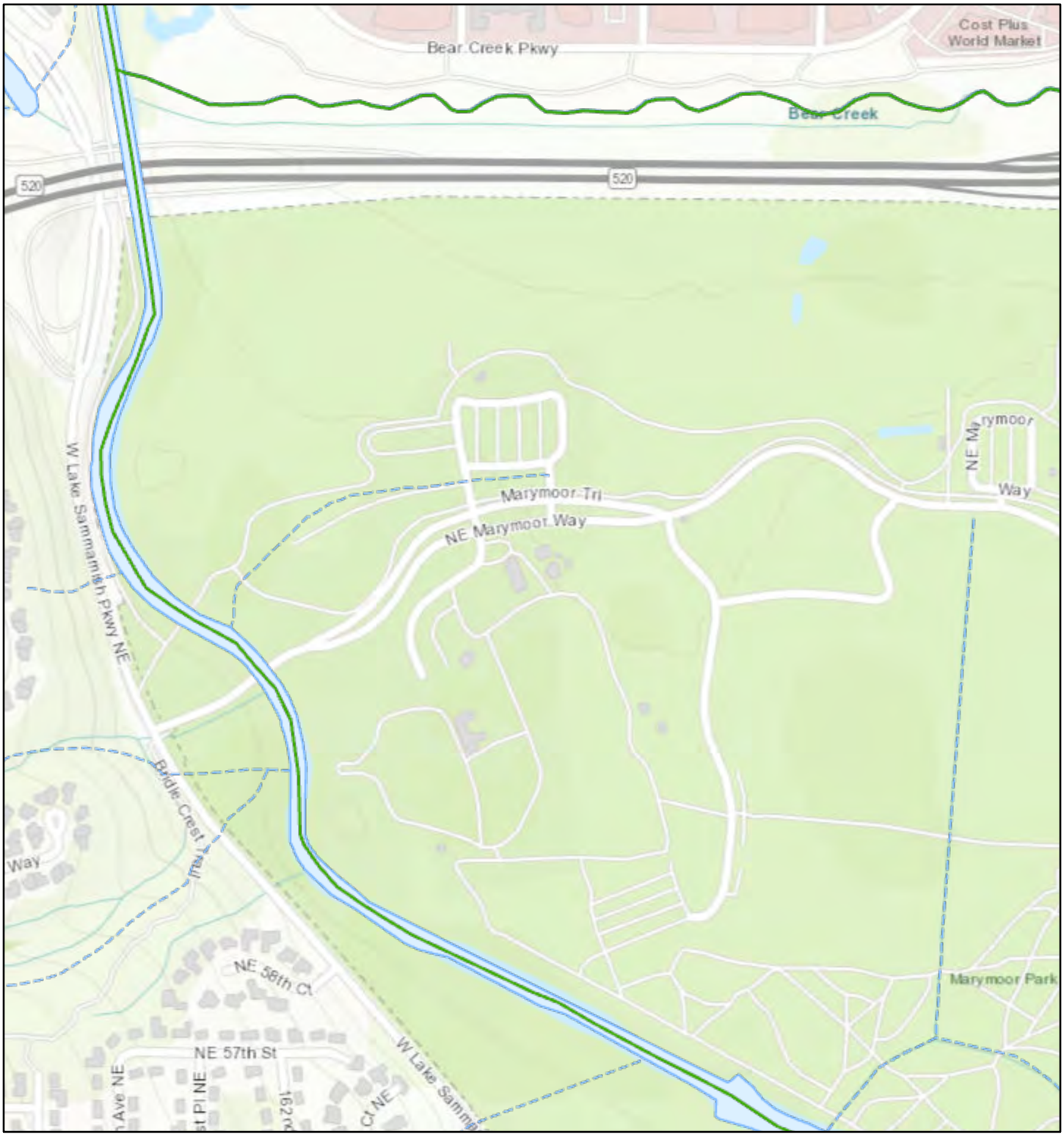
0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

Bull Trout

Documented Presence

USGS/NHD, Dale Gombert (WDFW), CoRGIS, County of King, Bureau of Land Management, Esri Canada, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA, WDFW




January 10, 2022

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

## Coho Streams

Documented Rearing

USGS/NHD, Dale Gombert (WDFW), CoRGIS, County of King, Bureau of Land Management, Esri Canada, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA, WDFW


January 10, 2022

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

Fall Chinook Streams

Documented Spawning

USGS/NHD, Dale Gombert (WDFW), CoRGIS, County of King, Bureau of Land Management, Esri Canada, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA, WDFW


January 10, 2022

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

Kokanee

Documented Presence

USGS/NHD, Dale Gombert (WDFW), CoRGIS, County of King, Bureau of Land Management, Esri Canada, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA, WDFW


January 10, 2022

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

## Sockeye Streams

- Documented Spawning
- Documented Presence


January 10, 2022

1:9,028

0 0.05 0.1 0.2 mi

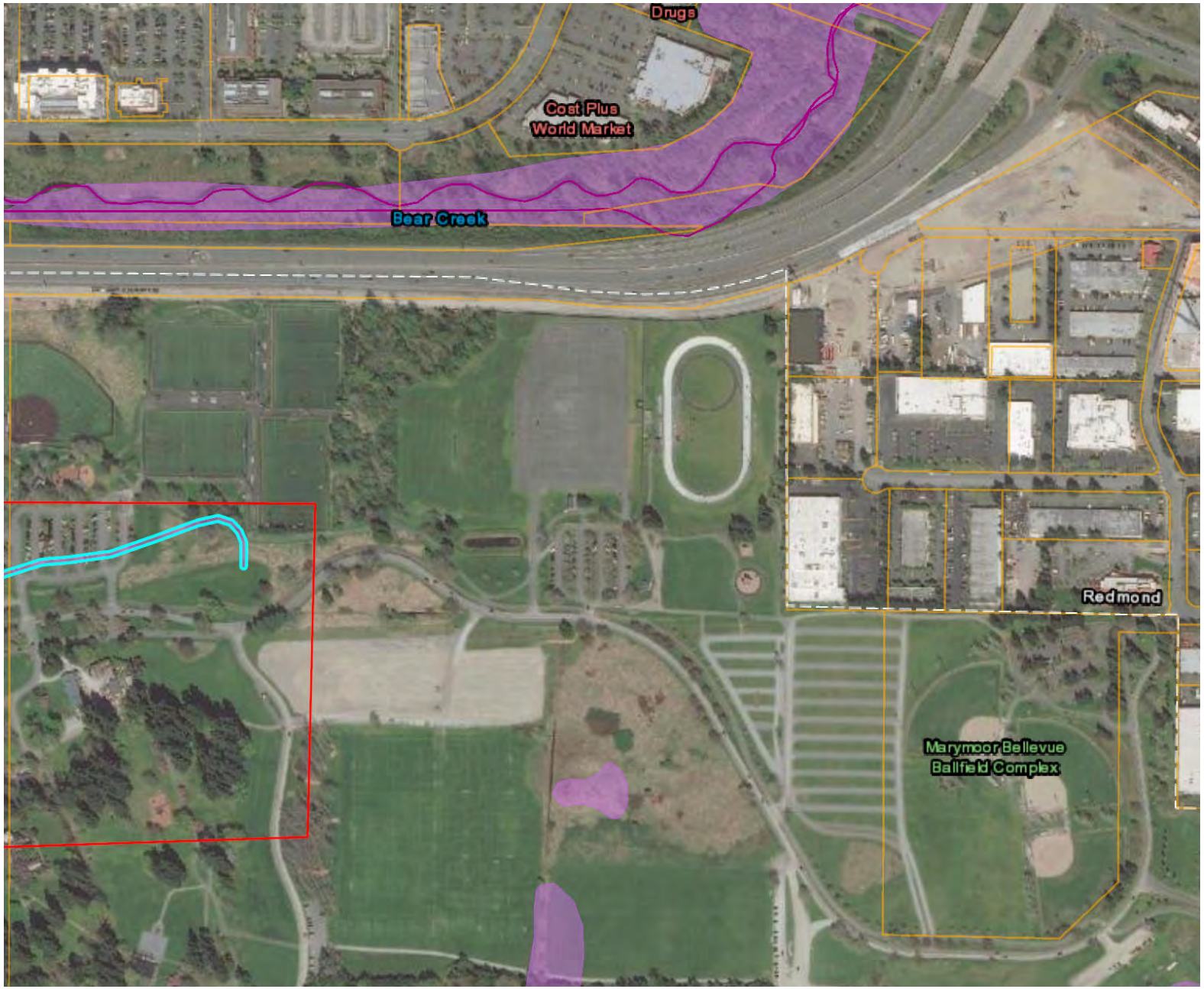
0 0.07 0.15 0.3 km

Winter Steelhead Streams

Documented Presence

USGS/NHD, Dale Gombert (WDFW), CoRGIS, County of King, Bureau of Land Management, Esri Canada, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA, WDFW

# Priority Habitats and Species on the Web




**Report Date: 12/02/2021**

## PHS Species/Habitats Overview:

| Occurence Name | Federal Status | State Status | Sensitive Location |
|---|---|---|---|
| Rainbow Trout | N/A | N/A | No |
| Fall Chinook | N/A | N/A | No |
| Coho | Candidate | N/A | No |
| Steelhead | Threatened | N/A | No |
| Sockeye | Not Warranted | N/A | No |
| Sockeye | N/A | N/A | No |
| Coho | N/A | N/A | No |
| Winter Steelhead | N/A | N/A | No |
| Resident Coastal Cutthroat | N/A | N/A | No |
| Dolly Varden/ Bull Trout | N/A | N/A | No |
| Kokanee | N/A | N/A | No |
| Biodiversity Areas And Corridor | N/A | N/A | No |
| Freshwater Emergent Wetland | N/A | N/A | No |

## PHS Species/Habitats Details:

| Rainbow Trout | |
|---|---|
| Scientific Name | *Oncorhynchus mykiss* |
| Priority Area | Occurrence/Migration |
| Site Name | Sammamish River |
| Accuracy | NA |
| Notes | LLID: 1222590476462, Fish Name: Rainbow Trout, Run Time: Unknown or not Applicable, Life History: Unknown |
| Source Record | 38830 |
| Source Dataset | SWIFD |
| Federal Status | N/A |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| More Info | http://wdfw.wa.gov/wlm/diversty/soc/soc.htm |
| Geometry Type | Lines |

| Fall Chinook | |
|---|---|
| Scientific Name | *Oncorhynchus tshawytscha* |
| Priority Area | Breeding Area |
| Site Name | Sammamish River |
| Accuracy | NA |
| Notes | LLID: 1222590476462, Fish Name: Chinook Salmon, Run Time: Fall, Life History: Anadromous |
| Source Record | 38821 |
| Source Dataset | SWIFD |
| Federal Status | N/A |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| More Info | http://wdfw.wa.gov/wlm/diversty/soc/soc.htm |
| Geometry Type | Lines |

| Coho | |
|---|---|
| Scientific Name | *Oncorhynchus kisutch* |
| Priority Area | Occurrence |
| Site Name | Sammamish River |
| Accuracy | NA |
| Notes | LLID: 1222590476462, Stock Name: Lake Washington/Sammamish Tribs Coho, Run: Unspecified, Status: Depressed |
| Source Record | 3120 |
| Source Dataset | SASI |
| Source Name | Not Given |
| Source Entity | WDFW Fish Program |
| Federal Status | Candidate |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| More Info | http://wdfw.wa.gov/wlm/diversty/soc/soc.htm |
| Geometry Type | Lines |

| Steelhead | |
|---|---|
| Scientific Name | *Oncorhynchus mykiss* |
| Priority Area | Occurrence |
| Site Name | Sammamish River |
| Accuracy | NA |
| Notes | LLID: 1222590476462, Stock Name: Lake Washington Winter Steelhead, Run: Winter, Status: Critical |
| Source Record | 6154 |
| Source Dataset | SASI |
| Source Name | Not Given |
| Source Entity | WDFW Fish Program |
| Federal Status | Threatened |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| More Info | http://wdfw.wa.gov/wlm/diversty/soc/soc.htm |
| Geometry Type | Lines |

| Sockeye | |
|---|---|
| Scientific Name | *Oncorhynchus nerka* |
| Priority Area | Occurrence |
| Site Name | Sammamish River |
| Accuracy | NA |
| Notes | LLID: 1222590476462, Stock Name: Lake Washington/Sammamish Tribs Sockeye, Run: Unspecified, Status: Healthy |
| Source Record | 5200 |
| Source Dataset | SASI |
| Source Name | Not Given |
| Source Entity | WDFW Fish Program |
| Federal Status | Not Warranted |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| More Info | http://wdfw.wa.gov/wlm/diversty/soc/soc.htm |
| Geometry Type | Lines |

| Sockeye | |
|---|---|
| Scientific Name | *Oncorhynchus nerka* |
| Priority Area | Occurrence/Migration |
| Site Name | Sammamish River |
| Accuracy | NA |
| Notes | LLID: 1222590476462, Fish Name: Sockeye Salmon, Run Time: Unknown or not Applicable, Life History: Anadromous |
| Source Record | 38831 |
| Source Dataset | SWIFD |
| Federal Status | N/A |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| More Info | http://wdfw.wa.gov/wlm/diversty/soc/soc.htm |
| Geometry Type | Lines |

| Coho | |
|---|---|
| Scientific Name | *Oncorhynchus kisutch* |
| Priority Area | Breeding Area |
| Site Name | Sammamish River |
| Accuracy | NA |
| Notes | LLID: 1222590476462, Fish Name: Coho Salmon, Run Time: Unknown or not Applicable, Life History: Anadromous |
| Source Record | 38824 |
| Source Dataset | SWIFD |
| Federal Status | N/A |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| More Info | http://wdfw.wa.gov/wlm/diversty/soc/soc.htm |
| Geometry Type | Lines |

| Winter Steelhead | |
|---|---|
| Scientific Name | *Oncorhynchus mykiss* |
| Priority Area | Occurrence/Migration |
| Site Name | Sammamish River |
| Accuracy | NA |
| Notes | LLID: 1222590476462, Fish Name: Steelhead Trout, Run Time: Winter, Life History: Anadromous |
| Source Record | 38832 |
| Source Dataset | SWIFD |
| Federal Status | N/A |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| More Info | http://wdfw.wa.gov/wlm/diversty/soc/soc.htm |
| Geometry Type | Lines |

| Resident Coastal Cutthroat | |
|---|---|
| Scientific Name | *Oncorhynchus clarki* |
| Priority Area | Occurrence/Migration |
| Site Name | Sammamish River |
| Accuracy | NA |
| Notes | LLID: 1222590476462, Fish Name: Cutthroat Trout, Run Time: Unknown or not Applicable, Life History: Unknown |
| Source Record | 38819 |
| Source Dataset | SWIFD |
| Federal Status | N/A |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| More Info | http://wdfw.wa.gov/wlm/diversty/soc/soc.htm |
| Geometry Type | Lines |

| Dolly Varden/ Bull Trout | |
|---|---|
| Scientific Name | *Salvelinus malma/S. confluentus* |
| Priority Area | Occurrence/Migration |
| Site Name | Sammamish River |
| Accuracy | NA |
| Notes | LLID: 1222590476462, Fish Name: Bull Trout, Run Time: Unknown or not Applicable, Life History: Unknown |
| Source Record | 38825 |
| Source Dataset | SWIFD |
| Federal Status | N/A |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| More Info | http://wdfw.wa.gov/wlm/diversty/soc/soc.htm |
| Geometry Type | Lines |

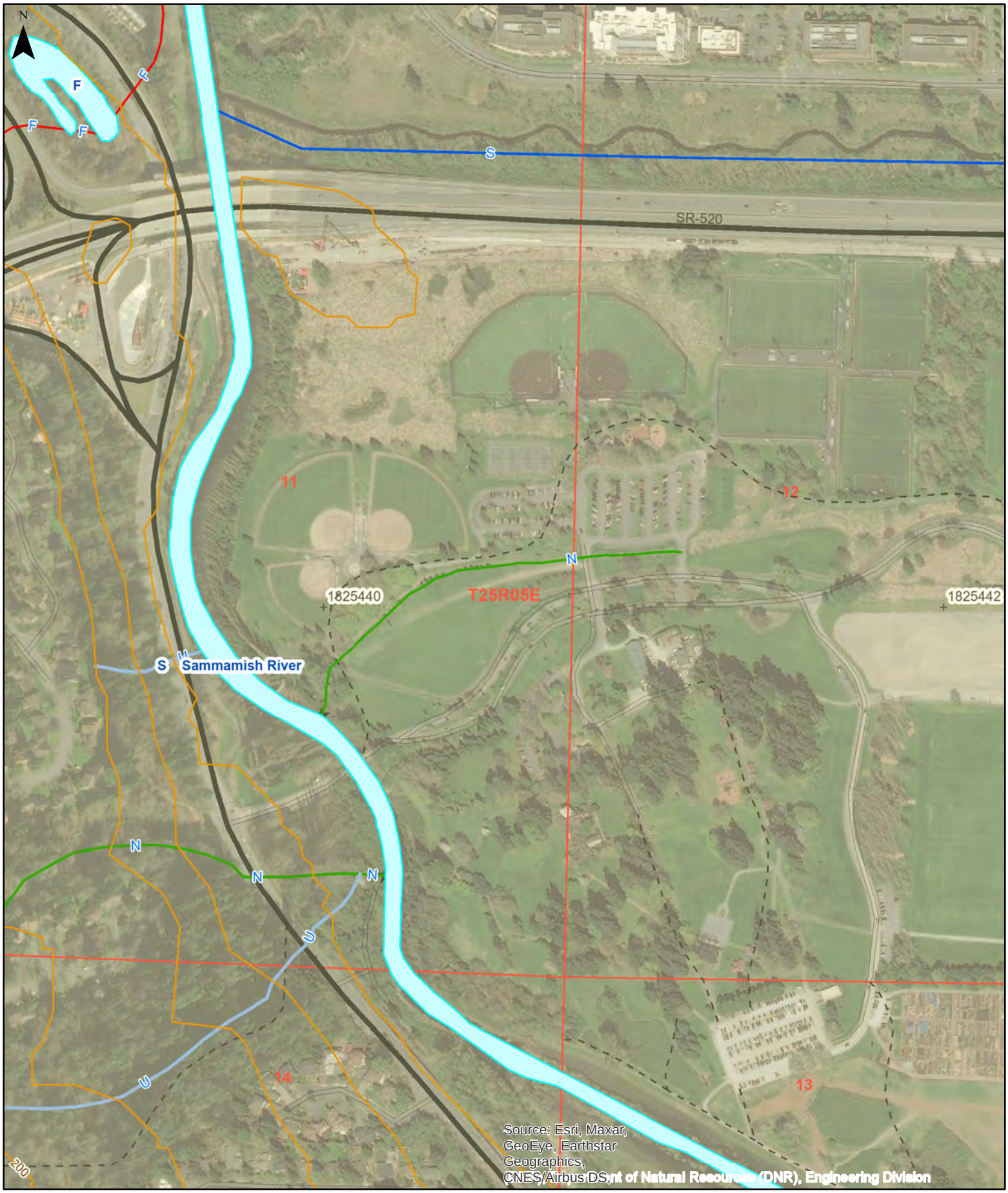
| Kokanee | |
|---|---|
| Scientific Name | *Oncorhynchus nerka* |
| Priority Area | Occurrence/Migration |
| Site Name | Sammamish River |
| Accuracy | NA |
| Notes | LLID: 1222590476462, Fish Name: Kokanee Salmon, Run Time: Unknown or not Applicable, Life History: Unknown |
| Source Record | 38828 |
| Source Dataset | SWIFD |
| Federal Status | N/A |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| More Info | http://wdfw.wa.gov/wlm/diversty/soc/soc.htm |
| Geometry Type | Lines |

| Biodiversity Areas And Corridor | |
|---|---|
| Priority Area | Terrestrial Habitat |
| Site Name | MARYMOOR PARK. |
| Accuracy | 1/4 mile (Quarter Section) |
| Notes | LARGE PARK AT NORTH END OF LAKE SAMMAMISH. AREA CONTAINS EXTENSIVE SCRUB-SHRUB AND EMERGENT WETLANDS, HOWEVER, IT HAS SUFFERED MUCH DISTURBANCE IN THE PAST. STILL PROVIDES EXTREMELY USEFULL HABITAT FOR MANY SPP. |
| Source Record | 902684 |
| Source Dataset | PHSREGION |
| Source Name | MULLER, TED |
| Source Entity | WA Dept. of Fish and Wildlife |
| Federal Status | N/A |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| ManagementRecommendations | http://wdfw.wa.gov/publications/pub.php?id=00023 |
| Geometry Type | Polygons |

| Freshwater Emergent Wetland | |
|---|---|
| Priority Area | Aquatic Habitat |
| Site Name | N/A |
| Accuracy | NA |
| Notes | Wetland System: Freshwater Emergent Wetland - NWI Code: PEM1C |
| Source Dataset | NWIWetlands |
| Source Name | Not Given |
| Source Entity | US Fish and Wildlife Service |
| Federal Status | N/A |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| ManagementRecommendations | http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html |
| Geometry Type | Polygons |

| Freshwater Emergent Wetland | |
|---|---|
| Priority Area | Aquatic Habitat |
| Site Name | N/A |
| Accuracy | NA |
| Notes | Wetland System: Freshwater Emergent Wetland - NWI Code: PEM1C |
| Source Dataset | NWIWetlands |
| Source Name | Not Given |
| Source Entity | US Fish and Wildlife Service |
| Federal Status | N/A |
| State Status | N/A |
| PHS Listing Status | PHS Listed Occurrence |
| Sensitive | N |
| SGCN | N |
| Display Resolution | AS MAPPED |
| ManagementRecommendations | http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html |
| Geometry Type | Polygons |

# Forest Practices Base Map



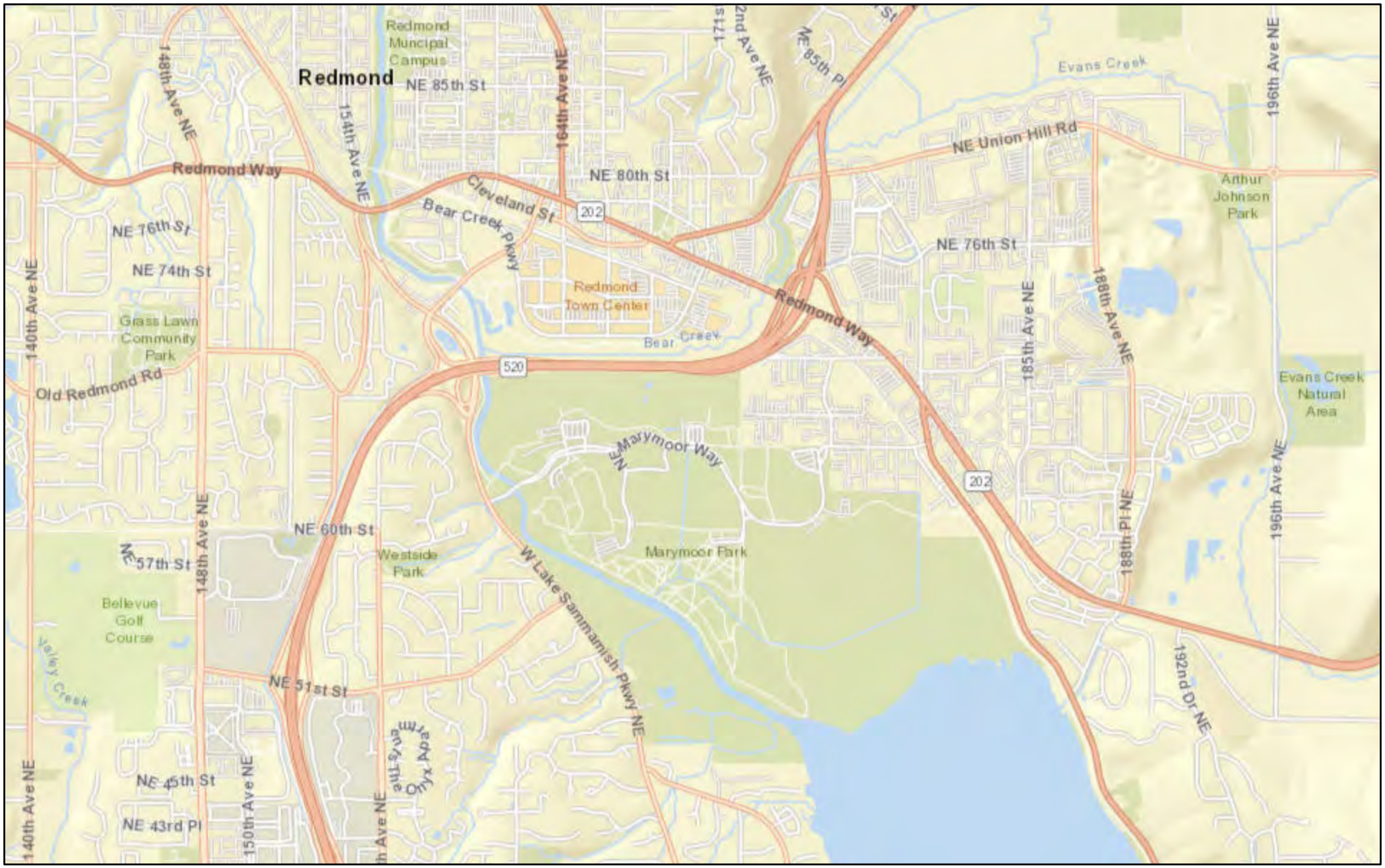

WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES

Extreme care was used during the compilation of this map to ensure its accuracy. However, due to changes in data and the need to rely on outside information, the Department of Natural Resources cannot accept responsibility for errors or omissions, and therefore, there are no warranties that accompany this material.

0 0.1 Miles

Date: 12/2/2021 Time: 1:06:25 PM

# WA Wetlands of High Conservation Value




1/10/2022, 2:26:57 PM

Counties

1:36,112

0 0.2 0.4 0.8 mi

0 0.33 0.65 1.3 km

CoRGIS, County of King, Bureau of Land Management, Esri, HERE, Garmin,

Washington Natural Heritage Program

CoRGIS, County of King, Bureau of Land Management, Esri, HERE, Garmin, INCREMENT P, NGA, USGS | Washington State Department of Natural Resources | Washington Natural Heritage Program http://www.dnr.wa.gov/natural-heritage-program |

# Appendix B
## Wetland Delineation Methods

# Marymoor Park Stormwater Facility Improvements: Appendix B

# CONFLUENCE ENVIRONMENTAL COMPANY WETLAND DELINEATION METHODS

Prepared by:

Confluence Environmental Company
2022

146 N Canal St, Suite 111 • Seattle, WA 98103 • www.confenv.com

# TABLE OF CONTENTS

This appendix describes the methods used to confirm the presence or absence of wetlands in a study area.

## 1.0 METHODOLOGIES

Confluence delineates the boundaries of wetlands using the "Routine Determinations for Areas Less Than 5 Acres in Size" method described by the U.S. Army Corps of Engineers (Corps) in the *Corps of Engineers Wetlands Delineation Manual* (Delineation Manual; Corps 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Regional Supplement; Corps 2010). The Regional Supplement was part of a nationwide effort to address regional wetland characteristics and improve the accuracy and efficiency of wetland-delineation procedures. The Regional Supplement uses the best available science to address regional differences in climate, geology, soils, hydrology, and plant and animal communities that cannot be addressed in a single national document, such as the Delineation Manual. The Regional Supplement was designed for use with the 1987 Delineation Manual and all subsequent versions. Where differences in the 2 documents occur, the Regional Supplement takes precedence over the 1987 Delineation Manual (Corps 2010). The Regional Supplement was developed to clarify the indicators of hydrophytic vegetation, hydric soils, and wetland hydrology found in the region (these indicators are discussed in detail in Section 2.0). It is important to note that areas that may have been determined to be wetlands under the 1987 Delineation Manual may not be determined to be wetlands under the Regional Supplement, and vice versa.

Confluence uses the PLANTS Database (NRCS 2021) for scientific names and the 2018 National Wetland Plant List (Corps 2018) to determine the wetland indicator status of plants. Wetlands are classified using the Cowardin Classification System (FGDC 2013). Confluence determines the wetland rating using Washington State Department of Ecology's Wetland Rating System for Western Washington (Hruby 2014). The National Wetland Inventory is also researched to determine if wetlands have previously been identified on the property (USFWS 2021).

The locations of test plots, soil cores, and wetland edges on a project property are recorded using a differential Global Positioning System with sub-meter accuracy. Delineated and surveyed wetland boundaries are subject to verification and approval by jurisdictional agencies.

## 2.0 WETLAND CRITERIA

There is specific technical language that applies to the study of wetlands. This section briefly explains the language Confluence uses in its wetland delineation reports.

The identification of wetlands is based on 3 criteria: hydrophytic vegetation, hydric soils, and hydrology. Each criterion has a number of indicators that can be used to determine whether the

criterion has been met. The Corps, which is the federal authority on the regulation of wetlands, has developed the guidance and the Data Sheet that are the standards used in all wetland determinations. The information presented below is based on their Delineation Manual (Corps 1987) and Regional Supplement (Corps 2010).

In order to confirm the presence of a wetland, data are collected from representative test plots chosen within and outside of a potential wetland. The test plots are representative of particular vegetative, topographic, and hydrologic features in the vicinity. Within the test plots particular data (see sections below) about vegetation, soils, and hydrology are collected to determine whether wetland characteristics are present. Plots that meet all 3 wetland criteria are wetland plots; plots that do not meet all 3 wetland criteria are upland (i.e., nonwetland) plots. The test plots (along with topographic and vegetative shifts) then inform the delineation of wetland boundaries.

## 2.1 Hydrophytic Vegetation

Vegetation is often the first visual cue that an area is a wetland. Similarly, vegetation often also signals the shift from wetland to nonwetland. The question regarding plants to be answered when performing a wetland delineation is: "Is the vegetation hydrophytic?" That is, is the vegetation of the variety that is adapted to live in wetter-than-average conditions? To determine the answer, there are a few resources and steps to follow. First, the indicator status for each plant present in the test plot is determined from the National Wetland Plant List (Corps 2018). The indicator status is a continuum from almost exclusively occurring in wetlands (obligate wetland plants, or OBL) to almost exclusively never found in wetlands (obligate upland plants, or UPL). The middle ground between those 2 extremes is known as a facultative plant (or FAC), which is found equally in wetland and upland environments. The FAC category has 2 further gradations: facultative upland plants (FACU), which are plants that are usually found in uplands, and facultative wetland plants (FACW), which are plants that are usually found in wetlands.

After the status of each plant species in the test plot has been determined, the hydrophytic vegetation indicator can be applied. The application of the indicators is performed sequentially, and once one is "passed," the box for hydrophytic vegetation is "checked," and the process continues to the next criterion. The first hydrophytic vegetation indicator is the "Rapid Test," which means with a quick visual survey, all the plants in the test plot are either OBL or FACW. The second test is the "Dominance Test." For the Dominance Test, the total number of dominant species in the test plot is divided by the number of species that are OBL, FACW, or FAC. The resulting percentage must be greater than 50 to pass this test. The third test is the "Prevalence Index." The Prevalence Index is a weighted average of the absolute cover of all the plant species present in the plot, regardless of dominance. There are also 2 other, less common, indicators:

morphological adaptations (e.g., buttressed trunks), or nonvascular plant species (e.g., sphagnum moss).

## 2.2 Hydric Soils

The soils tell the story about the presence of water over time. The National Technical Committee defines a hydric soil as: "...a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part." (USDA 1994) The question to be answered here is: "Has water been present long enough and recently enough to form hydric soils?" In order to examine the soil characteristics, a test pit must be dug, usually to about 18 inches. A sliver of soil from the test pit is extracted with a shovel (i.e., the soil profile) to examine the layers. The thickness, color, texture, redoximorphic features, and any other interesting information about each layer is observed and recorded. Those features are described more fully in the bullets below.

- **Thickness.** Layers are measured to the nearest inch. Usually, each soil profile has at least 2 layers.
- **Color.** Color is determined by comparison to a color chart. The industry standard is the Munsell Soil-Color Chart, which assigns each color a designation for hue, value, and chroma (e.g., 10YR 3/2, where 10YR=hue, 3=value, and 2=chroma).
- **Texture.** The precision of texture description for the purpose of wetland delineation is at a general scale. The Washington State University texture chart (Cogger 2010) is often used, but the delineator just needs to determine if the soil is sandy or loamy/clayey.
- **Redox Features.** The most common redoximorphic features are concentrations or depletions of iron in the soil matrix. Concentrations occur as red or yellow deposits, and depletions occur as grayish deposits.

When the soil profile is fully described, it can be determined if any of the layers meet a hydric soil indicator. Hydric soil indicators help to identify hydric soils. The presence of any indicator signifies a hydric soil, although a soil may be hydric and not meet any indicators. There are 19 hydric soil indicators in our region, 2 of which were observed at the site (Corps 2010). Additional hydric soil terminology definitions are in the sidebar.

**More Hydric Soils Definitions**
(adapted from Corps 2010)

*Matrix*: the dominant soil volume in a given soil layer

*Depleted Matrix*: the volume of a soil horizon in which soil processes have removed or transformed iron, creating colors of low chroma and high value, specifically:

- Value ≥5, chroma = 1, with or without redoximorphic features
- Value ≥6, chroma = 1 or 2, with or without redoximorphic features
- Value of 4 or 5, chroma =2, ≥2% distinct or prominent redoximorphic features
- Value of 4, chroma =1, ≥2% distinct or prominent redoximorphic features

*Distinct*: readily seen, but contrasting* moderately with comparison color

*Prominent*: readily seen and contrasting* greatly with comparison color

*See Corps 2010, Table A1, page 130 for full key on contrast determinations.

- **A11—Depleted Below Dark Surface.** A soil layer with a depleted matrix, with 60% or more chroma of ≤2, which starts within 12 inches of the surface and is at least 6 inches thick. Layers above the depleted layer must have a value ≤3, and a chroma ≤2.

- **F3—Depleted Matrix.** A soil layer that has a depleted matrix with 60% or more chroma of ≤2, with a thickness of either:

  - 2 inches, if entirely within the upper 6 inches of soil surface, or
  - 6 inches, starting within 10 inches of soil surface.

## 2.3 Hydrology

Wetland hydrology is the broadest criterion and has to do with signs of saturation and inundation in the test plot. While hydrophytic vegetation and hydric soils are the result of hydrology, they remain even during the dry season, whereas hydrology can be less apparent or absent during the dry season. The hydrology indicators are broad enough to encompass characteristics that may be present even during the dry season. Hydrology indicators are in 4 groups:

- Group A is based on direct observation of surface or ground water;
- Group B consists of evidence that the site is subject to inundation;
- Group C consists of other evidence that soil is or was saturated; and
- Group D consists of landscape, vegetation, and soil characteristics indicating contemporary wet conditions.

The indicators are further divided into 2 categories: primary and secondary. A test plot must have either 1 primary or 2 secondary indicators to pass the hydrology criterion. Primary and secondary indicators observed during this delineation are recorded on the wetland delineation data forms in Appendix C.

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# Appendix C
## Wetland Delineation Data Forms

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Marymoor Park City/County: Redmond/King Sampling Date: 11/29/21

Applicant/Owner: King County State: WA Sampling Point: TP-1

Investigator(s): KAM/BK/CB Section, Township, Range: T25N R5E S11

Landform (hillslope, terrace, etc.): none Local relief (concave, convex, none): Concave Slope (%): 0-1

Subregion (LRR): A Lat: 47.6642.1 ° N Long: 122.12193 ° W Datum: WGS 84

Soil Map Unit Name: Earlmont Silt Loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No _____ | **Is the Sampled Area within a Wetland?** Yes _____ No ✓ |
| Hydric Soil Present? | Yes _____ | No ✓ | |
| Wetland Hydrology Present? | Yes ✓ | No _____ | |

Remarks:
Overcast
Test plot located at west end of channel improvements

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 10 ') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| **Herb Stratum** (Plot size: 10 ') | | | |
| 1. Poa sp. | 90 | ✓ | FAC |
| 2. Plantago lanceolata | 5 | | FACU |
| 3. Trifolium repens | 5 | | FAC |
| 4. Taraxacum officinale | 5 | | FACU |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 105 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| | 0 = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- ✓ 2 - Dominance Test is >50%
- ___ 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ 5 - Wetland Non-Vascular Plants[1]
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ✓ No _____

Remarks:
Area of mowed lawn outside of plot observed lots of Plantago landceolata indicating upland
*assumed FAC tatings for mowed pasture grasses

## SOIL

Sampling Point: TP-1

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-3 | 10YR 3/3 | 100 | -- | -- | -- | -- | Sandy silt loam | |
| 3-16 | 2.5YR 3/3 | 84 | 10YR 5/1 | 6 | D | M | Sandy loam | |
| | | | 10YR 4/6 | 10 | C | M | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** _____ **No** ✓

Remarks:

Matrix value color is too bright to meet F3

Sandy soils likely due not dry out after rain

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes ✓ No _____ Depth (inches): 9"

Saturation Present? (includes capillary fringe) Yes ✓ No _____ Depth (inches): 9"

**Wetland Hydrology Present?** **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Recent heavy rains may be cause of hydrology and drains before oxidized rhizospheres develop.

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Marymoor City/County: Redmond/King Sampling Date: 11/29/21

Applicant/Owner: King County State: WA Sampling Point: TP-2

Investigator(s): KAM/BK/CB Section, Township, Range: T25N T5E S12

Landform (hillslope, terrace, etc.): none Local relief (concave, convex, none): none Slope (%): 2 %

Subregion (LRR): A Lat: 47.66421 ° N Long: 122.12087 ° W Datum: WGS 84

Soil Map Unit Name: Earlmont Silt Loam - non- hydric NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No _____ | **Is the Sampled Area within a Wetland?** Yes ✓ No _____ |
| Hydric Soil Present? | Yes ✓ | No _____ | |
| Wetland Hydrology Present? | Yes ✓ | No _____ | |

Remarks:
Overcast
Located in low spot between Lot K driveways; adjacent to ditch

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 10 ') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| **Herb Stratum** (Plot size: 10 ') | | | |
| 1. Poa sp. | 60 | ✓ | FAC |
| 2. Ranunculus repens | 40 | ✓ | FAC |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| | 0 = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ✓ No _____

Remarks:

## SOIL

Sampling Point: TP-2

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6 | 10YR 3/2 | 100 | -- | -- | -- | -- | Loam | |
| 6-10 | 10YR 3/2 | 99 | 10YR 3/4 | 1 | C | M | Loam | |
| 10-16 | 10YR 5/1 | 90 | 10YR 4/6 | 10 | C | M | Silty Clay | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ✓ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** ✓ **No** _____

Remarks:

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 8"

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 6"

**Wetland Hydrology Present?** **Yes** ✓ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Marymoor Park City/County: Redmond/King Sampling Date: 11/29/21

Applicant/Owner: King County State: WA Sampling Point: TP-3

Investigator(s): KAM/BK/CB Section, Township, Range: T25N T5E S12

Landform (hillslope, terrace, etc.): none Local relief (concave, convex, none): none Slope (%): 5%

Subregion (LRR): A Lat: 47.66419 ° N Long: 122.12086 ° W Datum: WGS 84

Soil Map Unit Name: Earlmont Silt Loam NWI classification: --

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No _____ | **Is the Sampled Area within a Wetland?** Yes _____ No ✓ |
| Hydric Soil Present? | Yes _____ | No ✓ | |
| Wetland Hydrology Present? | Yes _____ | No ✓ | |

Remarks:

slope

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 10 ') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Platanus sp. | 40 | ✓ | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 40 | = Total Cover | |
| **Sapling/Shrub Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 | = Total Cover | |
| **Herb Stratum** (Plot size: 10 ') | | | |
| 1. Poa sp. | 90 | ✓ | FAC |
| 2. Ranunculus repens | 5 | | FAC |
| 3. Trifolium repens | 5 | | FAC |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 100 | = Total Cover | |
| **Woody Vine Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| | 0 | = Total Cover | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ✓ No _____

Remarks:

## SOIL

Sampling Point: TP-3

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-13 | 10YR 2/2 | 100 | -- | -- | -- | -- | Loam | with gravel |
| 13-16 | 10YR 4/2 | 99 | 10YR 4/4 | T | C | M | Silty Clay | with gravel |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** _____ **No** ✓

Remarks:

Second layer redox are faint in F3 indicator

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

**Wetland Hydrology Present?** **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No indicators observed.

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Marymoor Park City/County: Redmond/King Sampling Date: 11/29/21

Applicant/Owner: King County State: WA Sampling Point: TP-4

Investigator(s): KAM/BK/CB Section, Township, Range: T25N T5E S12

Landform (hillslope, terrace, etc.): none Local relief (concave, convex, none): none Slope (%): 1-3%

Subregion (LRR): A Lat: 47.66432 ° N Long: 122.12010 ° W Datum: WGS 84

Soil Map Unit Name: Earlmont Silt Loam NWI classification: --

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No _____ | **Is the Sampled Area within a Wetland?** Yes _____ No ✓ |
| Hydric Soil Present? | Yes _____ | No ✓ | |
| Wetland Hydrology Present? | Yes _____ | No ✓ | |

Remarks:

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 10 ') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum (Plot size: 10 ')** | | | |
| 1. Rubus armeniacus | 40 | ✓ | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 40 = Total Cover | | |
| **Herb Stratum (Plot size: 10 ')** | | | |
| 1. Phalaris arundinacea | 80 | ✓ | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 80 = Total Cover | | |
| **Woody Vine Stratum (Plot size: 10 ')** | | | |
| 1. | | | |
| 2. | | | |
| | 0 = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ✓ No _____

Remarks:

## SOIL

Sampling Point: TP-4

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-6 | 10YR 3/2 | 100 | -- | -- | -- | -- | silt loam | |
| 6-14 | 10YR 3/3 | 100 | -- | -- | -- | -- | silt loam | |
| 14-16+ | 5Y 5/1 | 92 | 10YR 4/6 | 8 | C | M | silty clay | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** _____ **No** ✓

Remarks:

3rd layer too deep to meet F3 indicator

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

**Wetland Hydrology Present?** **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No primary and only 1 secondary indicators observed.

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Marymoor Park City/County: Redmond/King Sampling Date: 11/29/21

Applicant/Owner: King County State: WA Sampling Point: TP-5

Investigator(s): KAM/BK/CB Section, Township, Range: T25N T5E S12

Landform (hillslope, terrace, etc.): none Local relief (concave, convex, none): Concave Slope (%): 0-1

Subregion (LRR): A Lat: 47.66449 ° N Long: 122.11952 ° W Datum: WGS 84

Soil Map Unit Name: Earlmont Silt Loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No _____ | **Is the Sampled Area within a Wetland?** Yes _____ No ✓ |
| Hydric Soil Present? | Yes _____ | No ✓ | |
| Wetland Hydrology Present? | Yes ✓ | No _____ | |

Remarks:

low spot in Phalaris arundinacea at east of channel improvements

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 10 ') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| **Herb Stratum** (Plot size: 10 ') | | | |
| 1. Phalaris arundinacea | 100 | ✓ | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 100 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| | 0 = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ✓ No _____

Remarks:

## SOIL

Sampling Point: TP-5

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-10 | 10YR 3/2 | 100 | -- | -- | -- | -- | Silt Loam | |
| 10-16+ | 2.5YR 4/4 | 98 | 2.5Y 4/4 | 2 | C | M | Sandy Loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** ___ **No** ✓

Remarks:

Redox concentrations are faint do not meet F6 indicators.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ✓ No ___ Depth (inches): 12"

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): 12"

**Wetland Hydrology Present?** **Yes** ✓ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Despite recent heavy rains and ditch with standing water nearby hydrology is weak.

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Marymoor Park City/County: Redmond/King Sampling Date: 11/29/21

Applicant/Owner: King Coutnty State: WA Sampling Point: TP-6

Investigator(s): KAM/BK/CB Section, Township, Range: T25N T5E S12

Landform (hillslope, terrace, etc.): none Local relief (concave, convex, none): none Slope (%): 0

Subregion (LRR): A Lat: 47.66368 ° N Long: 122.12077 °W Datum: WGS 84

Soil Map Unit Name: Indianola loamy sand nonhydric NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No _____ | **Is the Sampled Area within a Wetland?** Yes _____ No ✓ |
| Hydric Soil Present? | Yes _____ | No ✓ | |
| Wetland Hydrology Present? | Yes _____ | No ✓ | |

Remarks:

West end of bioretention channel of rain garden

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 10 ') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| **Herb Stratum** (Plot size: 10 ') | | | |
| 1. Poa sp. | 100 | ✓ | FAC |
| 2. Taraxacum officinale | 5 | | FACU |
| 3. | 1 | | FAC |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 107 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| | 0 = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ✓ No _____

Remarks:

## SOIL

Sampling Point: TP-6

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-7 | 10YR 3/2 | 100 | -- | -- | -- | -- | Loam | |
| 7-15 | 10YR 2/2 | 100 | -- | -- | -- | -- | Loam | |
| 15-18+ | 7.5YR 3/3 | 100 | -- | -- | -- | -- | Sandy Loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present? Yes _____ No ✓**

Remarks:

No indicators observed

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

**Wetland Hydrology Present? Yes _____ No ✓**

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No indicators observed.

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Marymoor Park City/County: Redmond/King Sampling Date: 11/29/21

Applicant/Owner: King County State: WA Sampling Point: TP-7

Investigator(s): KAM/BK/CB Section, Township, Range: T25N T5E S12

Landform (hillslope, terrace, etc.): none Local relief (concave, convex, none): Concave Slope (%): 0-1 %

Subregion (LRR): A Lat: 47.66372 ° W Long: 122.11910 ° W Datum: WGS 84

Soil Map Unit Name: Indianola loamy sand NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No _____ | **Is the Sampled Area within a Wetland?** Yes _____ No ✓ |
| Hydric Soil Present? | Yes _____ | No ✓ | |
| Wetland Hydrology Present? | Yes _____ | No ✓ | |

Remarks:

Located in lowest topography spot within disturbance area for rain garden.

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 10 ') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. Platanus sp. | 30 | ✓ | FAC |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 30 | = Total Cover | |
| **Sapling/Shrub Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 | = Total Cover | |
| **Herb Stratum** (Plot size: 10 ') | | | |
| 1. Phalaris arundinacea | 100 | ✓ | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 100 | = Total Cover | |
| **Woody Vine Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| | 0 | = Total Cover | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ✓ No _____

Remarks:

## SOIL

Sampling Point: TP-7

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-18 | 10YR 2/2 | 100 | -- | -- | -- | -- | Silt Loam | |
| 18-20+ | 7.5YR 3/4 | 100 | -- | -- | -- | -- | Silt Loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** _____ **No** ✓

Remarks:

Dry soil observed in second layer, no indicator observed.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ✓ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

**Wetland Hydrology Present?** **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Soils slightly damp but not close to saturation despite recent heavy rains.

## WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Marymoor Park City/County: Redmond/King Sampling Date: 11/29/21

Applicant/Owner: King County State: WA Sampling Point: TP-8

Investigator(s): KAM/BK/CB Section, Township, Range: T25N T5E S12

Landform (hillslope, terrace, etc.): none Local relief (concave, convex, none): none Slope (%): 0-1 %

Subregion (LRR): A Lat: 47.6635 ° N Long: 122.11902 ° W Datum: WGS 84

Soil Map Unit Name: Indianola loamy sand NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

### SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

| | | | |
|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes ✓ | No _____ | **Is the Sampled Area within a Wetland?** Yes _____ No ✓ |
| Hydric Soil Present? | Yes _____ | No ✓ | |
| Wetland Hydrology Present? | Yes _____ | No ✓ | |

Remarks:

### VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 10 ') | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 0 = Total Cover | | |
| **Sapling/Shrub Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 0 = Total Cover | | |
| **Herb Stratum** (Plot size: 10 ') | | | |
| 1. Poa sp. | 100 | ✓ | FAC |
| 2. Plantago lanceolata | 2 | | FACU |
| 3. Taraxacum officinale | 5 | | FACU |
| 4. Cerastium fontanum | 2 | | FAC |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 109 = Total Cover | | |
| **Woody Vine Stratum** (Plot size: 10 ') | | | |
| 1. | | | |
| 2. | | | |
| | 0 = Total Cover | | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

**Prevalence Index worksheet:**

| Total % Cover of: | Multiply by: |
|---|---|
| OBL species _____ | x 1 = _____ |
| FACW species _____ | x 2 = _____ |
| FAC species _____ | x 3 = _____ |
| FACU species _____ | x 4 = _____ |
| UPL species _____ | x 5 = _____ |
| Column Totals: _____ (A) | _____ (B) |

Prevalence Index = B/A = _____

**Hydrophytic Vegetation Indicators:**

___ 1 - Rapid Test for Hydrophytic Vegetation

✓ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

**Hydrophytic Vegetation Present?** Yes ✓ No _____

Remarks:

## SOIL

Sampling Point: TP-8

**Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)**

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-13 | 10YR 3/2 | 100 | -- | -- | -- | -- | Silt Loam | |
| 13-16 | 10YR 3/6 | 100 | -- | -- | -- | -- | Sandy Loam | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

**Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)**

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

**Indicators for Problematic Hydric Soils[3]:**

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

**Hydric Soil Present?** **Yes** _____ **No** ✓

Remarks:

No indicators observed.

## HYDROLOGY

**Wetland Hydrology Indicators:**

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) (**except MLRA 1, 2, 4A, and 4B**)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) (**LRR A**)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A, and 4B**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) (**LRR A**)
- ___ Frost-Heave Hummocks (D7)

**Field Observations:**

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

**Wetland Hydrology Present?** **Yes** _____ **No** ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No indicators observed.

# Appendix D
## Wetland Rating Forms

Wetland name or number A

# RATING SUMMARY – Western Washington

Name of wetland (or ID #): A Date of site visit: 29-Nov-21

Rated by B Kidder Trained by Ecology? ☑ Yes ☐ No Date of training 2005

**HGM Class used for rating** Slope Wetland has multiple HGM classes? ☐ Yes ☑ No

**NOTE: Form is not complete with out the figures requested** (*figures can be combined*).
Source of base aerial photo/map

**OVERALL WETLAND CATEGORY** IV (based on functions ☐ or special characteristics ☐ )

### 1. Category of wetland based on FUNCTIONS

_____ **Category I** - Total score = 23 - 27
_____ **Category II** - Total score = 20 - 22
_____ **Category III** - Total score = 16 - 19
**X** **Category IV** - Total score = 9 - 15

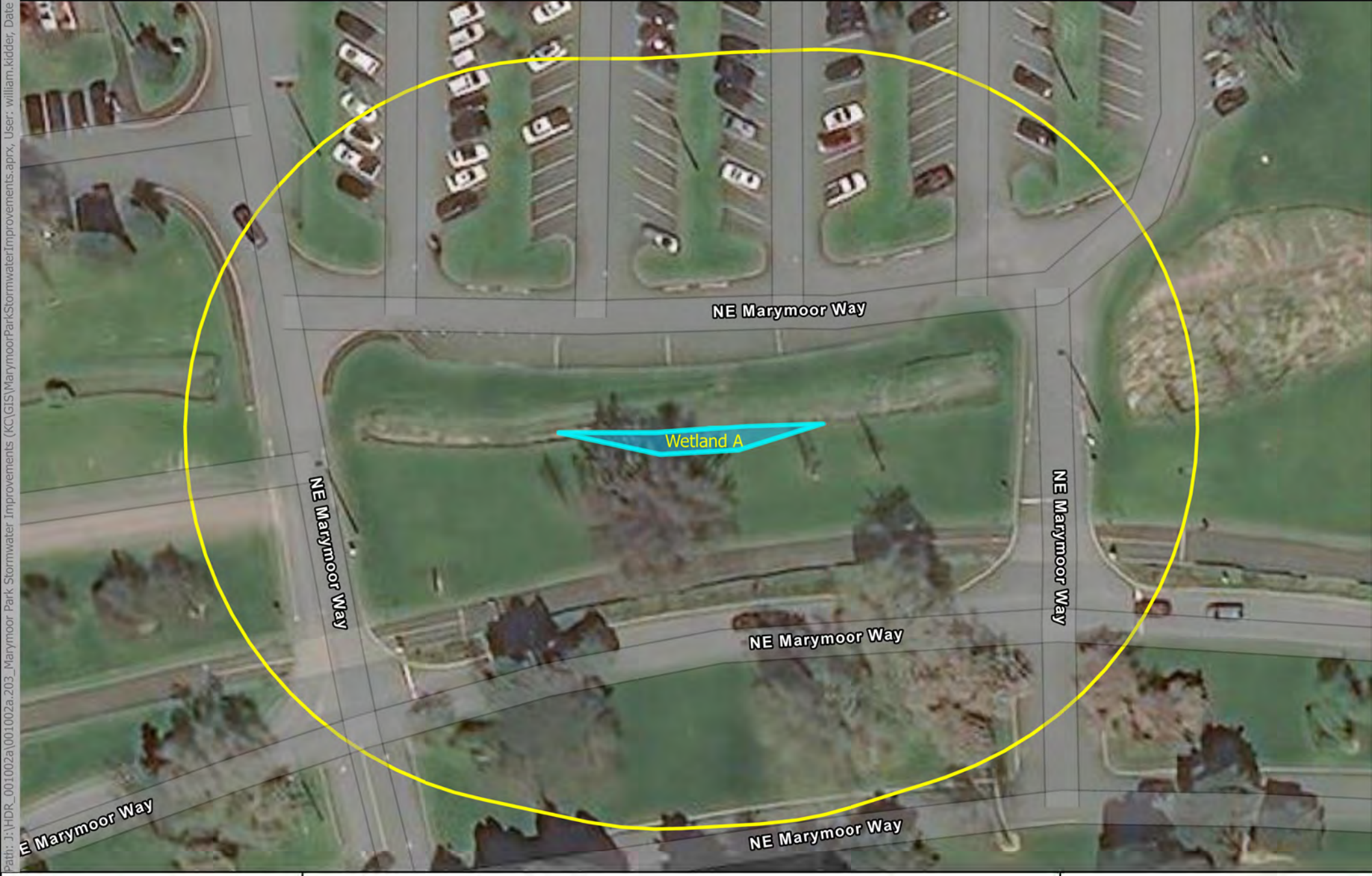
| FUNCTION | Improving Water Quality | Hydrologic | Habitat | |
|---|---|---|---|---|
| | | *List appropriate rating (H, M, L)* | | |
| Site Potential | L | L | L | |
| Landscape Potential | M | M | L | |
| Value | H | M | L | **Total** |
| **Score Based on Ratings** | 6 | 5 | 3 | **14** |

**Score for each function based on three ratings** (*order of ratings is not important*)

9 = H, H, H
8 = H, H, M
7 = H, H, L
7 = H, M, M
6 = H, M, L
6 = M, M, M
5 = H, L, L
5 = M, M, L
4 = M, L, L
3 = L, L, L

### 2. Category based on SPECIAL CHARACTERISTICS of wetland

| CHARACTERISTIC | Category |
|---|---|
| **Estuarine** | |
| **Wetland of High Conservation Value** | |
| **Bog** | |
| **Mature Forest** | |
| **Old Growth Forest** | |
| **Coastal Lagoon** | |
| **Interdunal** | |
| None of the above | **X** |




CONFLUENCE
ENVIRONMENTAL COMPANY

Wetland (Palustrine Emergent; Seasonally Saturated)

Wetland Rating Form 150-foot Analysis Area Buffer

N

0 100 Feet


Path: J:\HDR_001002a\001002a.203_Marymoor Park Stormwater Improvements (KC\GIS\MarymoorParkStormwaterImprovements.aprx, User: william.kidder, Date

CONFLUENCE ENVIRONMENTAL COMPANY

Wetlands

1 km Wetland Buffer

Land Use Intensity

Low / Moderate

Relatively Undisturbed

N

0 1,000 Feet

Wetland name or number A

# HGM Classification of Wetland in Western Washington

For questions 1 -7, the criteria described must apply to the entire unit being rated.
If hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1 - 7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

☑ NO - go to 2 ☐ **YES** - the wetland class is **Tidal Fringe** - go to 1.1

1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

☑ **NO - Saltwater Tidal Fringe (Estuarine)** ☐ **YES - Freshwater Tidal Fringe**
*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

☑ NO - go to 3 ☐ **YES** - The wetland class is **Flats**
*If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?
- ☐ The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
- ☐ At least 30% of the open water area is deeper than 6.6 ft (2 m).

☑ NO - go to 4 ☐ **YES** - The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?
- ☑ The wetland is on a slope (*slope can be very gradual*),
- ☑ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks.
- ☑ The water leaves the wetland **without being impounded.**

☐ NO - go to 5 ☑ **YES** - The wetland class is **Slope**

**NOTE**: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
- ☐ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
- ☐ The overbank flooding occurs at least once every 2 years.

☑ NO - go to 6 ☐ **YES** - The wetland class is **Riverine**

**NOTE**: The Riverine unit can contain depressions that are filled with water when the river is not flooding.

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

☑ NO - go to 7 ☐ **YES** - The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

☑ NO - go to 8 ☐ **YES** - The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

**NOTE**: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

| HGM classes within the wetland unit being rated | HGM class to use in rating |
|---|---|
| Slope + Riverine | Riverine |
| Slope + Depressional | Depressional |
| Slope + Lake Fringe | Lake Fringe |
| Depressional + Riverine along stream within boundary of depression | Depressional |
| Depressional + Lake Fringe | Depressional |
| Riverine + Lake Fringe | Riverine |
| Salt Water Tidal Fringe and any other class of freshwater wetland | Treat as ESTUARINE |

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have* ***more than 2 HGM classes*** *within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number __A_____

Wetland name or number A

## SLOPE WETLANDS

**Water Quality Functions** - Indicators that the site functions to improve water quality

| | |
|---|---|
| S 1.0. Does the site have the potential to improve water quality? | |
| S 1.1. Characteristics of the average slope of the wetland: (*a 1% slope has a 1 ft vertical drop in elevation for every 100 ft of horizontal distance*)<br>Slope is 1% or less — points = 3<br>Slope is > 1% - 2% — points = 2<br>Slope is > 2% - 5% — points = 1<br>Slope is greater than 5% — points = 0 | 1 |
| S 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic (*use NRCS definitions*): Yes = 3 No = 0 | 0 |
| S 1.3. Characteristics of the plants in the wetland that trap sediments and pollutants: Choose the points appropriate for the description that best fits the plants in the wetland. *Dense means you have trouble seeing the soil surface (>75% cover), and uncut means not grazed or mowed and plants are higher than 6 in.*<br>Dense, uncut, herbaceous plants > 90% of the wetland area — points = 6<br>Dense, uncut, herbaceous plants > ½ of area — points = 3<br>Dense, woody, plants > ½ of area — points = 2<br>Dense, uncut, herbaceous plants > ¼ of area — points = 1<br>Does not meet any of the criteria above for plants — points = 0 | 0 |
| Total for S 1 — Add the points in the boxes above | **1** |

**Rating of Site Potential** If score is: ☐ **12 = H** ☐ **6 - 11 = M** ☑ **0 - 5 = L** *Record the rating on the first page*

| | |
|---|---|
| S 2.0. Does the landscape have the potential to support the water quality function of the site? | |
| S 2.1. Is > 10% of the area within 150 ft on the uphill side of the wetland in land uses that generate pollutants? Yes = 1 No = 0 | 1 |
| S 2.2. Are there other sources of pollutants coming into the wetland that are not listed in question S 2.1?<br>Other Sources geese droppings, stormwater Yes = 1 No = 0 | 1 |
| Total for S 2 — Add the points in the boxes above | **2** |

**Rating of Landscape Potential** If score is: ☑ **1 - 2 = M** ☐ **0 = L** *Record the rating on the first page*

| | |
|---|---|
| S 3.0. Is the water quality improvement provided by the site valuable to society? | |
| S 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0 | 1 |
| S 3.2. Is the wetland in a basin or sub-basin where water quality is an issue? *At least one aquatic resource in the basin is on the 303(d) list.* Yes = 1 No = 0 | 1 |
| S 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? A*nswer YES if there is a TMDL for the basin in which the unit is found*? Yes = 2 No = 0 | 2 |
| Total for S 3 — Add the points in the boxes above | **4** |

**Rating of Value** If score is: ☑ **2 - 4 = H** ☐ **1 = M** ☐ **0 = L** *Record the rating on the first page*

Wetland name or number __A_____

Wetland name or number A

## SLOPE WETLANDS

**Hydrologic Functions** - Indicators that the site functions to reduce flooding and stream erosion

| S 4.0. Does the site have the potential to reduce flooding and stream erosion? | |
|---|---|
| S 4.1. Characteristics of plants that reduce the velocity of surface flows during storms: Choose the points appropriate for the description that best fits conditions in the wetland. *Stems of plants should be thick enough (usually > 1/8 in), or dense enough, to remain erect during surface flows.*<br>Dense, uncut, **rigid** plants cover > 90% of the area of the wetland — points = 1<br>All other conditions — points = 0 | 0 |

**Rating of Site Potential** If score is: ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

| S 5.0. Does the landscape have the potential to support hydrologic functions of the site? | |
|---|---|
| S 5.1. Is more than 25% of the area within 150 ft upslope of wetland in land uses or cover that generate excess surface runoff? Yes = 1 No = 0 | 1 |

**Rating of Landscape Potential** If score is: ☑ **1 = M** ☐ **0 = L** *Record the rating on the first page*

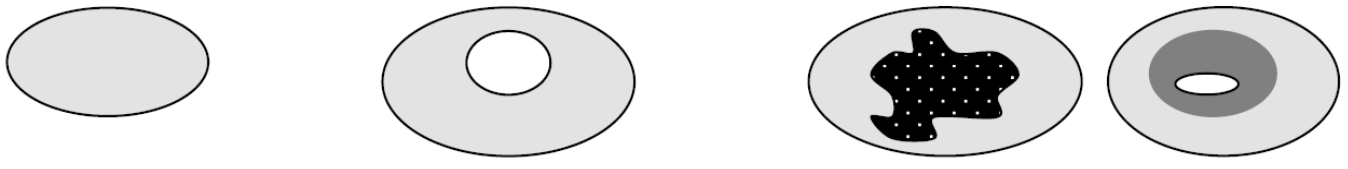
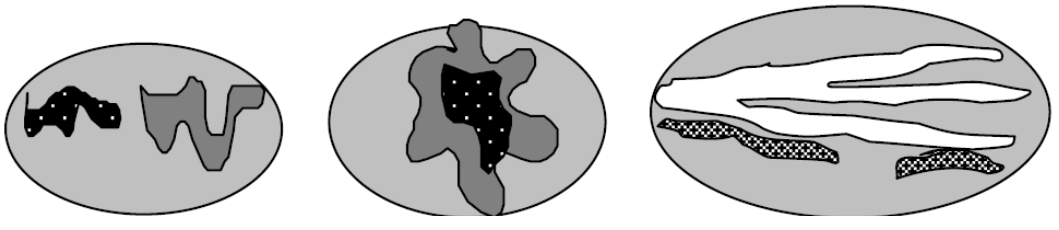
| S 6.0. Are the hydrologic functions provided by the site valuable to society? | |
|---|---|
| S 6.1. Distance to the nearest areas downstream that have flooding problems:<br>The sub-basin immediately down-gradient of site has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) — points = 2<br>Surface flooding problems are in a sub-basin farther down-gradient — points = 1<br>No flooding problems anywhere downstream — points = 0 | 1 |
| S 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0 | 0 |
| Total for S 6 — Add the points in the boxes above | **1** |

**Rating of Value** If score is: ☐ **2 - 4 = H** ☑ **1 = M** ☐ **0 = L** *Record the rating on the first page*

NOTES and FIELD OBSERVATIONS:

Wetland name or number __A_____

Wetland name or number A

| These questions apply to wetlands of all HGM classes. | |
|---|---|
| **HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat | |
| H 1.0. Does the site have the potential to provide habitat? | |
| H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*<br><br>☐ Aquatic bed — 4 structures or more: points = 4<br>☑ Emergent — 3 structures: points = 2<br>☐ Scrub-shrub (areas where shrubs have > 30% cover) — 2 structures: points - 1<br>☐ Forested (areas where trees have > 30% cover) — 1 structure: points = 0<br>*If the unit has a Forested class, check if*:<br>☐ The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon | 0 |
| H 1.2. Hydroperiods<br>Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).<br><br>☐ Permanently flooded or inundated — 4 or more types present: points = 3<br>☐ Seasonally flooded or inundated — 3 types present: points = 2<br>☐ Occasionally flooded or inundated — 2 types present: points = 1<br>☑ Saturated only — 1 types present: points = 0<br>☐ Permanently flowing stream or river in, or adjacent to, the wetland<br>☐ Seasonally flowing stream in, or adjacent to, the wetland<br>☐ **Lake Fringe wetland** — **2 points**<br>☐ **Freshwater tidal wetland** — **2 points** | 0 |
| H 1.3. Richness of plant species<br>Count the number of plant species in the wetland that cover at least 10 $ft^2$.<br>*Different patches of the same species can be combined to meet the size threshold and you do not have to name the species.* ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***<br><br>If you counted: > 19 species — points = 2<br>5 - 19 species — points = 1<br>< 5 species — points = 0 | 0 |
| H 1.4. Interspersion of habitats<br>Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*<br><br>  <br>**None** = 0 points — **Low** = 1 point — **Moderate** = 2 points<br><br>All three diagrams in this row are **HIGH** = 3 points<br><br>  | 0 |

Wetland name or number A

Wetland name or number A

| | |
|---|---|
| H 1.5. Special habitat features:<br>Check the habitat features that are present in the wetland. *The number of checks is the number of points.*<br>☐ Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long)<br>☐ Standing snags (dbh > 4 in) within the wetland<br>☐ Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m)<br>☐ Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present (*cut shrubs or trees that have not yet weathered where wood is exposed*)<br>☐ At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated (*structures for egg-laying by amphibians*)<br>☑ Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*) | 1 |
| Total for H 1 Add the points in the boxes above | **1** |

**Rating of Site Potential** If Score is: ☐ **15 - 18 = H** ☐ **7 - 14 = M** ☑ **0 - 6 = L** *Record the rating on the first page*

| | |
|---|---|
| H 2.0. Does the landscape have the potential to support the habitat function of the site? | |
| H 2.1 Accessible habitat (include *only habitat that directly abuts wetland unit*).<br>*Calculate:*<br>_____ % undisturbed habitat + ( _____ % moderate & low intensity land uses / 2 ) =<br><br>If total accessible habitat is:<br>> 1/3 (33.3%) of 1 km Polygon points = 3<br>20 - 33% of 1 km Polygon points = 2<br>10 - 19% of 1 km Polygon points = 1<br>< 10 % of 1 km Polygon points = 0 | 0 |
| H 2.2. Undisturbed habitat in 1 km Polygon around the wetland.<br>*Calculate:*<br>_____ % undisturbed habitat + ( _____ % moderate & low intensity land uses / 2 ) =<br><br>Undisturbed habitat > 50% of Polygon points = 3<br>Undisturbed habitat 10 - 50% and in 1-3 patches points = 2<br>Undisturbed habitat 10 - 50% and > 3 patches points = 1<br>Undisturbed habitat < 10% of 1 km Polygon points = 0 | 1 |
| H 2.3 Land use intensity in 1 km Polygon: If<br>> 50% of 1 km Polygon is high intensity land use points = (-2)<br>≤ 50% of 1km Polygon is high intensity points = 0 | -2 |
| Total for H 2 Add the points in the boxes above | **-1** |

**Rating of Landscape Potential** If Score is: ☐ **4 - 6 = H** ☐ **1 - 3 = M** ☑ **< 1 = L** *Record the rating on the first page*

| | |
|---|---|
| H 3.0. Is the habitat provided by the site valuable to society? | |
| H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated*.<br>Site meets ANY of the following criteria: points = 2<br>☐ It has 3 or more priority habitats within 100 m (see next page)<br>☐ It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists)<br>☐ It is mapped as a location for an individual WDFW priority species<br>☐ It is a Wetland of High Conservation Value as determined by the Department of Natural Resources<br>☐ It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan | 0 |

Wetland name or number A

| | | |
|---|---|---|
| Site has 1 or 2 priority habitats (listed on next page) with in 100m | points = 1 | |
| Site does not meet any of the criteria above | points = 0 | |

**Rating of Value** If Score is: ☐ **2 = H** ☐ **1 = M** ☑ **0 = L** *Record the rating on the first page*

# WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp.
http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here:
http://wdfw.wa.gov/conservation/phs/list/

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE**: This question is independent of the land use between the wetland unit and the priority habitat.*

- ☐ **Aspen Stands**: Pure or mixed stands of aspen greater than 1 ac (0.4 ha).
- ☐ **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).
- ☐ **Herbaceous Balds**: Variable size patches of grass and forbs on shallow soils over bedrock.
- ☐ **Old-growth/Mature forests**: Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.
- ☐ **Oregon White Oak**: Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).
- ☐ **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.
- ☐ **Westside Prairies**: Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).
- ☐ **Instream**: The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.
- ☐ **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page*).
- ☐ **Caves**: A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.
- ☐ **Cliffs**: Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.
- ☐ **Talus**: Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.
- ☐ **Snags and Logs**: Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Wetland name or number A

**Note**: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number A

# CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

| **Wetland Type**<br><br>*Check off any criteria that apply to the wetland. List the category when the appropriate criteria are met.* | **Category** |
|---|---|
| **SC 1.0. Estuarine Wetlands**<br>Does the wetland meet the following criteria for Estuarine wetlands?<br>☐ The dominant water regime is tidal,<br>☐ Vegetated, and<br>☐ With a salinity greater than 0.5 ppt<br>☐ Yes - Go to **SC 1.1** ☐ No = **Not an estuarine wetland** | |
| SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151?<br>☐ Yes = **Category I** ☐ No - Go to **SC 1.2** | |
| SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions?<br>☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina* , see page 25)<br>☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland.<br>☐ The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands.<br>☐ Yes = **Category I** ☐ No = **Category II** | |
| **SC 2.0. Wetlands of High Conservation Value (WHCV)**<br>SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value?<br>☐ Yes - Go to **SC 2.2** ☐ No - Go to **SC 2.3**<br>SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value?<br>☐ Yes = **Category I** ☐ No = **Not WHCV**<br>SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland?<br>http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf<br>☐ Yes - **Contact WNHP/WDNR and to SC 2.4** ☐ No = **Not WHCV**<br>SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website?<br>☐ Yes = **Category I** ☐ No = **Not WHCV** | |
| **SC 3.0. Bogs**<br>Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* ***If you answer YES you will still need to rate the wetland based on its functions*** *.*<br>SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile?<br>☐ Yes - Go to **SC 3.3** ☐ No - Go to **SC 3.2**<br>SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond?<br>☐ Yes - Go to **SC 3.3** ☐ No = **Is not a bog**<br>SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4?<br>☐ Yes = **Is a Category I bog** ☐ No - Go to **SC 3.4**<br>**NOTE**: If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog.<br>SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed | |

| | |
|---|---|
| in Table 4 provide more than 30% of the cover under the canopy?<br>☐ Yes = **Is a Category I bog** ☐ No = **Is not a bog** | |

**SC 4.0. Forested Wetlands**

Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? ***If you answer YES you will still need to rate the wetland based on its functions.***

☐ **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more.

☐ **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80- 200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm).

☐ Yes = **Category I** ☐ No = **Not a forested wetland for this section**

**SC 5.0. Wetlands in Coastal Lagoons**

Does the wetland meet all of the following criteria of a wetland in a coastal lagoon?

☐ The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks

☐ The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon (*needs to be measured near the bottom* )

☐ Yes - Go to **SC 5.1** ☐ No = **Not a wetland in a coastal lagoon**

SC 5.1. Does the wetland meet all of the following three conditions?

☐ The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100).

☐ At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland.

☐ The wetland is larger than $^{1}/_{10}$ ac (4350 $ft^2$)

☐ Yes = **Category I** ☐ No = **Category II**

**SC 6.0. Interdunal Wetlands**

Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ***If you answer yes you will still need to rate the wetland based on its habitat functions.***

In practical terms that means the following geographic areas:

☐ Long Beach Peninsula: Lands west of SR 103

☐ Grayland-Westport: Lands west of SR 105

☐ Ocean Shores-Copalis: Lands west of SR 115 and SR 109

☐ Yes - Go to **SC 6.1** ☐ No = **Not an interdunal wetland for rating**

SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)?

☐ Yes = **Category I** ☐ No - Go to **SC 6.2**

SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger?

☐ Yes = **Category II** ☐ No - Go to **SC 6.3**

SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac?

☐ Yes = **Category III** ☐ No = **Category IV**

**Category of wetland based on Special Characteristics**

If you answered No for all types, enter "Not Applicable" on Summary Form

# Appendix E
## Site Photographs


Photo 1—Soil profile at TP-1.

Photo 2—View to north from TP-1 in Alternative 6A study area.

Photo 3—View to west from TP-1 in Alternative 6A study area.

Photo 4—View to east from TP-1 in Alternative 6A study area.

Photo 5—Soil profile at TP-2 in Alternative 6A study area.

Photo 6— View to north from TP-2 in Alternative 6A study area.

Photo 7— View to west from TP-2 in Alternative 6A study area.

Photo 8— View to south from TP-2 in Alternative 6A study area.

Photo 9— View to east from TP-2 in Alternative 6A study area.

Photo 10—Soil profile at TP-3 in Alternative 6A study area.

Photo 11—View to north from TP-3 in Alternative 6A study area.

Photo 12—View to west from TP-3 in Alternative 6A study area.

Photo 13—View to east from TP-3 in Alternative 6A study area.

Photo 14—Soil profile at TP-4 in Alternative 6A study area.

Photo 15—View to north from TP-4 in Alternative 6A study area.

Photo 16—View to west from TP-4 in Alternative 6A study area.

Photo 17—View to east from TP-4 in Alternative 6A study area.


Photo 18—Soil profile at TP-5 in Alternative 6A study area.

Photo 19—View to west from TP-5 in Alternative 6A study area.

Photo 20—View to east from TP-5 in Alternative 6A study area.

Photo 21—View to south from TP-5 in Alternative 6A study area.

Photo 22—Soil profile at TP-6 in Alternative 4A study area.

Photo 23—View to west from TP-6 in Alternative 4A study area.

Photo 24—View to east from TP-6 in Alternative 4A study area.

Photo 25—Soil profile at TP-7 in Alternative 4A study area.

Photo 26—View to west from TP-7 in Alternative 4A study area.


Photo 27—View to east from TP-7 in Alternative 4A study area.

Photo 28—View to south from TP-7 in Alternative 4A study area.

Photo 29—View to west from TP-1 in Alternative 6A study area.

Photo 30—View to west from TP-8 in Alternative 4A study area.

Photo 31—View to east from TP-8 in Alternative 4A study area.

Photo 32—View to north from TP-8 in Alternative 4A study area.


Photo 33—Unnamed ditch outlet to Sammamish River. Note no water present on January 24, 2022

Photo 34—Unnamed ditch neat outlet (same location as Photo 33). Note water present on November 29, 2021


Photo 35—View to east of unnamed ditch from Photo 33.


Photo 36—View to east of unnamed ditch from Marymoor Connector Trail.

Photo 37—View to east of unnamed ditch.

# Appendix F
## Marymoor Park Drainage Ditch Analysis

CONFLUENCE
ENVIRONMENTAL COMPANY

To: Shazaad Jarrahian, King County
cc: Beth Rood, HDR, Inc.
Lisa Danielski, HDR, Inc.

From: Kerrie McArthur, PWS, CERP, and Chris Berger, PWS

Date: February 25, 2022

Re: Marymoor Park Drainage Ditch Analysis

Enclosures: Attachment A – 1895 Topo Map
Attachment B – 1936 Aerial Map
Attachment C – 1950 Topo Map
Attachment D – 1964 Aerial Map

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This technical memorandum was prepared by Confluence Environmental Company (Confluence) to document the historic conditions of the Marymoor Park east–west drainage collector channel (hereafter, "the ditch"), located north of NE Marymoor Way and fronting Parking Lot K (the northern portion of the "Study Area" on all attachments). This technical memorandum also summarizes our interpretation of the regulatory status of the ditch, its potential for fish use, and the factors influencing whether fish passable culverts are warranted.

King County proposes improvements to the existing ditch to create a larger infiltrating bioretention channel that would provide supplemental treatment and infiltration. Existing undersized culverts at trail and road crossings would be replaced with larger box culverts for reduced channel flow depth and improved hydraulic function. This would reduce known existing operational water quality impacts (e.g., seasonal standing water temperature effects, heavy waterfowl use and fecal coliform contributions). The bioretention channel would be similar to a wet biofiltration swale, but with a bottom bioretention soil media mix to facilitate added channel infiltration and pollutant adsorption. Biofiltration treatment would occur at shallow depths along the vegetated channel bottom, with supplemental bioretention soil media mix treatment of infiltrated runoff.

An infiltrating bioretention channel and a rain garden to provide runoff treatment and infiltration from Parking Lot MO and for the crushed rock access, parking, and storage yard surrounding the Art Barn and the Maintenance Shop are proposed to be constructed in the southern portion of the study area.

## 1.0 HISTORICAL ANALYSIS

Confluence reviewed historical maps and aerial photos of the project area to determine if the ditch represents an anthropogenically altered stream channel. A U.S. Geological Survey (USGS) 1895 Land Classification Map shows that Bear Creek historically flowed through what is now Marymoor Park before flowing into the Sammamish River (Attachment A). The map also shows that this area was likely dominated by floodplain wetlands with potential for substantial channel braiding and other channel migration. Between 1895 and 1936, as the area was converted to agricultural use, the lower reach of Bear Creek was relocated into a straightened channel and its current alignment along the north side of the agricultural fields. A 1936 aerial image shows evidence of remnant Bear Creek channel threads through the agricultural fields, including some minor intersections with the current ditch alignment; however, no active or remnant connections to the Sammamish River remained (Attachment B). By 1950, USGS maps indicate that the site had been developed with buildings shown overlapping both the current ditch and the historically mapped Bear Creek channel (Attachment C). By 1964, the site had been further manipulated, and the remnant Bear Creek channel threads are no longer apparent on the aerial imagery. However, a segment of the current ditch, including connection to the Sammamish River, was constructed between 1950 and 1964. While it appears that some of the current ditch may have been excavated in a portion of a relic dendritic channel or topographic low area, it does not align with what has been mapped as the historical main channel of Bear Creek (Attachment D). Based on this historical analysis, the ditch does not represent a former stream; it is a man-made feature with no association with the natural Bear Creek system.

## 2.0 EXISTING CONDITIONS

On November 29, 2021, Confluence evaluated the current conditions of the ditch and delineated the ordinary high water mark within the study area for the project. Results of the ordinary high water mark delineation are described in the critical areas report (Confluence 2022). As mentioned above, Bear Creek was relocated to a new alignment sometime prior to 1936, and the area was in agricultural use with no active stream channels for many years. The soils in the vicinity of the ditch have been mapped as Earlmont silt loam and Indianola loamy sand, both of which are non-hydric soils (NRCS 2021). One small wetland was identified and delineated adjacent to the ditch; otherwise, the remainder of the study area consists of uplands, and the ditch does not appear to drain any wetlands. The ditch conveys flow from the study area in a westerly direction approximately 850 feet to a downgradient culvert (not included in the proposed project), then another approximately 135 feet in a rock-lined channel to the Sammamish River.

The ditch contained standing water at the time of the November 9, 2021 site visit, with minor surface flow from the downgradient culvert to the Sammamish River. However, this flow went subsurface 20 feet or more before the confluence with the Sammamish River. Precipitation for the prior 2 months was approximately 12.3 inches, 2.8 inches above the normal precipitation of 9.5 inches for the same period (NWS 2022). Despite the recent heavy rains, there was no surface water connection to the Sammamish River. During the January 24, 2022, site visit, the ditch again contained standing water, but water was not flowing out of the downgradient culvert. Precipitation for the prior 2 months was approximately 11.2 inches, 0.5 inches above the normal precipitation of 10.7 inches for the same period (NWS 2022).

The lack of surface flow from the ditch into the Sammamish River during periods of above normal precipitation indicates that it does not have sufficient duration of flow or groundwater inputs to provide suitable salmonid habitat. Topographic survey data indicate that it may be accessible to fish during periods of Sammamish Rivers flows with water surface elevations exceeding approximately 31 feet (NAVD 1988), but this happens very infrequently. Based on the Sammamish River KC Gage 51M data, Sammamish River water levels would come close to the 2-year flood elevation of 30.5 feet (NAVD 1988) and backwater into the ditch as far as the downgradient culvert only about 1% of the time. Flood water would backwater upstream of the downgradient culvert (i.e., potentially into the study area) about 0.01% of the time (TetraTech 2018). While topographic surveys and gage data indicate the ditch may backwater and be accessible to fish during periods of high flows in the Sammamish River, based on the observed lack of flow in the ditch during periods of above normal precipitation, the potential for fish access likely occurs very rarely and for very short durations. It is unlikely that flow elevations allowing access to the ditch during spring outmigration periods for juvenile salmonid rearing or high flow refuge occur in most years given the gage data noted above. Additionally, the current ditch grade and elevation of the downgradient culvert may pose a stranding hazard.

Habitat conditions in the ditch for fish are very low quality. Salmonid spawning habitat and access to upstream spawning habitat do not exist. The upstream extent of the ditch lacks a defined channel or scour line, is choked with vegetation, and terminates within 170 meters of the eastern culvert; therefore, it does not constitute a significant reach of potential salmonid habitat. The lack of habitat complexity or cover, in addition to primary hydrologic contributions from pollutant-generating impervious surfaces, qualifies this habitat as very low quality, if not adverse, for potential rearing.

## 3.0 REGULATORY REVIEW AND INTERPRETATION

Because the elevations and gage data indicate that fish access to the ditch could occur in any given year, it would likely be construed as fish habitat per Section 222-16-010 of the Washington

Administrative Code (WAC): "'Fish habitat' means habitat, which is used by fish at any life stage at any time of the year including potential habitat likely to be used by fish, which could be recovered by restoration or management and includes off-channel habitat." The ditch also meets the physical criteria for fish habitat per WAC 222-16-031: "Stream segments having a defined channel of 2 feet or greater within the bankfull width in Western Washington… and having a gradient less than 16 percent." This is consistent with the evaluation of the ditch by Washington Department of Fish and Wildlife (WDFW) in the Washington State Fish Passage barrier inventory, which also identifies the culverts proposed for replacement as potential fish passage barriers (WDFW 2021).

WAC 220-660-030 provides that, "'Watercourse,' 'river,' or 'stream' means any portion of a stream or river channel, bed, bank, or bottom waterward of the ordinary high water line of waters of the state. Watercourse also means areas in which fish may spawn, reside, or pass, and tributary waters with defined bed or banks that influence the quality of habitat downstream. Watercourse also means waters that flow intermittently or that fluctuate in level during the year, and the term applies to the entire bed of such waters whether or not the water is at peak level. A watercourse includes all surface-water-connected wetlands that provide or maintain habitat that supports fish life. This definition does not include irrigation ditches, canals, stormwater treatment and conveyance systems, or other entirely artificial watercourses, except where they exist in a natural watercourse that has been altered by humans."

Therefore, per the regulatory definitions in the WAC that include the potential for fish habitat (e.g., generally meeting the criteria of fish habitat), the ditch could be considered a "watercourse" subject to the Hydraulic Code rules (WAC 220-660) and would require a Hydraulic Project Approval by WDFW to authorize the proposed culvert replacements (WAC 220-660-190). Culverts in watercourses with the potential for fish use typically require designs that allow fish to move freely through them at all flows when fish are expected to move (WAC 220-660-190(2)(a)).

At the federal level, waters of the U.S. (WOTUS) are being regulated consistent with the pre-2015 regulatory regime until further notice. The regulatory status of the ditch under this regime could be subject to the jurisdiction of the U.S. Army Corps of Engineers (Corps) for the proposed culvert replacements as well. The guidance indicates that the agencies generally will not assert jurisdiction over ditches that are excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water (at least seasonally). To determine if the ditch qualifies as a tributary meeting the definition of a WOTUS, the Corps must establish that there is "relatively permanent flow" (e.g., typically 3 months) or determine that the functions of the ditch significantly affect the chemical, physical, and biological integrity (i.e., "significant nexus" test) of downstream traditional navigable waters (i.e., Sammamish River). Based on the

flow discussion above, it appears that this ditch does not meet the "relatively permanent flow" criterion, and jurisdiction by the Corps would depend on the "significant nexus" test.

## 4.0 CONCLUSIONS

Based on historical data and mapping, the current ditch does not represent an anthropogenic alteration and loss of historical stream channel habitat since Bear Creek has been relocated and provides fish access to the upper watershed. The anthropogenically altered stream channel in this case is represented by the current alignment of Bear Creek to the north[1]. For this reason, the ditch should be considered exclusively an artificial feature distinct from an altered stream channel. Though "physical fish use potential" exists per the criteria outlined in the Fish Passage Inventory, Assessment, and Prioritization Manual (WDFW 2019), it is negligible at best. The criteria under WAC 220-660-190 for water crossing structures in fish-bearing waters are not justified given the conditions described in Section 2. Based on our analysis and best professional judgment, to avoid and minimize harm, fish access from the Sammamish River to this feature should not be promoted. We recommend that the design criteria for the proposed on-site culverts be based on anticipated flows and conveyance needs and improvement to water quality.

## 5.0 REFERENCES

Confluence (Confluence Environmental Company). 2022. Marymoor Park stormwater facility improvements critical areas study. Prepared for King County Parks and Recreation Division and HDR Engineering, Inc., by Confluence, Seattle, Washington.

NRCS (Natural Resources Conservation Service). 2021. Web soil survey [online database]. U.S. Department of Agriculture, NRCS, Soil Science Division, Washington D.C. Available at: http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm (accessed on November 29, 2021).

NWS (National Weather Service). 2022. NOWData – NOAA online weather data for Seattle/Tacoma, WA [online database]. National Weather Service, National Oceanic and Atmospheric Administration, Silver Spring, MD. Available at: https://www.weather.gov (accessed February 4, 2022).

Tetra Tech. 2018. Willowmoor floodplain restoration project, preliminary dynamic weir analysis technical memorandum. Prepared for King County, Seattle, Washington and King County Flood Control District, Seattle, Washington by Tetra Tech, Seattle, Washington.

[1] Incidentally, the historically straightened alignment of the relocated Bear Creek reach has been recently enhanced with greater sinuosity, large woody material complexes, off-channel backwater habitat, and a woody riparian zone.

WDFW (Washington Department of Fish and Wildlife). 2019. Fish Passage Inventory, Assessment, and Prioritization Manual. Olympia, Washington.

WDFW. 2021. Washington State fish passage [online database]. WDFW, Lacey, Washington. Available at https://geodataservices.wdfw.wa.gov/hp/fishpassage/index.html (accessed January 10, 2021).

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ATTACHMENT A


CONFLUENCE ENVIRONMENTAL COMPANY

N

0 1,600 3,200 Feet

1895 Topographic Map

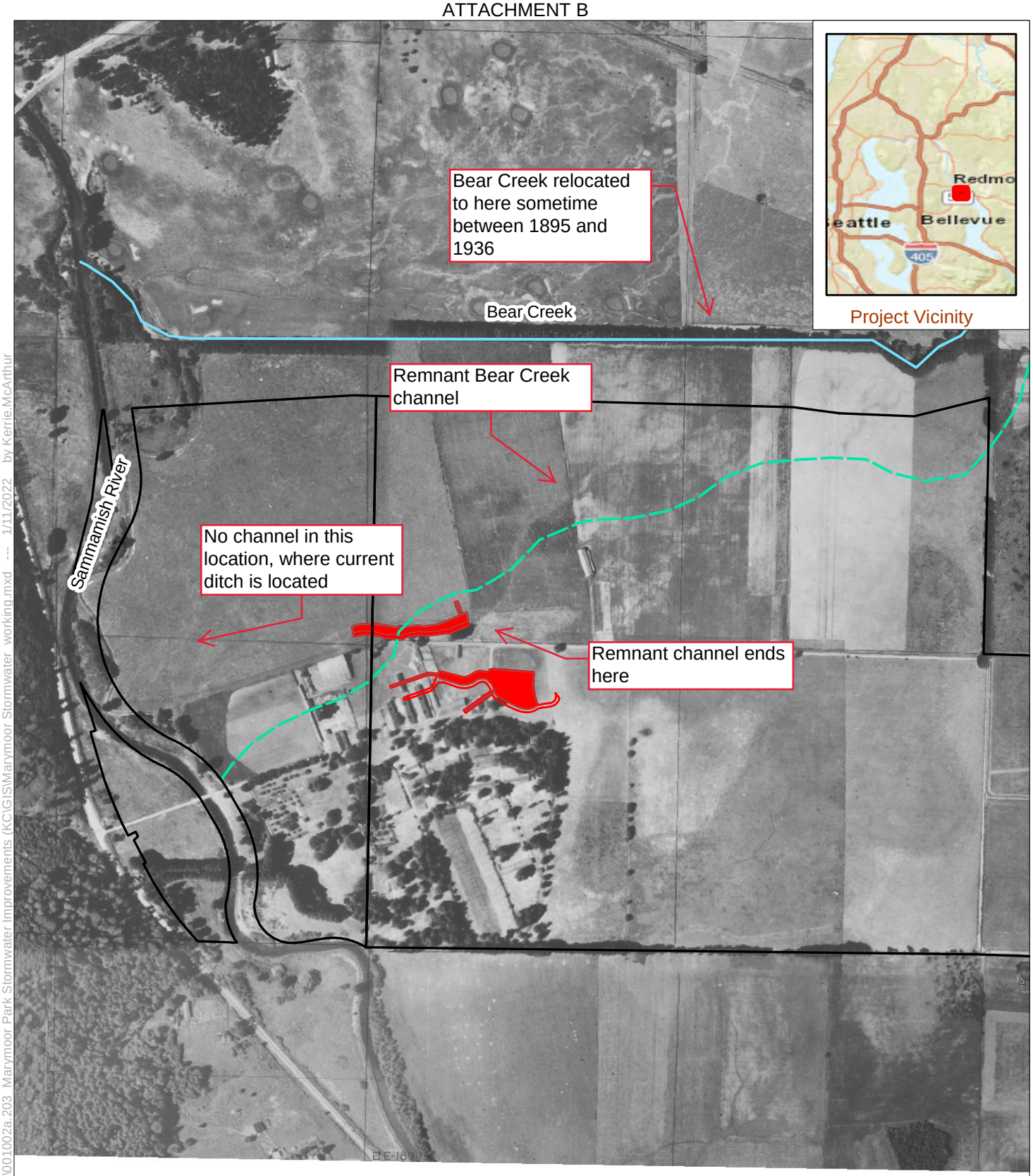
Parcel

Study Area

Bear Creek - 1895 alignment

Document Path: J:\HDR_001002a\001002a.203_Marymoor Park Stormwater Improvements (KC\GIS\Marymoor Stormwater working.mxd --- 1/18/2022 by Kerrie.McArthur

ATTACHMENT B




CONFLUENCE ENVIRONMENTAL COMPANY

N

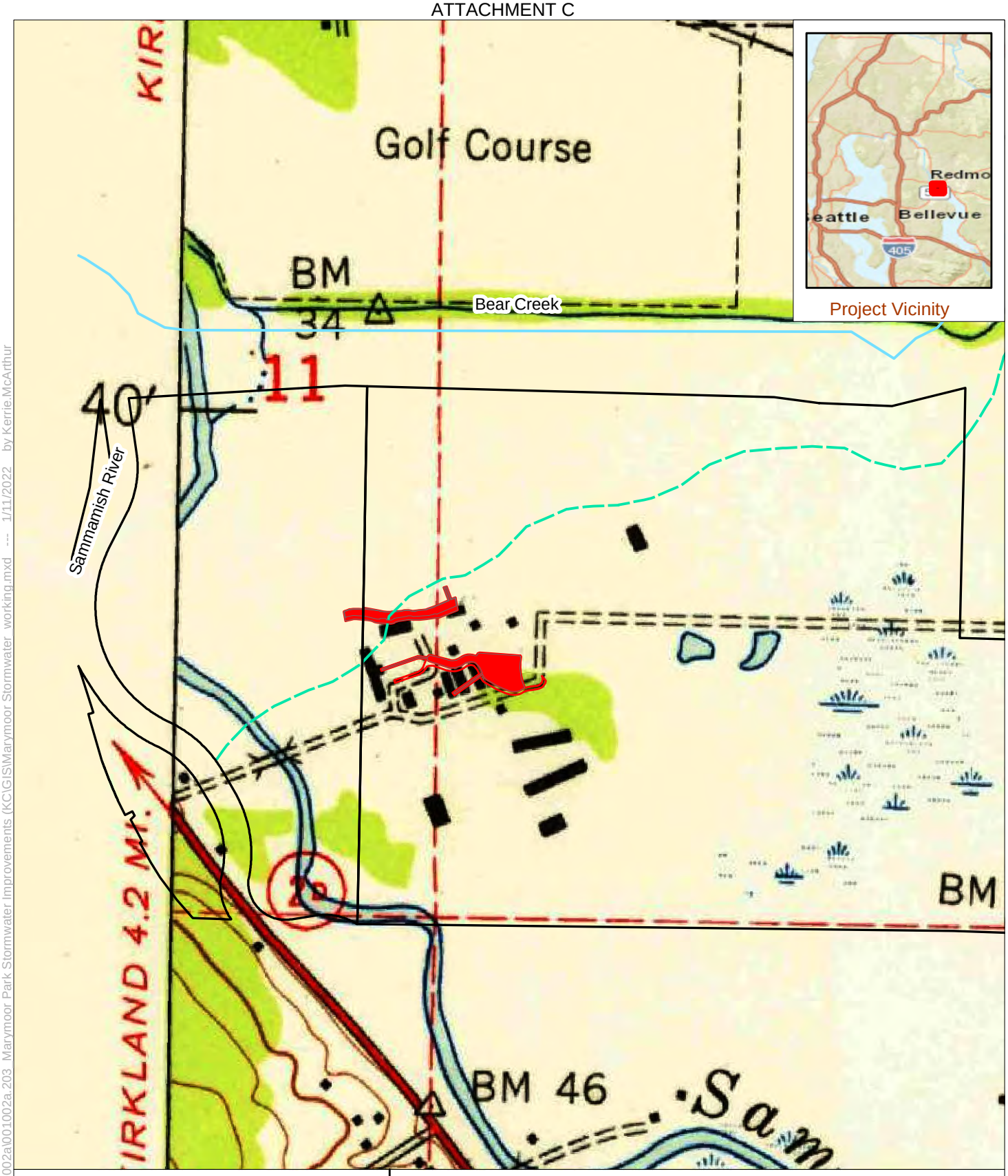
0 470 940 Feet

1936 Aerial Image

- Parcel
- Study Area
- Bear Creek - 1895 alignment
- Bear Creek - 1936 alignment

Document Path: J:\HDR_001002a\001002a.203_Marymoor_Park_Stormwater_Improvements_(KCIGIS\Marymoor_Stormwater_working.mxd --- 1/11/2022 by Kerrie.McArthur

ATTACHMENT C




CONFLUENCE
ENVIRONMENTAL COMPANY

N

0 470 940 Feet

1950 Topographic Map

- Parcel
- Study Area
- Bear Creek - 1895 alignment
- Bear Creek - 1936 alignment

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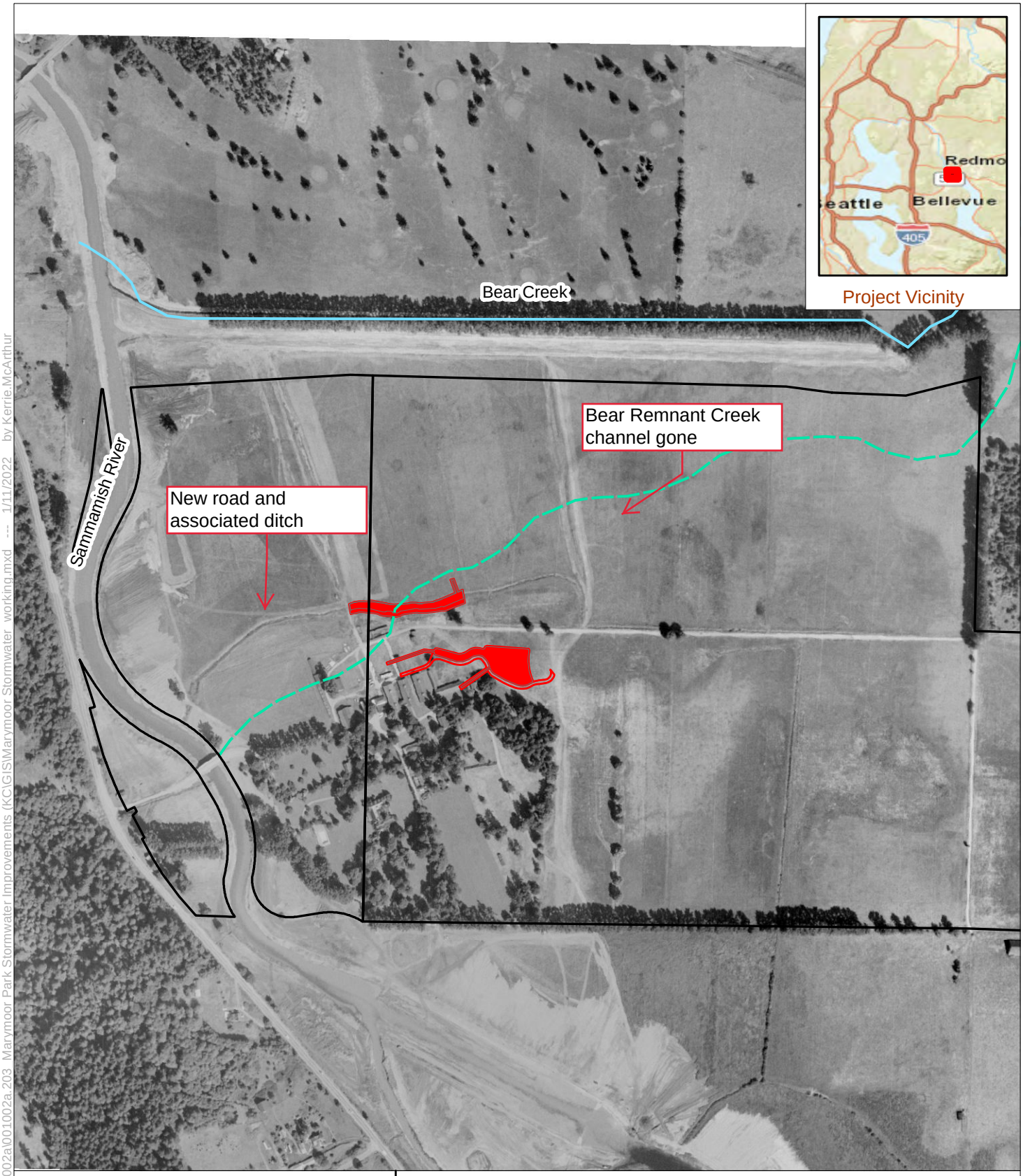
ATTACHMENT D




CONFLUENCE ENVIRONMENTAL COMPANY

N

0 470 940 Feet

1964 Aerial Image

Parcel

Study Area

Bear Creek - 1895 alignment

Bear Creek - 1936 alignment

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