CRITICAL AREA REPORT

Westside Park
Redmond, Washington

April 28, 2020

RAEDEKE ASSOCIATES, INC.

Raedeke Associates, Inc.

Wetland & Aquatic Sciences
Wildlife Ecology
Landscape Architecture

Report To:	Ms. Leslie Batten Board & Vellum 115 15th Avenue East, Suite 100 Seattle, WA. 98112
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Project Number:	2019-082-003
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Date:	April 28, 2020

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1.0 INTRODUCTION

1.1 PURPOSE

Raedeke Associates, Inc. was retained by Board & Vellum to provide a critical area evaluation of the Westside Park redevelopment project located in Redmond, Washington. As part of the site assessment we conducted a site visit to identify and delineate any wetlands and streams on the project site or within the immediate vicinity. In addition, during our field investigations we collected information sufficient to provide a characterization of wildlife habitat and use that may occur on the project site.

This report presents the findings of our background information review and our October 31, 2019 site investigation of the project site. This report follows the City of Redmond (2019) critical areas reporting requirements. This report assumes that the project will not result in direct impacts to critical areas.

1.2 PROJECT LOCATION

Westside Park consists of two King County Tax Parcels (Nos 1425059039 and 1425059058) totaling approximately 17.3-acres. For the purpose of this investigation, the project site consists of the approximately 6.42-acre parcel identified as King County Parcel No. 142505039. The project site is located along 156th Avenue North East in the City of Redmond, Washington (Figure 1). This places the project site in a portion of Section 14, Township 25 North, Range 5 East, W.M. Parcel maps retrieved on-line from King County depict the property boundaries.

The project site is bordered to the north, south, and west by single-family homes, and to the east by West Lake Sammamish Parkway NE. The project site is accessed from paved parking along 156th Avenue NE.

2.0 METHODS

2.1 DEFINITIONS AND METHODOLOGIES

Wetlands and streams are protected by federal law as well as by state and local regulations. Federal law (Section 404 of the Clean Water Act) prohibits the discharge of dredged or fill material into "Waters of the United States", including certain wetlands, without a permit from the U.S. Army Corps of Engineers (COE 2017). The COE makes the final determination as to whether an area meets the definition of a wetland and whether the wetland is under their jurisdiction.

2.1.1 Wetlands

The COE wetland definition was used to determine if any portions of the project area could be classified as wetland. A wetland is defined as an area "inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (Federal Register 1986:41251).

We based our investigation upon the guidelines of the U. S. Army Corps of Engineers (COE) Wetlands Delineation Manual (Environmental Laboratory 1987) and subsequent amendments and clarifications provided by the COE (1991a, 1991b, 1992, 1994), as updated for this area by the regional supplement to the COE wetland delineation manual for the Western Mountains, Valleys, and Coast Region (COE 2010). The COE wetlands manual is required by state law (WAC 173-22-035, as revised) for all local jurisdictions.

Hydrophytic vegetation is defined as "macrophytic plant life growing in water, soil or substrate that is at least periodically deficient in oxygen as a result of excessive water content" (Environmental Laboratory 1987). The U.S. Army Corps of Engineers National Wetland Plant List wetland indicator status (WIS) ratings were used to make this determination (Lichvar et al. 2016). The WIS ratings "reflect the range of estimated probabilities (expressed as a frequency of occurrence) of a species occurring in wetland versus non-wetland across the entire distribution of the species" (Reed 1988:8). Plants are rated, from highest to lowest probability of occurrence in wetlands, as obligate (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), and upland (UPL), respectively. In general, hydrophytic vegetation is present when the majority of the dominant species are rated OBL, FACW, and FAC.

A hydric soil is defined as "a soil that is formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (Federal Register 1995: 35681). The morphological characteristics of the soils in the study area were examined to determine whether any could be classified as hydric.

According to the 1987 methodology, wetland hydrology could be present if the soils were saturated (sufficient to produce anaerobic conditions) within the majority of the rooting zone (usually the upper 12 inches) for at least 5% of the growing season, which in this area is usually at least 2 weeks (COE 1991a). It should be noted, however, that areas having saturation to the surface between 5% and 12% of the growing season may or may not be wetland (COE 1991b). Depending on soil type and drainage characteristics, saturation to the surface would occur if water tables were shallower than about 12 inches below the soil surface during this time period. Positive indicators of wetland hydrology include direct observation of inundation or soil saturation, as well as indirect evidence such as driftlines, watermarks, surface encrustations, and drainage patterns (Environmental Laboratory 1987). Hydrology was further investigated by noting drainage patterns and surface water connections between wetlands and streams within and adjacent to the project area.

2.1.2 Streams

We based our evaluation of Ordinary High-Water Mark for streams on definitions provided under the Washington State Shoreline Management Act of 1971. The Washington State definition for the OHWM is as follows:

> *Ordinary high water mark or "OHWM" means the mark on the shores of all waters 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 ordinary years, as to mark upon the soil or vegetation a character distinct from that of the abutting upland, provided that in any area where the ordinary high water line cannot be found, the ordinary high water line adjoining saltwater shall be the line of mean higher high water, and the ordinary high water line adjoining freshwater shall be the elevation of the mean annual flood."*…(RCW 90.58.030(2)(b) and WAC173-22-030(5).

As outlined in the WDOE (2016) Shoreline Administrators Manual, the general guidelines for determining the OHWM include: (1) a clear vegetation mark; (2) wetland/upland edge; (3) elevation; (4) a combination of changes in vegetation, elevation, and landward limit of drift deposition; (5) soil surface changes from algae or sediment deposition to areas where soils show no sign of depositional processes; and/or (6) soil profile changes from wetter conditions (low chroma, high soil organic matter, and lack of mottling) to drier conditions (higher chroma, less organic matter, or brighter mottles).

2.2 Background Research

Prior to conducting our site visit, we conducted an extensive review of existing background maps and information for the project site including the U.S.D.A. Natural Resource Conservation Service (NRCS 2019) Web Soil Survey, the U.S. Fish and Wildlife (USFWS 2018) National Wetland Inventory (NWI), King County (2019) iMap,

City of Redmond (2005) Wetlands map, the City of Redmond (2016a) Conservation Areas map, the City of Redmond (2016b) Stream Classification Map, the Washington Department of Fish and Wildlife (WDFW 2019b) Salmonscape database, and the Wild Fish Conservancy (2019) Water Types and Assessment Interactive Maps.

We also reviewed the Washington Department of Fish and Wildlife (WDFW 2019a) Priority Habitat and Species (PHS) database to determine whether endangered fish and wildlife or their habitats were present within the project site or its vicinity. In addition, we examined current and historical aerial photographs (Google Earth 2019) to assist in the definition of existing plant communities, drainage patterns, and land use.

2.3 FIELD SAMPLING PROCEDURES

Wetlands and Streams

We conducted a site visits on October 31, 2019 to identify and delineate any wetlands or streams within vicinity of the project site and collect data to characterize and rate them. During our site visit, we also collected information to describe the general landscape conditions of the site.

Vegetation, soils, and hydrology were examined in representative portions of the study area according to the procedures described in the Regional Supplement (COE 2010). Plant communities were inventoried, classified, and described during our field investigation. We estimated the percent coverage of each species. Plant identifications were made according to standard taxonomic procedures described in Hitchcock and Cronquist (1976), with nomenclature as updated by the U.S. Army Corps of Engineers National Wetland Plant List (Lichvar et al. 2016). Wetland classification follows the USFWS wetland classification system (Cowardin et al. 1992). We determined the presence of a hydrophytic vegetation community using the procedure described in the Regional Supplement (COE 2010), which requires the use of the dominance test, unless positive indicators of hydric soils and wetland hydrology are also present, in which case the prevalence index or the use of other indicators of a hydrophytic vegetation community as described in the Regional Supplement (COE 2010) may also be required.

We excavated pits to at least 18 inches below the soil surface, where possible, in order to describe the soil and hydrologic conditions throughout the study area. We sampled soil at locations that corresponded with vegetation sampling areas and potential wetland areas. Soil colors were determined using the Munsell Soil Color Chart (Munsell Color 2009). We used the indicators described in the Regional Supplement (COE 2010) to determine the presence of hydric soils and wetland hydrology.

We identified one onsite wetland (Wetland 1) and one stream (Stream 1) located in a ravine in the east half of the project site. In addition, we identified one off-site wetland (Wetland 2) and off-site stream (Stream 2) located in a ravine immediately east of the study area. Wetland and stream boundaries on the project site were marked with pink

and black striped plastic flagging tape. Wetland and non-wetland sample plots were examined during our investigation and were demarcated with red and white striped plastic flagging tape.

Wildlife

A wildlife field investigation of the project site and vicinity was completed on October 31, 2019. During our field investigation, we documented wildlife presence, sign, and habitat while inventorying and describing plant communities. We recorded information regarding reproduction, habitat use, and activities of all wildlife species observed. In addition, we noted special habitat features such as large and/or hollow trees, snags [standing dead or partly dead trees at least 4 inches diameter at breast height (dbh) and 6 feet tall], and large down logs. Historic and present land-use of the site and immediate vicinity were noted from direct observations in the field and analysis of aerial photographs.

We also searched specifically for the presence, sign, or habitats of any wildlife species of concern that may occur on the project site or vicinity. We searched for the presence of large stick-type nests, hollow trees, tree cavities, and pileated woodpecker foraging sign. Large stick nests are built and used by several species of concern, including bald eagles and great blue herons. Tree cavities are created and used by woodpeckers, including species of concern such as the pileated woodpecker, and are used secondarily by a host of bird and mammal species, including species of concern such as purple martins, various cavity-nesting duck species, and various bats. Hollow trees are used as daytime roost for priority species including various bat species, as well as Vaux's swifts.

3.0 EXISTING CONDITIONS

3.1 RESULTS OF BACKGROUND INVESTIGATION

The USDA NRCS (2019) Web Soil Survey (Figure 2) identifies Alderwood gravelly sandy loam soils within the immediate vicinity of the project site. Alderwood soils are not listed as a hydric soil on either the state or national hydric soils list; however, they may contain the following potential hydric soil inclusions: Bellingham, Norma, Shalcar, Seattle, and Tukwila soils (NRCS 2019; U.S.D.A. Soil Conservation Service 1991, Federal Register 1995). Soil series boundaries or mapping units are mapped from aerial photographs with limited field verification. Thus, the location and extent of boundaries between mapping units may not be accurate for a given parcel of land within the survey area.

The USFWS (2019) NWI (Figure 3) does not show any wetlands on the Westside Park project site. The NWI does show a stream channel in the south half of the project site that continues off-site to the east. The nearest wetland shown on the NWI map is located approximately 1,600 feet east of the project site. Wetlands and streams shown on the NWI are general in terms of location and extent as they are determined primarily from aerial photograph interpretation. Thus, the number and extent of existing wetlands located within the project area may differ from those marked on the NWI map.

The King County (2019) iMap does not identify any wetlands in the immediate vicinity of the project site (Figure 4). The iMap does depict a stream channel located in the central portion of the project site. The stream channel is shown to continue off-site to the east. A second stream channel is also depicted off-site immediately south of the project site. This stream channel is also shown to continue to the east.

The City of Redmond (2005a) Wetland map depicts a large wetland located on the project site that continues off-site to the east (Figure 5). The wetland appears to be associate with stream channels depicted on the other natural resource inventories.

The City of Redmond (2005b) Fish and Wildlife Habitat Conservation Areas (Core Preservation Areas) map depicts two Native Growth Protection Easements immediately adjacent to the Westside Park parcels to the north and southeast, within suburban housing parcels (Figure 6). Neither of these extend onto the project site.

The City of Redmond (2016) Stream Classification map shows two class III streams on or in the immediate vicinity of the project site (Figure 7). The class III streams are shown to continue to the east and are mapped as class II east of the project site.

The Washington Department of Fish and Wildlife (2019a) Salmonscape database shows the onsite stream channel mapped as a fish-bearing stream channel for all fish species (Figure 8).

The Wild Fish Conservancy (2019) Water Type Assessments and Interactive Map identifies that water typing was completed for the onsite stream channel. The onsite stream channel (Stream 1) is identified as Redmond 6B on the Wild Fish Conservancy map and is shown as not meeting the physical criteria for a fish bearing stream (Figure 9). The channel is depicted as continuing east toward West Lake Sammamish Parkway, where it is identified to meet the criteria of a fish-bearing stream.

The Washington Department of Fish and Wildlife (2019b) Priority Habitat and Species database depicts resident cutthroat trout in the onsite stream channel. The PHS map also depicts a biodiversity corridor and several listed salmonid species approximately 1,600 feet east of the project site (Figure 10). The PHS map also depicts these biodiversity corridors and salmonid species to the east of the Westside Park parcels, within the boundaries of Marymoor Park and the Sammamish River.

3.2 Results of Field Investigations

3.2.1 Existing Conditions

The west half of the Westside Park project site is currently developed and maintained as a public park. An existing paved sports court and playground are in the southwest corner of the park property, while the northwest half of the site is maintained as a mowed lawn with scattered native trees. In general, the lawn area consists of scattered Douglas-fir (*Pseudotsuga menziesii*, FACU) and big-leaf maple (*Acer macrophyllum*, FACU) trees with an understory of Kentucky bluegrass (*Poa pratensis*, FAC), white clover (*Trifolium repens*, FAC), common dandelion (*Taraxacum officinale*, FACU), and common plantain (*Plantago major*, FAC) (Sample Plots 1, 3, 4, and 5).

Soils throughout the west half of the project site generally consist of between 6 and 12 inches of grayish brown (2.5Y 4/2) sand loams with up to 20% dark yellowish brown (10YR 4/6) redoximorphic concentrations in the soil matrix to a depth greater than 18 inches. While the soils in portions of the west half of the site met the technical criteria of hydric, we observed a disturbed soil matrix with the presence of large chunks of asphalt at a depth of 6 inches at some locations. We did not observe any indicators of wetland hydrology including inundation, a water table, or soil saturation within the upper 12 inches of the soil profile. In addition, we did not observe any secondary indicators of wetland hydrology such as water stained leaves, drift deposits, algal mats, or water marks in portions of the park currently maintained as lawn (Sample Plot 1, 3, 4, and 5).

The east half of the project site slopes to the east at approximately 20% gradient and is forested with a mixed overstory of Douglas-fir, big-leaf maple, and red alder (*Alnus ruba*) trees with an understory of snowberry (*Symphoricarpos albus*, FAC), red elderberry (*Sambucus racemosa,* FACU), vine maple (*Acer circinatum*, FAC), salmon raspberry (*Rubus spectabilis*, FAC), Himalayan blackberry (*Rubus armeniacus*, FAC), trailing blackberry (*Rubus ursinus*, FACU), western swordfern (*Polystichum munitum*,

FACU), and Robert geranium (*Geranium robertianum*, FACU) (Sample Plot 1, 3, 4, and 5).

Soils on the hillslope typically consisted of up to 8 inches of very dark grayish brown (10YR 3/2) sandy loam soils over brown (10YR 5/4) sandy loam soils with up to 10% dark yellowish brown (10YR 4/6) redoximorphic concentrations in the soil matrix to a depth greater than 18 inches (Sample Plot 1, 3, 4, and 5). We did not observe any indicators of wetland hydrology including inundation, a water table, or soil saturation within the upper 12 inches of the soil profile. In addition, we did not observe any secondary indicators of wetland hydrology such as water stained leaves, drift deposits, algal mats, or water marks on the steep slopes in the east half of the site.

3.2.2 Wetlands

During our October 31, 2019 site investigation, we identified two wetlands within vicinity of the project site. Wetland 1 is in the east half of the project site in a ravine associated with Stream 1 (Figure 11). Wetland 1 and Stream 1 continue off-site to the east. Wetland 2 is located immediately southeast of the project site and is associated with Stream 2.

Wetland 1

Wetland 1 is approximately 17,180 square feet in size. Wetland 1 is in the bottom of a topographic ravine that is associated with a stream channel in the southeast portion of the project site (Figure 11).

Vegetation

Vegetation in Wetland 1 is dominated by a dense scrub-shrub community consisting of an overstory of red alder and salmon raspberry, with an understory of slough sedge (*Carex obnupta*, OBL), creeping buttercup (*Ranunculus repens*, FAC), youth-on-age (*Tolmeia menziesii*, FAC), skunk cabbage (*Lysichiton americanus*, OBL), and field horsetail (*Equisetum arvense*, FAC) (Sample Plot 2).

Soils and Hydrology

Soils within the wetland consist of up to 12 inches of black (10YR 2/1) silt loam soils over dark gley (N 3/1) silt loam soils with a strong hydrogen sulfide odor starting at approximately 4 inches of the soil surface (Sample Plot 2). We found that soils throughout the delineated wetland met criteria of the COE wetland delineation manual (Environmental Laboratory 1987) and regional supplement (COE 2010) to be considered hydric.

Hydrologic input to Wetland 1 appears to be from a combination of shallow groundwater table, seepage from the adjacent hillslopes, seasonal overflow from the stream channel, surface sheet flow, and direct precipitation. During our October 31, 2019 site visit soils in portions of the wetland were saturated to the surface, and we observed a water table

starting at approximately 8 inches within the soil profile (Sample Plot 2). Based on our observations, sufficient indicators of wetland hydrology were present per criteria of the COE wetland delineation manual (Environmental Laboratory 1987) and regional supplement (COE 2010).

Classification and Determination

Positive indicators for each of the three wetland parameters were present within Wetland 1 at the time of our site investigation. Therefore, the delineated area meets the necessary criteria for designation as a wetland according to the guidelines of the COE wetland delineation manual (Environmental Laboratory 1987) and the Regional Supplement (COE 2010).

Wetland 1 consists of a palustrine, scrub-shrub (PSS) vegetation class according to the USFWS wetland classification system (Cowardin et al. 1992).

Wetland Rating

We rated Wetland 1 using the 2014 WDOE Wetland Rating System for Western Washington (Hruby 2014), as required by City of Redmond (2019) code for determination of wetland buffer widths and mitigation ratios (see the attached completed wetland rating form, Appendix B).

We determined that Wetland 1 consists of both slope and riverine hydrogeomorphic (HGM) classes. When both slope and riverine HGM classes are present within a wetland, the WDOE guidance dictates that the wetland should be rated as riverine. Based on our analysis of the rating, Wetland 1 meets Category II criteria because it scored a total of 21 points (6 points for habitat function) on the attached rating form.

Off-Site Wetland 2

During our site investigation, we identified a second off-site wetland (Wetland 2) located southeast of the project site (Figure 11). Wetland 2 is located on a steep slope and is associated with a stream channel that flows to the east.

Vegetation

Wetland 2 is dominated by an overstory of vine maple (*Acer circinatum*, FAC) and oso-berry (*Oemleria cerasiformis*, FACU) with an understory of youth-on-age (*Tolmia menziesii*, FAC), giant horsetail (*Equisetum telmateia*, FACW), and lady fern (*Athyrium cyclosorum*, FAC).

Soils and Hydrology

Soils within the wetland consist of up to 9 inches of very dark brown (10YR 2/2) silt loam soils over olive gray (5Y 4/2) silt loam soils with up to 10% dark yellowish brown

(10YR 4/6) redoximorphic concentrations in the soil matrix. We found that found that soils throughout the delineated wetland met criteria of the COE wetland delineation manual (Environmental Laboratory 1987) and regional supplement (COE 2010) to be considered hydric.

Hydrologic input to the wetland appears to be from a combination a seasonal shallow groundwater table, shallow groundwater seepage, seasonal overflow from the adjacent stream channel, surface runoff, and direct precipitation. During our October 31, 2019 site visit we did not observe a water table or saturation associated with Wetland 2; however, we did observe drainage patters and evidence of seasonal saturation (such as water stained leaves) within the wetland. Based on our observations, sufficient indicators of wetland hydrology were present per criteria of the COE wetland delineation manual (Environmental Laboratory 1987) and regional supplement (COE 2010).

Classification and Determination

Positive indicators for each of the three wetland parameters were present within Wetland 2 at the time of our site investigation. Therefore, the delineated area meets the necessary criteria for designation as a wetland according to the guidelines of the COE wetland delineation manual (Environmental Laboratory 1987) and the Regional Supplement (COE 2010).

Wetland 2 consists of a palustrine, scrub-shrub (PSS) vegetation classes according to the USFWS wetland classification system (Cowardin et al. 1992).

Wetland Rating

We rated Wetland 2 using the 2014 WDOE Wetland Rating System for Western Washington (Hruby 2014), as required by City of Redmond (2019) code for determination of wetland buffer widths and mitigation ratios (see the attached completed wetland rating form, Appendix B).

We determined that Wetland 2 consists of both slope and riverine hydrogeomorphic (HGM) classes. When both slope and riverine HGM classes are present within a wetland, the WDOE guidance dictates that the wetland should be rated as riverine. Based on our analysis of the rating, Wetland 2 meets Category II criteria because it scored a total of 21 points (6 points for habitat function) on the attached rating form.

3.2.3 Streams

During our site investigation, we delineated the ordinary high-water mark of the onsite portion of Stream 1 and identified the location of off-site Stream 2. Stream 1 originates in the south-central portion of the project site and continues into a topographic ravine that trends generally to the east (Figure 11). At its upper extent, Stream 1 is approximately 1-2 feet in width and has a subtle bed and bank consisting of fine gravel and sand, with

evidence of seasonal flow. As the channel continues eastward where there is more gradient (approximately 15-20% slope), the channel widens to approximately 3-4 feet in width and has a more defined bed and bank consisting of sand and cobbles. Stream 1 was flowing at approximately 0.25cubic feet per second (cfs) during our October 31, 2019 site visit. After we delineated the onsite portion of the stream channel, we conducted a visual characterization of the off-site portion of the stream channel to the east. This characterization extended to West Lake Sammamish Parkway NE where the stream passes beneath in an approximately 6-foot-wide culvert. The stream then continues to a confluence with the Sammamish River.

Downstream of the project site, the stream channel remains largely unaffected by incision throughout the remainder of the east park parcel, as well as off-site. We did note one significant nick points occurring at approximately station 8 of the OHWM flag sequence, as well as further downstream where two large trees have recently fallen from the riparian corridor. The nick point appears to be controlled by fallen branches and roots and not progressing for the time being. The recently fallen trees suggest some degree of bank erosion here.

Riparian habitat downstream of the upper parcel transitioned to less shrub cover and larger Douglas-firs and western red arborvitae growing near the banks with an understory dominated sword fern. These large trees (greater than approximately 2.5 feet diameter at breast height) and associated deciduous trees remained straight and not tipping or growing curved – further suggesting the stream channel has remained stable over time and is not eroding.

Downstream of the upper parcel, a second branch of the stream system flows in from the south of the basin. At the time of survey, the early wet season had been relatively dry. Nonetheless, this stream branch was also flowing at approximately twice the flow rate as the branch originating in the park. Both branches of the stream are classified as fish bearing by the Wild Fish Conservancy (2019) Water Types Assessment and Interactive Map.

The stream channel downstream of this primary confluence gains small flows from other small basins, flows beneath West Lake Sammamish Parkway NE in a 6 foot diameter culvert, and meanders through a lower gradient flow path with meander bends and step pools formed by fallen branches and apparent stream restoration efforts.

The confluence of the water surface of the stream at the Sammamish River at the time of survey was at grade with the River water surface, forming a backwatered channel for the last 60 to 80 feet of the channel. This profile provides easy fish access for juvenile or other fish migrating upstream for off-channel rearing or potentially spawning.

3.2.4 Wildlife

A wide variety of wildlife species may be expected to inhabit lowland coniferous, deciduous, or mixed forest communities in the Pacific Northwest, such as that found on and near the Westside park parcels. Of the more than 300 vertebrate wildlife species expected to occur in west side forests of Oregon and Washington, over 230 species occur within west side lowland mixed coniferous and deciduous forests (Johnson and O'Neil 2001). A more limited number of species are expected to occur within lowland deciduous or mixed forests of western Washington, particularly King County: over 80 species, nearly 60% of which are birds, about 25% are mammals, and the rest are amphibians and reptiles (King County 1987).

The overall site can be characterized by four major habitat types: mowed grass/recreational areas with open understory and sparse remnant trees, coniferous-dominated forest, mixed coniferous/deciduous forest, and deciduous-dominated forest. Edges between habitat is generally simple and interspersion of habitat types is generally low. There were a small number of very large remnant trees on-site, the largest of which being an approximately 60 inch or greater diameter at breast height bigleaf maple.

During our site visit we observed 20 various wildlife species within or in the vicinity of the project site. The number of species that we observed is likely slightly limited by the surrounding suburban land uses and nearby large roadways. Species observed include: northern flicker, hairy woodpecker, red-breasted sapsucker, pileated woodpecker, dark-eyed junco, American crow, song sparrow, pacific wren, golden-crowned kinglet, chestnut-backed chickadee, black-capped chickadee, Anna's hummingbird, Stellar's jay, red-breasted nuthatch, American robin, bushtit, Townsend mole, eastern grey squirrel, Douglas squirrel, and black-tailed deer. Other species expected to utilize the Westside Park parcels include those adapted to urban environments with limited persistent cover, such as starlings, rock doves, house sparrows, mice, rats, raccoons, and the like. Invasive species such as starlings and eastern gray squirrels are expected to somewhat adversely impact habitat quality for native species.

A variety of other bird species are likely to inhabit the vicinity at different times of the year. Many of these are spring and summer residents that migrate out of the area for the fall and winter, as well as year-round residents. We did not observe any raptors (eagles, hawks, falcons, or owls) during our field visits, and no raptor nests were found on any of the trees within the site. Most of the larger trees had intact tops and lacked appropriate branching structures to support large raptor nests for species such as bald eagles.

Several snags on-site contained some evidence of woodpecker use including foraging excavations by red-breasted sapsuckers and hairy woodpeckers, and some nesting excavations for smaller species such as hairy woodpeckers. We observed one snag with a cavity that is potentially a pileated woodpecker nesting cavity. Their nesting cavities

have a distinct size and oblong shape, indicating this cavity was constructed by a pileated woodpecker, even if it is currently in use by another secondary cavity-nesting species.

We observed many black-tailed deer on-site during our field investigation, as well as deer game trails. On-site trees may also provide potential cover and breeding locations for other small to medium-sized mammals such as rats, mice, raccoons, and squirrels. The presence of domestic dogs and cats in the area, as well as hikers utilizing the walking paths through the site may limit the suitability of the forest on site, as they can act as highly effective deterrents/predators on native wildlife species in urban and suburban areas, particularly those that nest or inhabit the ground (Penland 1984, Maestas et al. 2003, Odell and Knight 2001, Leu et al. 2008).

We did not observe any reptiles, amphibians, or their sign during our field visits.

3.2.5 Endangered, Threatened, Sensitive, or Other Priority Species and Habitats

We did not note any signs of great blue herons (or associated rookeries), bald eagles, or large raptor stick nests; nor did we observe any evidence of bats, mammal dens, or large game species other than the aforementioned black-tailed deer.

As noted above, we did observe signs of woodpecker forage and nesting cavities on the project site, including those of pileated woodpeckers. The pileated woodpecker is a Washington State Priority species. Regulatory considerations for this species are discussed below in Section 4.5.

We observed several snags within the project site. Many were large enough to be considered priority snags per WDFW (2008) definitions, i.e., they were greater than 20 inches diameter at breast height (dbh). In addition, we observed several State of Washington (WDFW 2008) priority logs (>12 inches diameter at the large end and >20 feet long) widely scattered throughout the site. These were generally large-diameter cuttings of trees left within the site.

3.2.6 Geological Context

A geotechnical report has been prepared by Associate Earth Science, Inc. (2020) for the project site. Primarily, the geotechnical report was used to identify steep slopes, substrate materials, or other geologic issues that had impact on site development. The completed geotechnical report has been included with this report as Appendix C.

4.0 REGULATORY CONSIDERATIONS

Wetlands are protected by Section 404 of the Federal Clean Water Act and other state and local policies and ordinances including City of Redmond (2019) Zoning code. Regulatory considerations pertinent to wetlands identified within the study area are discussed below; however, this discussion should not be considered comprehensive. Additional information may be obtained from agencies with jurisdictional responsibility for, or interest in, the site. A brief review of the U.S. Army Corps of Engineers regulations and City of Bothell policy, relative to wetlands, is presented below.

4.1 FEDERAL CLEAN WATER ACT (U.S. ARMY CORPS OF ENGINEERS)

Federal law (Section 404 of the Clean Water Act) discourages the discharge of dredged or fill material into the nation's waters, including most wetlands and streams, without a permit from the U.S. Army Corps of Engineers (COE). The COE makes the final determination as to whether an area meets the definition of "Waters of the U.S." as defined by the federal government (Federal Register 1986:41251), and thus, if it is under their jurisdiction.

We should caution that the placement of fill within wetlands or other "Waters of the U.S." without authorization from the COE is not advised, as the COE makes the final determination regarding whether any permits would be required for any proposed alteration (COE 2017). Because the COE makes the final determination regarding permitting under their jurisdiction, a jurisdictional determination from the COE is generally recommended prior to any construction activities, if any modification of wetlands is proposed. A jurisdictional determination would also provide evaluation and confirmation of the wetland delineations by the COE.

4.2 WASHINGTON STATE

Under Section 401 of the Clean Water Act, an activity involving a discharge in waters of the U.S. authorized by a federal permit must receive water quality certification by the affected certifying agency. In Washington State, the certifying agency is WDOE, which has regulatory authority over waters of the state, including streams and isolated wetlands, under the state Water Pollution Control Act (90.48 RCW) and the Shoreline Management Act (90.58 RCW).

4.3 CITY OF REDMOND

Redmond (2019) Zoning code (RZC) regulates wetlands and streams as critical areas. Alterations of wetlands and their buffers are generally prohibited, except as allowed under certain conditions. All direct wetland impacts must be mitigated through creation, restoration, or enhancement. City of Redmond (2019) has the final authority to determine ratings, buffers, and allowed uses of wetlands, their buffers, and other sensitive areas that are under their jurisdiction.

The City of Redmond (2019) provides a range of buffer widths for wetlands depending on the wetland category, quality of habitat functions provided by the wetland, and the land use intensity adjacent to the wetland.

Section 21.64.030(A) Redmond (2019) Zoning Code requires use of the most current version of Washington Department of Ecology Wetland Rating system for western Washington to be used to rate wetlands. On November 4, 2014 the Washington Department of Ecology issued an updated version of this rating system (Hruby 2014).

We determined that both Wetlands 1 and 2 meet the criteria to be regulated as a Category II because they scored a total of 21 points (6 points for habitat function) on the wetland rating forms. Redmond (2019) Zoning Code requires a 110-foot-wide buffer for Category II wetlands that provide a moderate level of habitat (5-7 points) that our located in a moderate intensity land use, such as parks.

Redmond (2019) Zoning Code Section 21.64.020(d) provides guidance on the classification of stream channels within the jurisdiction. Redmond stream corridors are classified as Class I to Class IV based on the function and characteristic of the stream channel, and if it provides habitat for fish and wildlife. Class I streams are those identified as shorelines of the state, Class II streams are natural streams that are perineal or intermittent and have salmonid use or potential salmonid fish use, Class III streams are those natural streams that are either perennial or intermittent and do not provide or have potential to support salmonid fish use, or are headwater streams with a surface connection to a salmonid bearing or potentially salmon bearing streams, and Class IV streams are those natural streams that are perennial or intermittent, do not have fish or potential fish use, and are non-headwater streams.

Based on our review of the various resource inventories and our field investigation, Streams 1 and 2 meet the criteria of Class III streams as they appear to be natural headwater streams and are not utilized by salmonids or have the potential to be utilized by salmonids. Redmond (2019) Zoning Code requires a 100-foot-wide buffer for Class III streams.

Redmond Zoning Code (2019) Section 21.64.020(6) allows for steam buffer averaging if certain requirements such as no loss in stream habitat, reduction in salmonid fisheries will occur. In addition, the total area contained within the stream buffer averaging cannot be less than before, and the reduced buffer is not less than 25 feet of the standards stream buffer or 25 feet, whichever is greater.

4.4 WILDLIFE

4.4.1 State of Washington

Other protected species include birds not classified as game birds or predatory birds, and includes endangered, threatened species and sensitive species. Pileated woodpeckers,

signs of which were detected on site as noted above, are considered a protected species under Washington code.

WDFW management recommendations for pileated woodpeckers (Lewis and Azerrad 2004) focus on preservation of contiguous patches of forest habitat, as well as provision and maintenance of snags and decaying live trees of varying sizes for nesting, roosting, and foraging, where feasible. These guidelines recognize that within urban/suburban areas, such as the City of Redmond, habitat requirements for a nesting pair likely extend well beyond a single site, given the large home ranges occupied by this species (typically up to, or over 2 square miles). WDFW (2008) defines mature forest as a priority habitat type and preferred by pileated woodpeckers, but does not provide specific management recommendations for this habitat type.

The home range of pileated woodpeckers is estimated to be over 2 square miles in areas west of the Cascade Range (Lewis and Azerrad 2004). It would be possible to retain the noted habitat features on-site to affect pileated woodpeckers in a small, localized area, and thus it is unlikely that significant adverse impacts to pileated woodpeckers or their habitat in the area as a whole would occur as a result of development of the property, provided there is nearby available habitat. This is consistent with the WDFW guideline for this species.

4.4.2 City of Redmond

The City of Redmond (2019) regulates certain specified wildlife species and their habitats as Fish and Wildlife Habitat Conservation Areas (FWHCAs) under Chapter 21.64 of its Zoning Code. Redmond Municipal Code (RMC) 21.64.020 defines FWHCAs as "Areas with which federally listed threatened or endangered species have a primary association." and "State priority habitats and areas with which priority species have a primary association." As noted above, no federal or state endangered, threatened, or sensitive species were observed on site, nor are they considered to inhabit or have a primary association with the site. However, we observed evidence of use of the site by pileated woodpeckers. The pileated woodpecker is designated by WDFW (2008) as a "state candidate" species for listing as threatened, endangered, or sensitive by the state, but is not federally listed as endangered or threatened. Although pileated woodpeckers do not have any of these designations, they are considered a WDFW priority species which means the habitat is FWHCA under City of Redmond (2019) code. Further, the habitat elements observed on-site, including large mature trees and the large priority snags and downed logs are also considered to be priority habitat, and therefore, FWHCA under City of Redmond (2019) code.

The City of Redmond (2019) regulates development proposals in or adjacent to a fish and wildlife conservation area such that the qualities of the habitat that are essential to maintain feeding, breeding or nesting of a listed species that may utilize the habitats are not disturbed. The City of Redmond (2019) relies on WDFW management

recommendations for "species of concern" found in "Management Recommendations for Washington's Priority Habitats and Species," originally issued by WDFW in 1991 (Rodrick and Milner 1991), and as later updated (e.g., Larsen 1997, Larsen *et al.* 2004), and by any recovery and management plans prepared by WDFW for the listed species pursuant to WAC 232-12-297(11).

5.0 IMPACTS

The following discussion of impacts below is based on our review of the site plans and communications provided to us by Board & Vellum site plans prepared for the Redmond West Side Park project dated April 13, 2020.

5.1 DIRECT IMPACTS

Direct impacts to onsite wetlands and streams would be avoided under the proposed site development plan (Figure 12). The project proposes to design new park infrastructure including a play area, ball fields, trails, and stormwater collection system.

5.2 HYDROLOGIC IMPACTS

New stormwater resulting from the proposed site development will be discharged to a level spreader located in the northeast portion of the project site, immediately outside of the buffer for Stream 1. The project has been designed such that stormwater discharge will match the natural hydrologic conditions and will maintain flows consistent to the natural hydrologic conditions currently provided by Stream 1 and Wetland 1.

Hydrologic modeling for the proposed dispersion trench was completed by Mayfly Engineering and Design (2020) and shows no significant change in the hydrologic input to the onsite wetland and stream will occur as a result of the project. As no significant impacts to the timing, duration, or quantity of water discharged to the stream and wetland will occur, we do not believe that the hydrology of Stream 1 or Wetland 1 will be adversely impacted as part of the proposed site development.

5.3 STREAM 1 BUFFER IMPACTS

The project proposes to build a new trail in the outer portion of the buffer for Stream 1. The proposes trail would be located in the north east portion of the stream buffer and would be approximately 4 feet in width (Figure 12). Total impacts from the trail would result in approximately 245 square feet of buffer impact. In addition, a small portion of the project (approximately 15 square feet) will also be located within the outer portion of the stream buffer for a total of 260 square feet of buffer take (Figure 12) The project proposes to provide additional buffer through buffer averaging as outlined in RZC 21.64.020(6).

Redmond Zoning Code (2019) Section 21.64.020(6) allows buffer averaging if best available science can demonstrate that:

- The width reductions will not reduce stream or habitat functions, including those of non-fish habitat;
- The width reduction will not degrade the habitat, including habitat for salmonid fisheries;

- The proposal will provide additional habitat protection;
- The total area contained in the stream buffer area after averaging is no less than that which would be contained within the standard stream buffer area; and
- The buffer width is not reduced to less than 25 percent of the standard stream buffer width or 25 feet, whichever is greater.

Specifically, the project would meet the above criteria for buffer averaging by:

- The buffer reduction will not result in reduced stream or habitat functions. The existing buffer is currently maintained as a lawn area. As a result of the project, approximately 290 square feet of additional buffer will be provided adjacent to the area of buffer take. The proposed area of buffer give will be enhanced by planting native trees and shrubs. The area of buffer give is also located contiguous with a portion of the buffer proposes for native tree and shrub plantings (Figure 12).
- The proposed buffer reduction will not degrade the habitat, including habitat for fisheries. The existing buffer is maintained as lawn. As a result of the project, the proposed buffer averaging area will be enhanced with native trees and shrubs. The proposed restoration and enhancement within the stream buffer should provide a greater degree of habitat function and value and should also contribute to downstream fisheries.
- As noted above, the project will provide additional protection and restoration to the existing buffer through the planting of a variety of native trees and shrubs.
- As noted above, the total area of proposed buffer encroachment will total 260 square feet. The proposed area of buffer give will be approximately 290 square feet. The proposed area of buffer give will also be enhanced with native trees and shrubs and should provide significantly better quality of habitat than the existing lawn; and
- A small portion of the buffer will be reduced in the northeast portion of the project site. This area will not be anywhere near the threshold of greater than 25 percent of the standard buffer, or 25 feet in width (see Figure 12).

A proposed new trail would would be located in the northeast portion of the project site and would result in the impact of approximately 245 square feet of stream buffer (Figure 12). Redmond Zoning Code (2019) Section 21.64.020(c) allows for trails in a stream buffer so long as the following criteria are met:

- Constructed of permeable materials;
- Designed to minimize impact on the stream system;
- Of a maximum trail corridor width of six feet; and
- Located within the outer half of the buffer; i.e., the portion of the buffer that is farther away from the stream; See also RZC 21.68.180, Shoreline Access, for trail construction in shorelines of the state;

Specifically, the proposed trail located within the stream buffer will meet the criteria outlined in RZC 21.64.020(c) by:

- The proposed trail system will be constructed of permeable mulch material.
- The trail will be located within the outer 50% portion of the stream buffer, as far away from the stream channel as feasible. Vegetation in the existing buffer is currently maintained as lawn and herbaceous cover. Native trees and shrubs will be planted within a significant portion of the remaining buffer in order to compensate for the impact of placement of the new trail.
- The trail will be not be wider than 6 feet. The proposed trail will be approximately 4 feet wide on average.
- As noted above, the trail will be located within the outer half of the buffer, furthest way from the onsite stream channel. The onsite stream channel is not a Shoreline of the State, therefore review of shoreline code outlined in RZC 21.168.180 is not required as part of the project.

As noted above, the project will result in approximately 260 square feet of impact to the buffer of Stream 1. To compensate for these impacts, approximately 290 square feet of buffer in the northeast portion of the project site will be provided through buffer averaging and will be enhanced with a mixture of native trees and shrubs (see Figure 12). The additional buffer provided through averaging will be contiguous with an area that will be enhanced with native trees and shrubs. The overall project will not result in an adverse impact to the Stream 1 or its buffer. The proposed buffer after averaging should provide a greater degree of habitat form and function after completion of the project.

6.0 MITIGATION

Mitigation has been defined by the State Environmental Policy Act (SEPA) (WAC 197-11-768; cf. Cooper 1987), and more recently in a Memorandum of Agreement between the Environmental Protection Agency and the U.S. Army Corps of Engineers (Anonymous 1989). In order of desirability, mitigation may include:

1. ***Avoidance*** - avoiding impacts by not taking action or parts of an action;

2. ***Minimization*** - minimizing impacts by limiting the degree or magnitude of the action and its implementation;

3. ***Compensation*** - which may involve:

    a) repairing, rehabilitating, or restoring the affected environment;
    b) replacing or creating substitute resources or environments;
    c) mitigation banking.

6.1 AVOIDANCE AND MINIMIZATION

Redevelopment of the Redmond Westside Park would incorporate several mitigating measures that would avoid or minimize impacts to wetlands, streams, and fish and wildlife habitat, or their buffers.

The proposed project will avoid direct impacts to onsite wetlands and streams. The project proposes to impact approximately 260 square feet of the buffer of Stream 1 through the development of a new trail system located in the outer portion of the buffer. The trail will comply with the City of Redmond (2019) Zoning Code requirements, which require that trails are located in the outer 50% of the buffer, are no greater than 6 feet in width, and are constructed with a pervious material. The proposed site development plan incorporates a number of other design features that would avoid or minimize impacts to the retained areas and off-site habitats:

- Direct impacts to the on-site Category II wetland and Class III stream would be avoided;
- The proposed site plan would require that approximately 260 square feet of stream buffer be impacted for the development of a new trail and infrastructure. To compensate for this intrusion, approximately 290 square feet of stream buffer would be added through buffer averaging. In addition, the project would provide buffer enhancement through the planting of native trees and shrubs;
- No impervious surfaces would be placed within the stream buffer for the construction of the new trail. The trail would be constructed of a pervious surface such as wood chips or mulch;
- The proposed park redevelopment would collect and direct stormwater to a dispersion trench located in the northeast portion of the site. The volume and rate of discharge has been designed to match existing conditions and should not have a significant hydrologic impact to the onsite wetland or stream;
- Temporary erosion and sediment control (TESC) measures would be installed during construction and would utilize appropriate best management practices (BMPs) designed to prevent sediment deposition to on-site open space tracts and off-site areas.

6.2 COMPENSATORY MITIGATION

As noted above, the project will avoid direct impacts to wetlands, streams, and fish and wildlife habitat. The east half of the project site currently contains existing second-growth forest habitat that will not be impacted and will be retained as part of the project. A small portion of the existing stream buffer (approximately 260 square feet) in the northeast portion of the site will be impacted for the development of a new previous trail system. The proposed impact would occur in a portion of the site that is currently maintained as a grass lawn. To compensate for these impacts, approximately 290 square feet of additional buffer will be provided through buffer averaging. The proposed area of

buffer averaging will be enhanced with a mixture of native trees and shrubs (see Figure 12). The additional buffer provided through averaging will be contiguous with an area that will be enhanced with native trees and shrubs. As a result, the overall habitat form and function within the stream buffer should improve as a result of the project.

7.0 LIMITATIONS

We have prepared this report for the exclusive use of Board & Vellum and their consultants. No other person or agency may rely upon the information, analysis, or conclusions contained herein without permission from Board and Vellum.

The determination of ecological system classifications, functions, values, and boundaries is an inexact science, and different individuals and agencies may reach different conclusions. With regard to wetlands, the final determination of their boundaries for regulatory purposes is the responsibility of the various agencies that regulate development activities in wetlands. We cannot guarantee the outcome of such determinations. Therefore, the conclusions of this report should be reviewed by the appropriate regulatory agencies.

We warrant that the work performed conforms to standards generally accepted in our field, and prepared substantially in accordance with then-current technical guidelines and criteria. The conclusions of this report represent the results of our analysis of the information provided by the project proponent and their consultants, together with information gathered in the course of the study. No other warranty, expressed or implied, is made.

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FIGURES

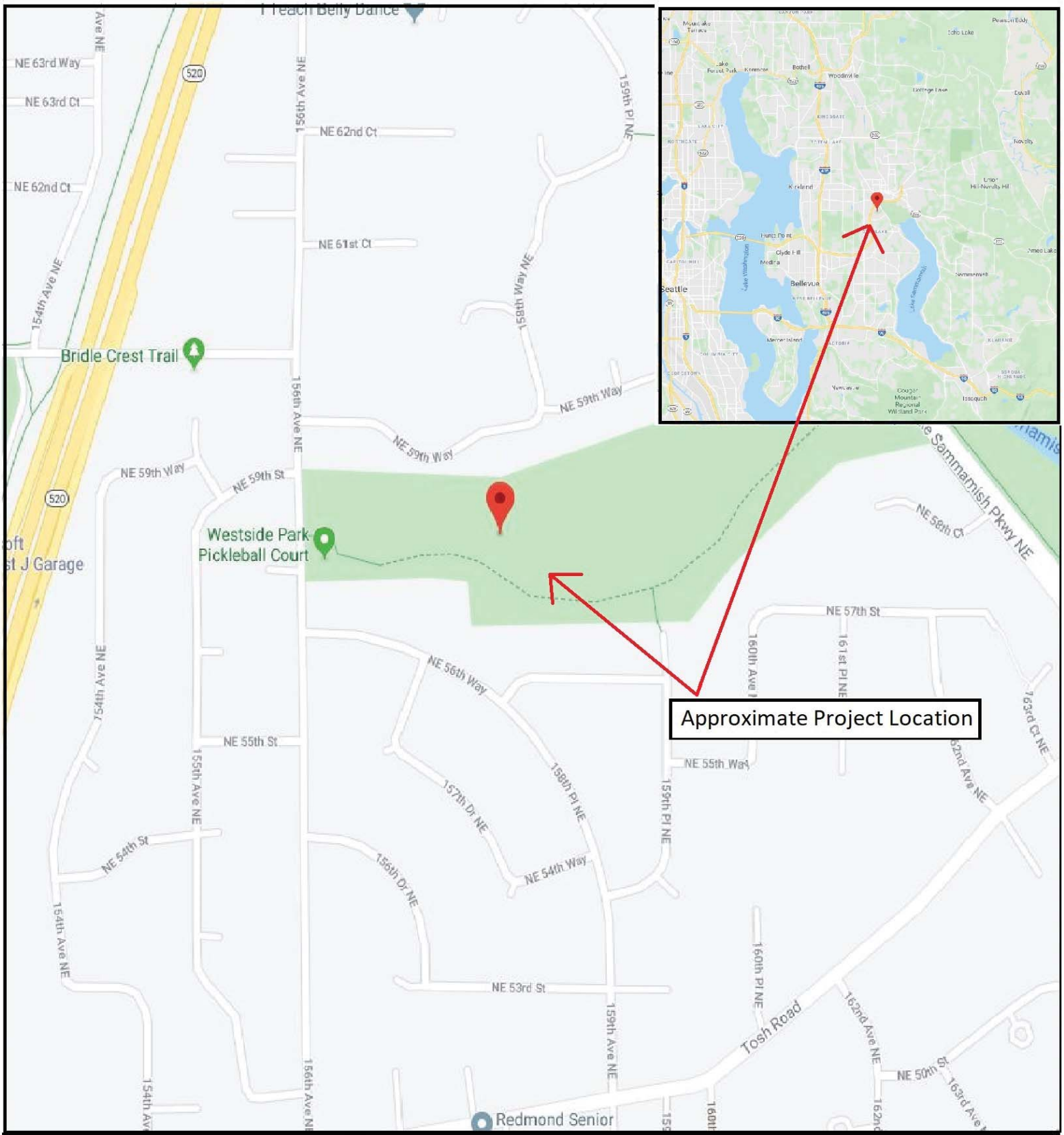

FIGURE 1 - Regional and Vicinity Map

Redmond Westside Park

RAI Project #: 2019-082-003

Map Created By: A. Rossi

IMAGE SOURCE: Google https://www.google.com/maps/

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Figure 2. U.S.D.A. Soil Conservation Service Soil Survey Map

Redmond Westside Park

RAI Project #: 2020-082-003

Map Created By: A. Rossi

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AgB	Alderwood gravelly sandy loam, 0 to 8 percent slopes	3.7	10.7%
AgC	Alderwood gravelly sandy loam, 8 to 15 percent slopes	23.1	67.2%
AmB	Arents, Alderwood material, 0 to 8 percent slopes	4.7	13.6%
AmC	Arents, Alderwood material, 8 to 15 percent slopes	2.9	8.6%
Totals for Area of Interest		**34.3**	**100.0%**

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Source: NRCS Web Soil Survey https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

U.S. Fish and Wildlife Service
National Wetlands Inventory

Wetlands

November 21, 2019

Wetlands

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

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

Figure 3. U.S. Fish and Wildlife National Wetland Inventory

Redmond Westside Park

RAI Project Number: 2019-082-003

Map Created By: A. Rossi

Source: NWI Mapper https://www.fws.gov/wetlands/data/mapper.html

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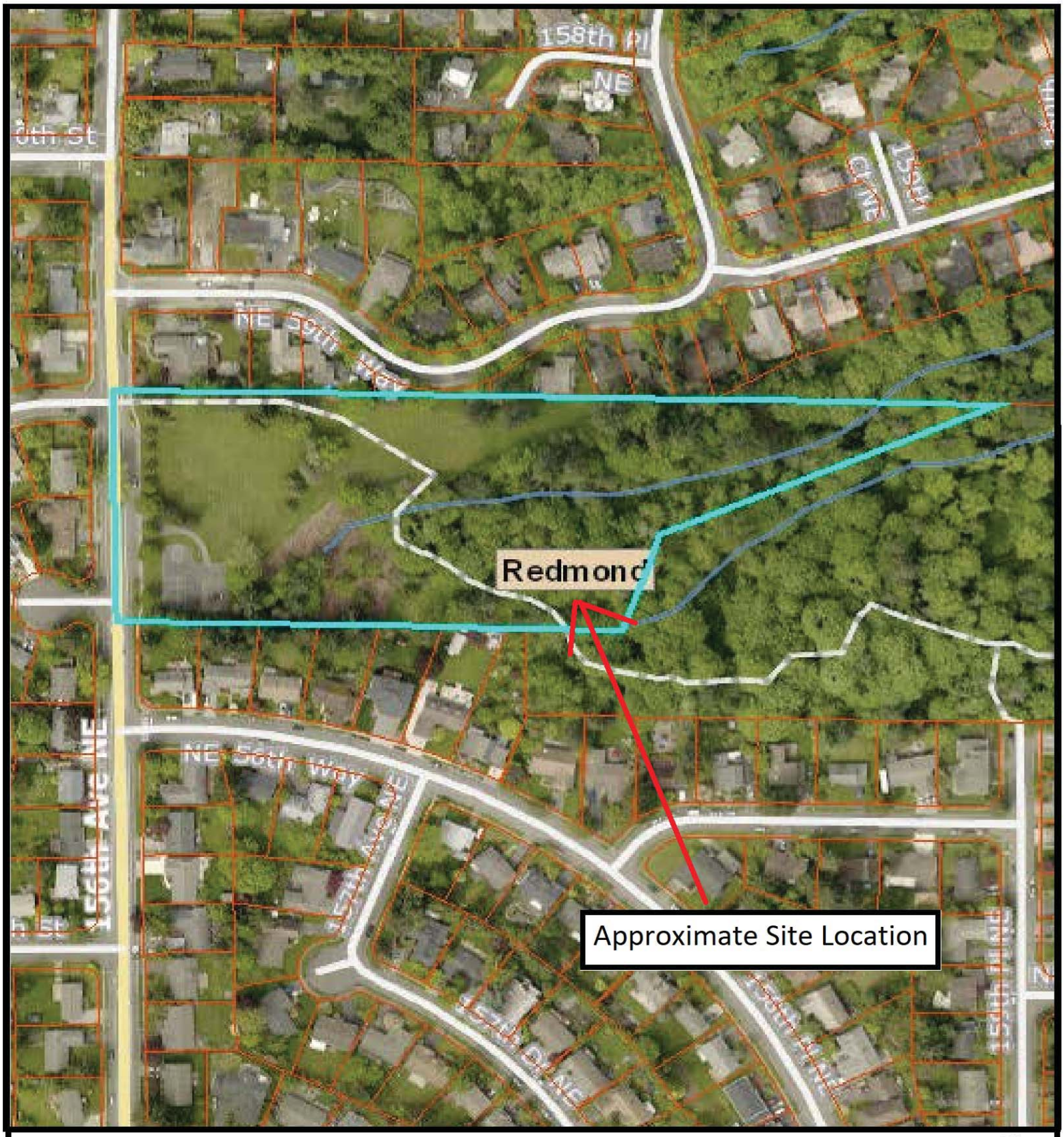

Figure 4. Kind County iMap

Redmond Westside Park

RAI Project #: 2019-082-003

Map Created By: A. Rossi

IMAGE SOURCE: King County iMap https://gismaps.kingcounty.gov/iMap/

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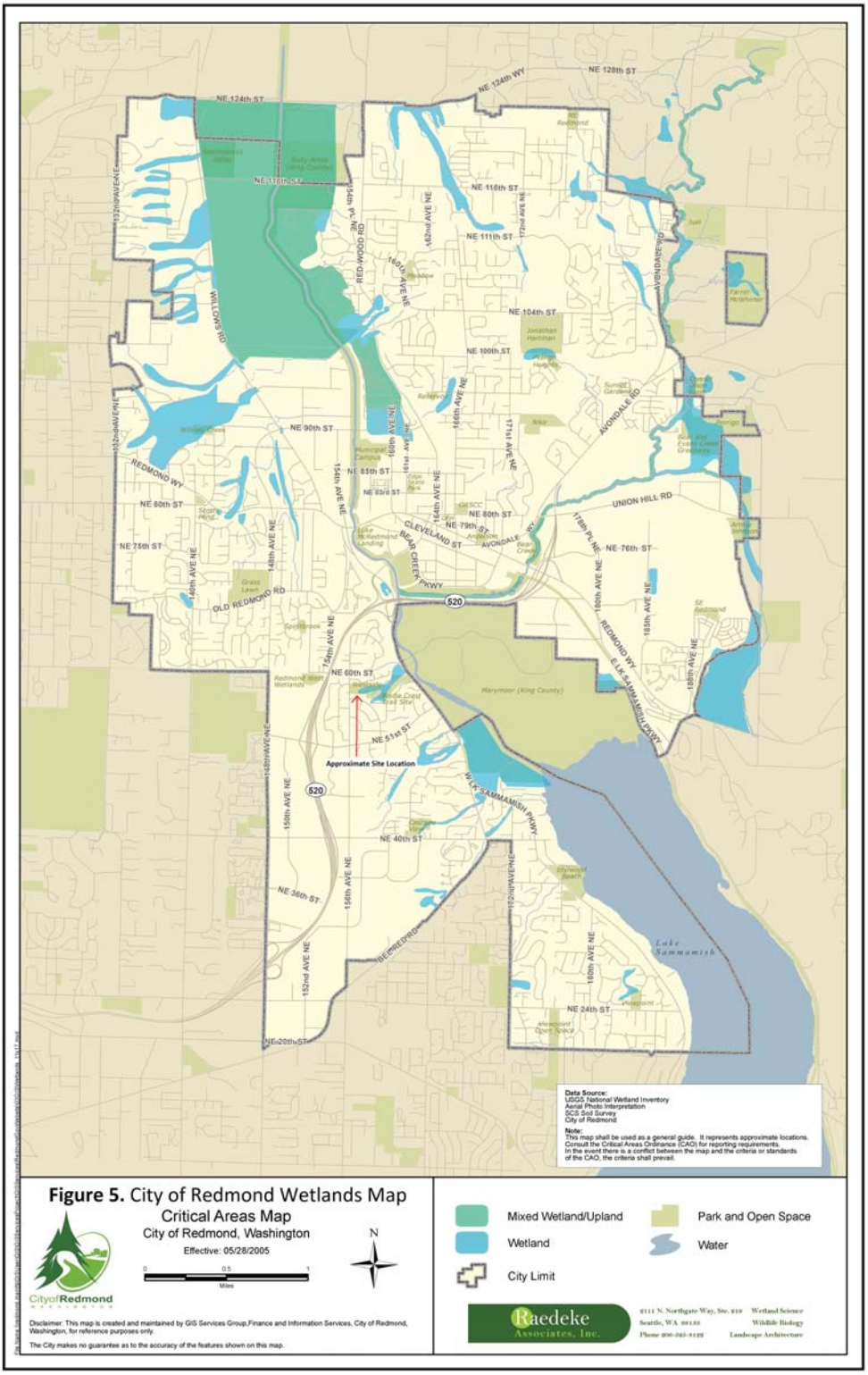

Figure 5. City of Redmond Wetlands Map

Critical Areas Map

City of Redmond, Washington

Effective: 05/28/2005

0 0.5 1 Miles

N

Mixed Wetland/Upland

Wetland

City Limit

Park and Open Space

Water

CityofRedmond

Raedeke Associates, Inc.

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Wetland Science
Wildlife Biology
Landscape Architecture

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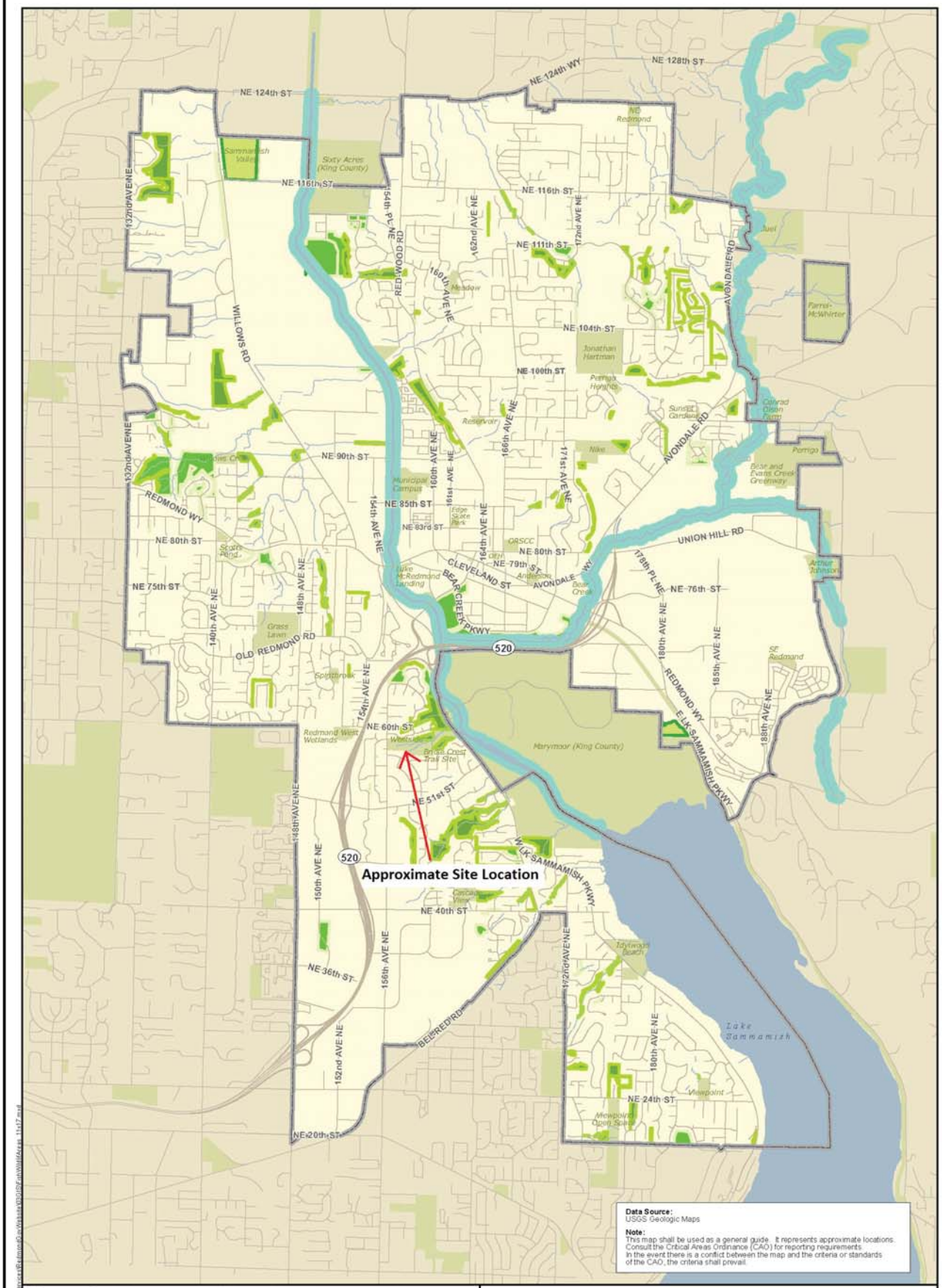

Figure 6. Fish and Wildlife Habitat Conservation Areas (Core Preservation Areas)

Critical Areas Map

City of Redmond, Washington

Effective: 05/28/2005

0 0.5 1 Miles

N

CityofRedmond

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The City makes no guarantee as to the accuracy of the features shown on this map.

- Class 1 Streams and Buffers
- Native Growth Protection Easements
- Open Space Easements
- Transfer Development Rights Easements
- City Limit
- Park and Open Space
- Water

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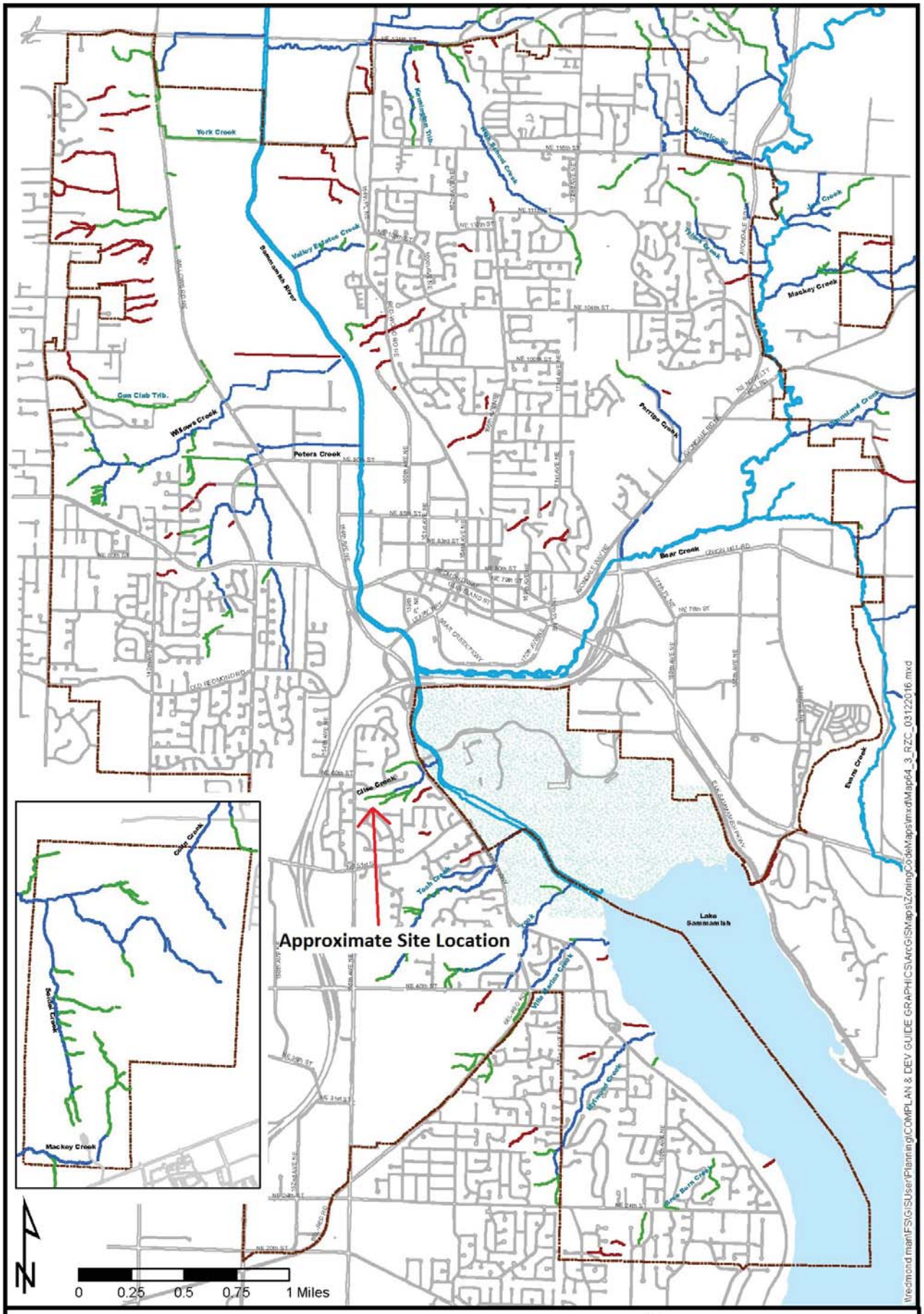

Figure 7. City of Redmond Streams map

City of Redmond

Critical Areas Map
Effective: 3/12/2016

Stream Official USGS Stream Name
Stream Informal Stream Name

Class I Stream
Class II Stream
Class III Stream
Class IV Stream

Map 64.3 Streams Classification

Sources:
City of Redmond Public Works, Natural Resources Division
City of Redmond GIS Services
Washington Trout / Wild Fish Conservancy
King County GIS

Note: This map shall be used as a general guide representing the approximate location of streams, per RZC 21.64.010(E)(2). The map does not necessarily ensure the presence or absence of streams. In the event of a conflict between the map and the criteria of the Critical Areas Ordinance (CAO), the criteria shall prevail. Consult the CAO (RZC 21.64) for reporting requirements

Note: Gaps in illustrated streams may indicate culverts, pipes, etc.

Note: Informal stream names may not conform to USGS policies and may change in the future.

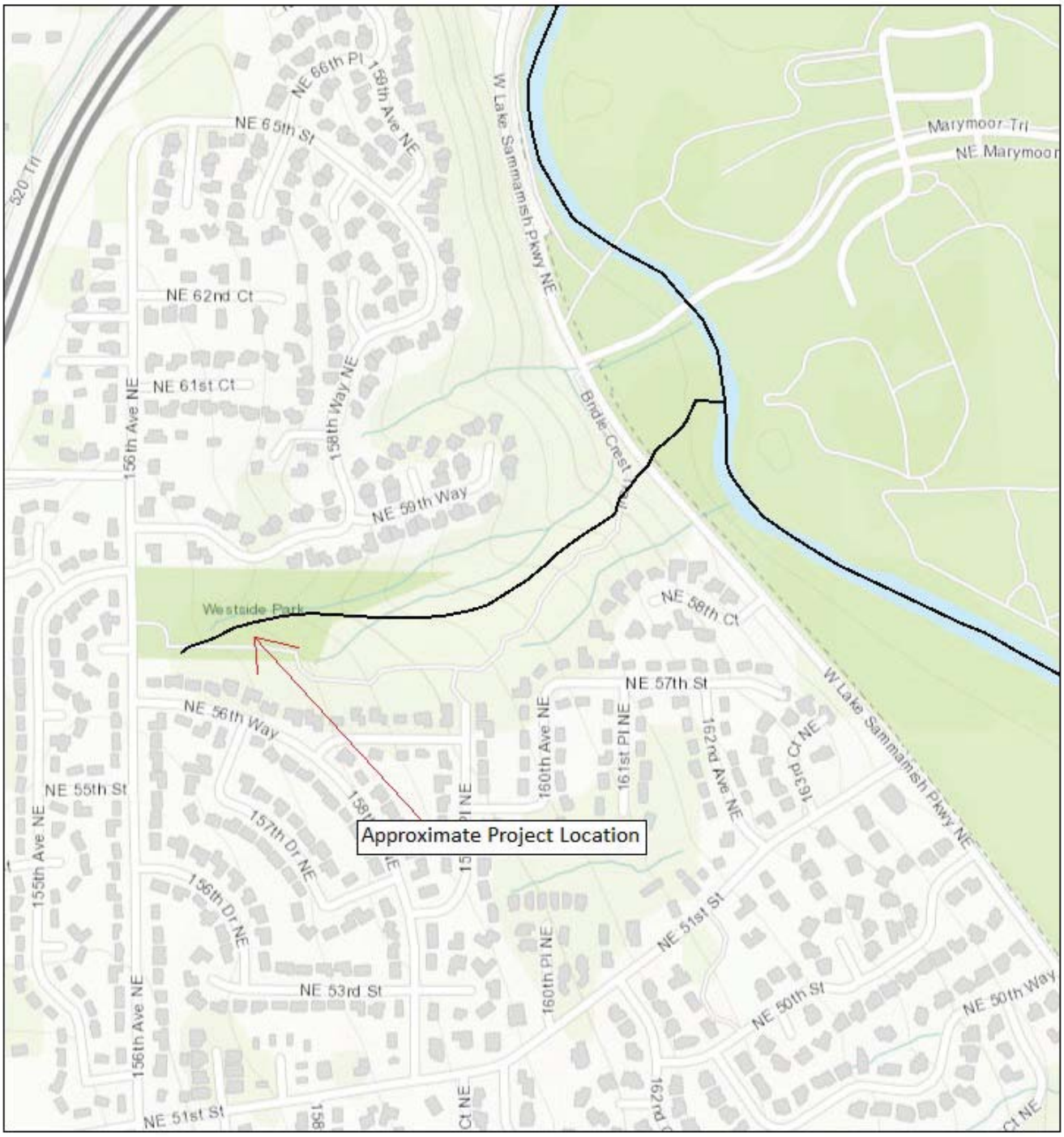

Figure 8. WDFW Salmonscape Map

Redmond Westside Park

RAI Project #: 2019-082-003

Map Created By: A. Rossi

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), © OpenStreetMap contributors, and the GIS User Community
WDFW

Image Source: Salmonscape https://apps.wdfw.wa.gov/salmonscape/map.html

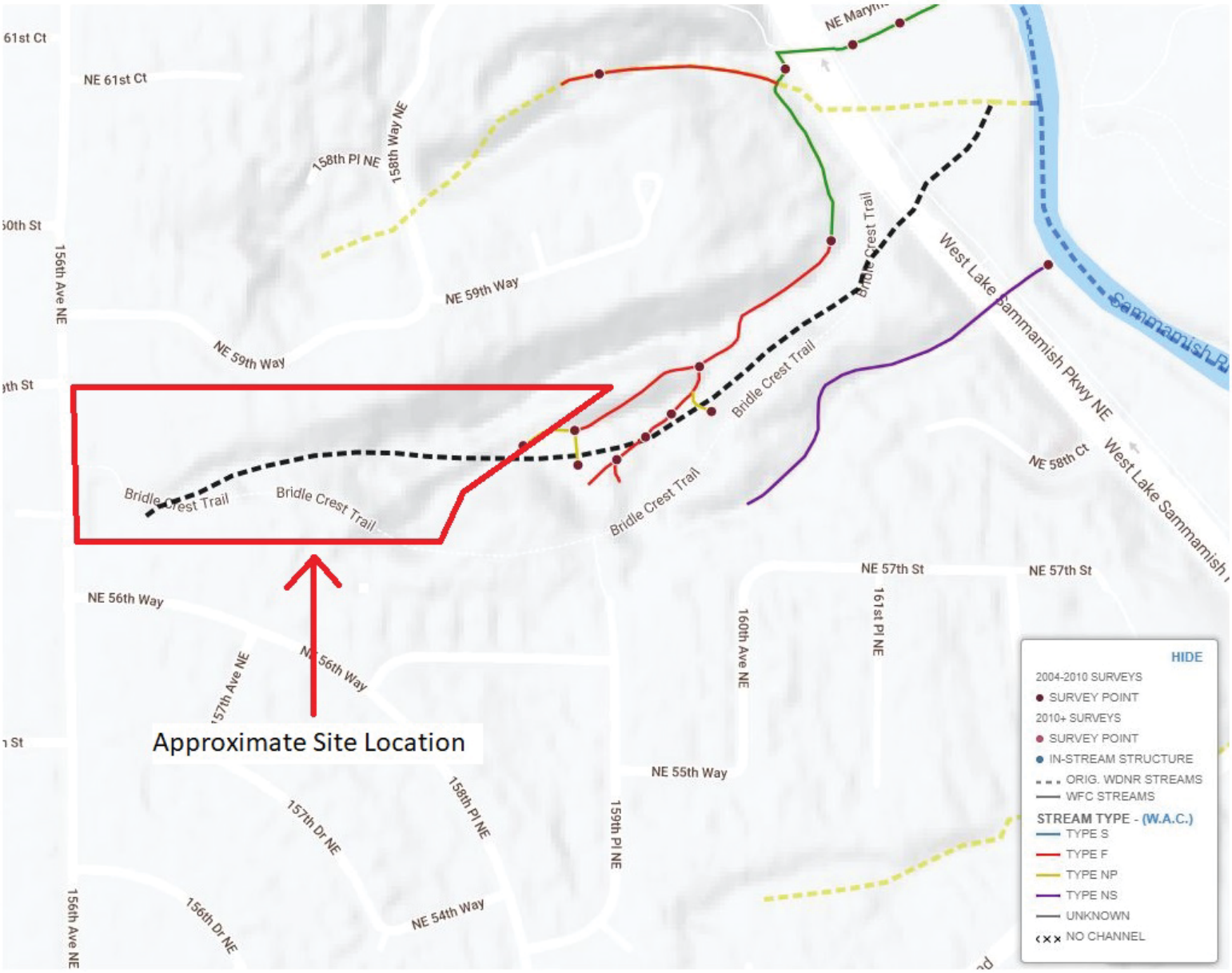

Figure 9. Wild Fish Conservancy Watertyping Surveys Map

Redmond Westside Park
RAI Project Number: 2019-082-003
Created By: A. Rossi

Image Source: Wild Fish Conservancy
http://www.moonlitgeo.com/wfc/?lat=47.285&lng=-123.076&zoom=11

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Seattle, Washington 98133

Figure 10. WDFW Priority Habitat and Species Map

Redmond Westside Park
RAI Project Number: 2019-082-003
Created By: A. Rossi

Image Source: WDFW PHS On the Web
http://apps.wdfw.wa.gov/phsontheweb/

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Seattle, Washington 98133

FIGURE 11

BOARD & VELLUM

WESTSIDE PARK

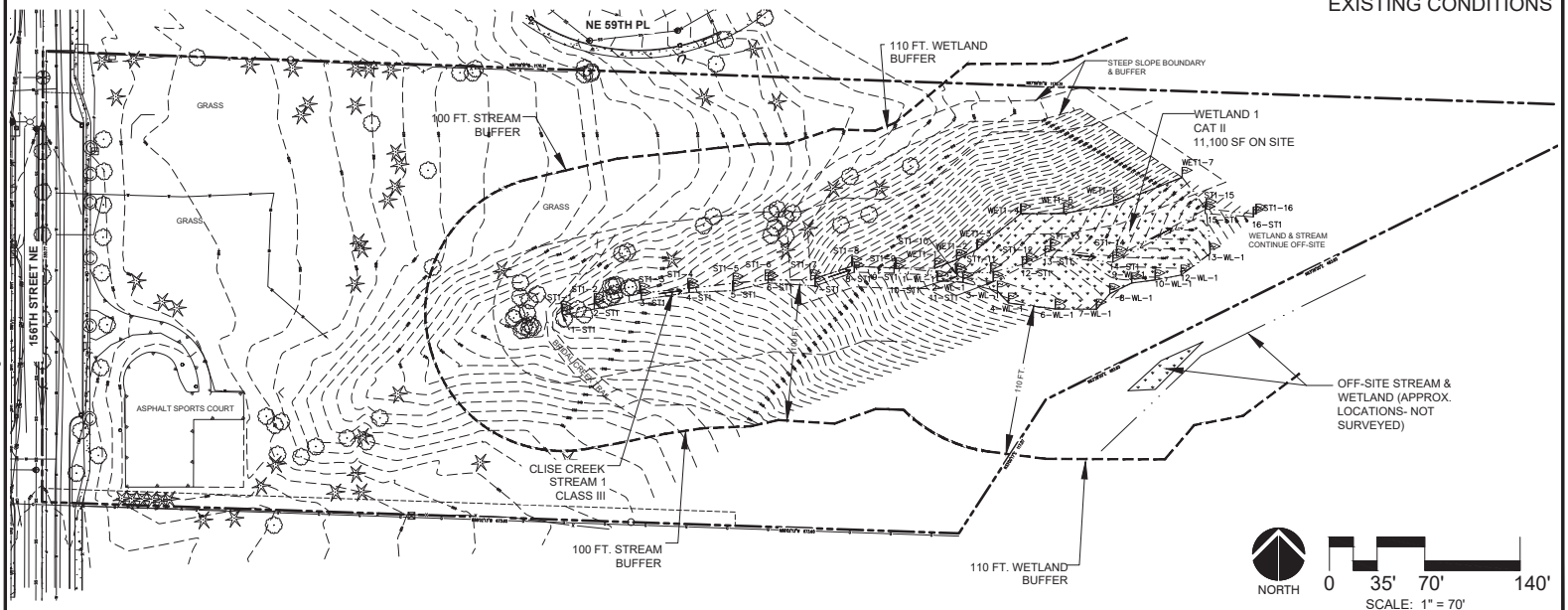
REDMOND, WA

CRITICAL AREAS REPORT

EXISTING CONDITIONS

LEGEND

- PARK BOUNDARY
- WETLAND
- WETLAND FLAG
- STREAM
- ORDINARY HIGH WATER FLAG
- WETLAND/ STREAM BUFFER



NORTH 0 35' 70' 140'

SCALE: 1" = 70'

RAI PROJECT: 2019-082	
DATE: 4/15/2020	
DRAWN BY:AC	PM:KK

BASE INFORMATION:
SURVEY: CORE ENGINEERING, BELLEVUE
RECEIVED 4/12/2020

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FIGURE 12

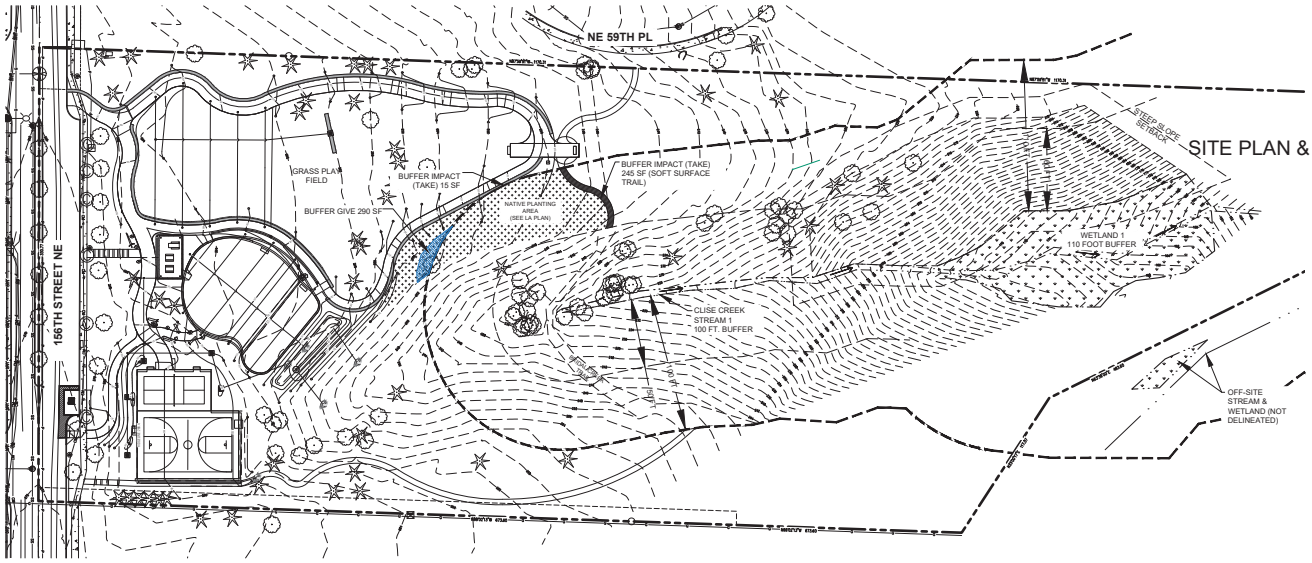
BOARD & VELLUM

WESTSIDE PARK

REDMOND, WA

CRITICAL AREAS REPORT

SITE PLAN & PROPOSED MITIGATION



LEGEND

- PARK BOUNDARY
- WETLAND
- STREAM
- WETLAND/ STREAM BUFFER
- INNER BUFFER
- BUFFER TAKE- 260 SF
- BUFFER GIVE- 290 SF
- NATIVE PLANTING AREA SEE LANDSCAPE ARCHITECT PLAN

PLANT LIST FOR NATIVE PLANTING AREA

NATIVE BUFFER

Acer circinatum / Vine Maple
Fragaria chiloensis / Beach Strawberry
Gaultheria shallon / Salal
Mahonia aquifolium / Oregon Grape
Oemleria cerasiformis / Indian Plum
Polystichum munitum / Western Sword Fern
Ribes sanguineum / Red Flowering Currant
Thuja plicata / Western Red Cedar

SEE LANDSCAPE ARCHITECT PLANS FOR PLANT LAYOUT

NORTH 0 35' 70' 140'

SCALE: 1" = 70'

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2111 N. Northgate Way, Ste 219
Seattle, WA 98133

RAI PROJECT: 2019-082	
DATE: 4/15/2020	
DRAWN BY:AC	PM:KK

BASE INFORMATION:
SURVEY: CORE ENGINEERING, BELLEVUE
RECEIVED 4/12/2020 SITE PLAN: BOARD & VELLUM RECEIVED 4/12/2020

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APPENDIX A

Field Survey Data

Print Form

DATA FORM 1 *(Revised)*
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Westside Park	Date: 10/31/2019
Applicant/owner: City of Redmond	County: King State: Washington
Investigator(s): K. Kosters, A. Clark, A. Rossi	S/T/R: S14 / T25 / R5
Do Normal Circumstances exist on the site? yes ☒ no ☐ Is the site significantly disturbed (atypical situation)? yes ☐ no ☒ Is the area a potential Problem Area? yes ☐ no ☒ Explanation of atypical or problem area:	Community ID: Transect ID: Plot ID: SP 1-1 Paired Plot, upslope south of Wet 1.

VEGETATION (For strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	Stratum	% cover	Indicator	Dominant Plant Species	Stratum	% cover	Indicator
Alnus rubra	T	50	FAC	Polystichum munitum	H	20	FACU
				Geranium robertianum	H	5	FAC
Sambucus racemosa	S	40	FACU				
Rubus spectabilis	S	20	FAC				

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC 75%

Check all indicators that apply & explain below:

Visual observation of plant species growing in areas of prolonged inundation/saturation	_____	Physiological/reproductive adaptations	_____
		Wetland plant database	_____
Morphological adaptations	_____	Personal knowledge of regional plant communities	_____
Technical Literature	_____	Other (explain)	_____

Hydrophytic vegetation present? **yes** ☒ **no** ☐
Rationale for decision/Remarks:

75% of present of dominant vegetation is hydrophytic.

HYDROLOGY

Is it the growing season? yes ☐ no ☒	Water Marks: yes ☐ no ☒ on _____	Sediment Deposits: yes ☐ no ☒
Based on: _____ soil temp (record temp _____) October other (explain)	Drift Lines: ☐ ☒	Drainage Patterns: yes ☐ no ☒
Dept. of inundation: None	Oxidized Root (live roots) Channels <12 in. yes ☐ no ☒	Local Soil Survey: yes ☐ no ☒
Depth to free water in pit: Depth to saturated soil:	FAC Neutral: yes ☐ no ☒	Water-stained Leaves yes ☐ no ☒
Check all that apply & explain below: Stream, Lake or gage data: _____ Aerial photographs: _____ Other: ____	Other (explain):	

Wetland hydrology present? **yes** ☐ **no** ☒
Rationale for decision/Remarks:

SOILS

Map Unit Name Alderwood Gravelly Sandy Loam

Drainage Class Moderately well-drained

(Series & Phase)

Field observations confirm mapped type? Yes ☒ No ☐

Taxonomy (subgroup) _____

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size & contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0 - 10	A	10YR 3/2	None		Sandy Loam	
10 - 16+	B	10YR 4/3	10YR 4/6	5% C, M	Sandy Loam	

Hydric Soil Indicators: (check all that apply)

_____ Histosol
_____ Histic Epipedon
_____ Sulfidic Odor
_____ Aquic Moisture Regime
_____Reducing Conditions
_____ Gleyed or Low-Chroma (=1) matrix
_____ Matrix chroma ≤ 2 with mottles
_____ Mg or Fe Concretions
_____ High Organic Content in Surface Layer of Sandy Soils
_____ Organic Streaking in Sandy Soils
_____ Listed on National/Local Hydric Soils List
_____ Other (explain in remarks)

Hydric soils present? Rationale for decision/Remarks: **yes** ☐ **no** ☒

Wetland Determination (circle)

Hydrophytic vegetation present? yes ☒ no ☐
Hydric soils present? yes ☐ no ☒
Wetland hydrology present? yes ☐ no ☒

Is the sampling point within a wetland? yes ☐ no ☒

Rationale/Remarks:

Revised 4/97

Data Form 2: Atypical Situations

Applicant Name: _____ Applicant Number: _____ Project Name: _____
Location: _____ Plot Number: _____ Date: _____

A. **Vegetation:**

1. Type of Alteration: _____
2. Effect on Vegetation: _____
3. Previous Vegetation: _____
   (Attach documentation)_____
4. Hydrophytic Vegetation? Yes_____No_____

B. **Soils:**

1. Type of Alteration: _____
2. Effect on Soils: _____
3. Previous Soils:_____
   (Attach documentation)_____
4. Hydric Soils? Yes_____No_____

C. **Hydrology:**

1. Type of Alteration: _____
2. Effect on Hydrology: _____
3. Previous Hydrology: _____
   (Attach documentation) _____
4. Wetland Hydrology? Yes_____No_____
   Characterized By: _____

Print Form

DATA FORM 1 *(Revised)*
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Westside Park	Date: 10/31/2019
Applicant/owner: City of Redmond	County: King State: Washington
Investigator(s): K. Kosters, A. Clark, A. Rossi	S/T/R:
Do Normal Circumstances exist on the site? yes ☒ no ☐ Is the site significantly disturbed (atypical situation)? yes ☐ no ☒ Is the area a potential Problem Area? yes ☐ no ☒ Explanation of atypical or problem area:	Community ID: Transect ID: SP 1-2 Plot ID: Located in Wetland 1.

VEGETATION (For strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	Stratum	% cover	Indicator	Dominant Plant Species	Stratum	% cover	Indicator
Alnus rubra	T	30	FAC	Carex obnupta	H	30	OBL
				Ranunculus repens	H	20	FAC
				Tolmeia menziesii	H	20	FAC
				Lysichiton americanus	H	5	OBL
				Equisetum arvense	H	5	FAC

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC 100%

Check all indicators that apply & explain below:

Visual observation of plant species growing in areas of prolonged inundation/saturation	_____	Physiological/reproductive adaptations	_____
		Wetland plant database	_____
Morphological adaptations	_____	Personal knowledge of regional plant communities	_____
Technical Literature	_____	Other (explain)	_____

Hydrophytic vegetation present? **yes** ☒ **no** ☐
Rationale for decision/Remarks:

100% of present vegetation is hydrophytic.

HYDROLOGY

Is it the growing season? yes ☐ no ☒	Water Marks: yes ☐ no ☒ on _____	Sediment Deposits: yes ☐ no ☒
Based on: _____ soil temp (record temp _____) October other (explain)	Drift Lines: ☐ ☒	Drainage Patterns: yes ☐ no ☒
Dept. of inundation:	Oxidized Root (live roots) Channels <12 in. yes ☐ no ☒	Local Soil Survey: yes ☐ no ☒
Depth to free water in pit: 12 inches BGS Depth to saturated soil: 10 inches BGS	FAC Neutral: yes ☒ no ☐	Water-stained Leaves yes ☐ no ☒
Check all that apply & explain below: Stream, Lake or gage data: _____ Aerial photographs: _____ Other: _____	Other (explain):	

Wetland hydrology present? **yes** ☒ **no** ☐
Rationale for decision/Remarks:

SOILS

Map Unit Name Alderwood Gravelly Sandy Loam

Drainage Class Moderately well-drained

(Series & Phase)

Field observations confirm mapped type? Yes ☒ No ☐

Taxonomy (subgroup) _____

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size & contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0 - 12	A	10YR 2/1	None		Silt Loam	
12 - 18	B	N 3/1	None		Silt Loam	

Hydric Soil Indicators: (check all that apply)

_____ Histosol
_____ Histic Epipedon
__X__ Sulfidic Odor
_____ Aquic Moisture Regime
_____ Reducing Conditions
__X__ Gleyed or Low-Chroma (=1) matrix
_____ Matrix chroma ≤ 2 with mottles
_____ Mg or Fe Concretions
_____ High Organic Content in Surface Layer of Sandy Soils
_____ Organic Streaking in Sandy Soils
_____ Listed on National/Local Hydric Soils List
_____ Other (explain in remarks)

Hydric soils present? Rationale for decision/Remarks: **yes** ☒ **no** ☐

Hydrogen sulfide odor at 6 inches depth (A4 - Hydrogen Sulfide) and gley soils at 12 inches depth (F2 - Loamy Gleyed Matrix).

Wetland Determination (circle)

Hydrophytic vegetation present? yes ☒ no ☐
Hydric soils present? yes ☒ no ☐
Wetland hydrology present? yes ☒ no ☐

Is the sampling point within a wetland? yes ☒ no ☐

Rationale/Remarks:

Revised 4/97

Data Form 2: Atypical Situations

Applicant Name: _____ Applicant Number: _____ Project Name: _____
Location: _____ Plot Number: _____ Date: _____

A. **Vegetation:**

1. Type of Alteration: _____
2. Effect on Vegetation: _____
3. Previous Vegetation: _____
   (Attach documentation)_____
4. Hydrophytic Vegetation? Yes_____No_____

B. **Soils:**

1. Type of Alteration: _____
2. Effect on Soils: _____
3. Previous Soils:_____
   (Attach documentation)_____
4. Hydric Soils? Yes_____No_____

C. **Hydrology:**

1. Type of Alteration: _____
2. Effect on Hydrology: _____
3. Previous Hydrology: _____
   (Attach documentation) _____
4. Wetland Hydrology? Yes_____No_____
   Characterized By: _____

Print Form

DATA FORM 1 *(Revised)*
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Westside Park	Date: 10/31/2019
Applicant/owner: City of Redmond	County: King State: Washington
Investigator(s): K. Kosters, A. Clark, A. Rossi	S/T/R: S14 / T25 / R5
Do Normal Circumstances exist on the site? yes ☒ no ☐ Is the site significantly disturbed (atypical situation)? yes ☐ no ☒ Is the area a potential Problem Area? yes ☐ no ☒ Explanation of atypical or problem area:	Community ID: Transect ID: SP 2 Plot ID: On hillslope north of Wetland 1.

VEGETATION (For strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	Stratum	% cover	Indicator	Dominant Plant Species	Stratum	% cover	Indicator
Pseudotsuga menziesii	T	50	FACU	Mahonia nervosa	S	1	FACU
Acer macrophyllum (sap)	S	10	FACU				
Rubus armeniacus	S	10	FAC	Polystichum munitum	H	20	FACU
Symphoricarpos albus	S	5	FACU	Geranium robertianum	H	15	FAC
Thuja plicata (sapling)	S	2	FAC	Poa pratensis	H	3	FAC
Rubus spectabilis	S	2	FAC	Equisetum telmateia	H	2	FACW

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC 25%

Check all indicators that apply & explain below:

Visual observation of plant species growing in areas of prolonged inundation/saturation	_____	Physiological/reproductive adaptations	_____
		Wetland plant database	_____
Morphological adaptations	_____	Personal knowledge of regional plant communities	_____
Technical Literature	_____	Other (explain)	_____

Hydrophytic vegetation present? **yes** ☐ **no** ☒
Rationale for decision/Remarks:

Only 25% of present of dominant vegetation is hydrophytic.

HYDROLOGY

Is it the growing season? yes ☐ no ☒	Water Marks: yes ☐ no ☒ on _____	Sediment Deposits: yes ☐ no ☒
Based on: _____ soil temp (record temp _____) October other (explain)	Drift Lines: ☐ ☒	Drainage Patterns: yes ☐ no ☒
Dept. of inundation: None	Oxidized Root (live roots) Channels <12 in. yes ☐ no ☒	Local Soil Survey: yes ☐ no ☒
Depth to free water in pit: Depth to saturated soil:	FAC Neutral: yes ☐ no ☒	Water-stained Leaves yes ☐ no ☒
Check all that apply & explain below: Stream, Lake or gage data: _____ Aerial photographs: _____ Other: ____	Other (explain):	

Wetland hydrology present? **yes** ☐ **no** ☒
Rationale for decision/Remarks:

SOILS

Map Unit Name Alderwood Gravelly Sandy Loam

Drainage Class Moderately well-drained

(Series & Phase)

Field observations confirm mapped type? Yes ☒ No ☐

Taxonomy (subgroup) _____

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size & contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0 - 12	A	10YR 3/2	None		Sandy Loam	
12 - 16+	B	2.5Y 5/4 (60%)	None		Sandy Loam	
	B	10YR 3/2 (40%)	None		Sandy Loam	

Hydric Soil Indicators: (check all that apply)

_____ Histosol
_____ Histic Epipedon
_____ Sulfidic Odor
_____ Aquic Moisture Regime
_____Reducing Conditions
_____ Gleyed or Low-Chroma (=1) matrix
_____ Matrix chroma ≤ 2 with mottles
_____ Mg or Fe Concretions
_____ High Organic Content in Surface Layer of Sandy Soils
_____ Organic Streaking in Sandy Soils
_____ Listed on National/Local Hydric Soils List
_____ Other (explain in remarks)

Hydric soils present? Rationale for decision/Remarks: **yes** ☐ **no** ☒

Wetland Determination (circle)

Hydrophytic vegetation present? yes ☐ no ☒
Hydric soils present? yes ☐ no ☒
Wetland hydrology present? yes ☐ no ☒

Is the sampling point within a wetland? yes ☐ no ☒

Rationale/Remarks:

Revised 4/97

Data Form 2: Atypical Situations

Applicant Name: _____ Applicant Number: _____ Project Name: _____
Location: _____ Plot Number: _____ Date: _____

A. **Vegetation:**

1. Type of Alteration: _____
2. Effect on Vegetation: _____
3. Previous Vegetation: _____
   (Attach documentation)_____
4. Hydrophytic Vegetation? Yes_____No_____

B. **Soils:**

1. Type of Alteration: _____
2. Effect on Soils: _____
3. Previous Soils:_____
   (Attach documentation)_____
4. Hydric Soils? Yes_____No_____

C. **Hydrology:**

1. Type of Alteration: _____
2. Effect on Hydrology: _____
3. Previous Hydrology: _____
   (Attach documentation) _____
4. Wetland Hydrology? Yes_____No_____
   Characterized By: _____

Print Form

DATA FORM 1 *(Revised)*
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Westside Park	Date: 10/31/2019
Applicant/owner: City of Redmond	County: King State: Washington
Investigator(s): K. Kosters, A. Clark, A. Rossi	S/T/R: S14 / T25 / R5
Do Normal Circumstances exist on the site? yes ☒ no ☐ Is the site significantly disturbed (atypical situation)? yes ☐ no ☒ Is the area a potential Problem Area? yes ☐ no ☒ Explanation of atypical or problem area:	Community ID: Transect ID: SP 3 Plot ID: In north central grass lawn.

VEGETATION (For strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	Stratum	% cover	Indicator	Dominant Plant Species	Stratum	% cover	Indicator
No trees or shrubs				Poa pratensis	H	60	FAC
				Trifolium repens	H	10	FAC
				Taraxacum officinale	H	10	FACU
				Plantago major	H	10	FAC

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC 60%

Check all indicators that apply & explain below:

Visual observation of plant species growing in areas of prolonged inundation/saturation	_____	Physiological/reproductive adaptations	_____
		Wetland plant database	_____
Morphological adaptations	_____	Personal knowledge of regional plant communities	_____
Technical Literature	_____	Other (explain)	_____

Hydrophytic vegetation present? **yes** ☒ **no** ☐
Rationale for decision/Remarks:

60% of present of dominant vegetation is hydrophytic.

HYDROLOGY

Is it the growing season? yes ☐ no ☒	Water Marks: yes ☐ no ☒ on _____	Sediment Deposits: yes ☐ no ☒
Based on: _____ soil temp (record temp _____) October other (explain)	Drift Lines: ☐ ☒	Drainage Patterns: yes ☐ no ☒
Dept. of inundation: None	Oxidized Root (live roots) Channels <12 in. yes ☐ no ☒	Local Soil Survey: yes ☐ no ☒
Depth to free water in pit: Depth to saturated soil:	FAC Neutral: yes ☐ no ☒	Water-stained Leaves yes ☐ no ☒
Check all that apply & explain below: Stream, Lake or gage data: _____ Aerial photographs: _____ Other: ____	Other (explain):	

Wetland hydrology present? **yes** ☐ **no** ☒
Rationale for decision/Remarks:

SOILS

Map Unit Name Alderwood Gravelly Sandy Loam

Drainage Class Moderately well-drained

(Series & Phase)

Field observations confirm mapped type? Yes ☒ No ☐

Taxonomy (subgroup) _____

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size & contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0 - 6	A	10YR 3/2	None		Sandy Loam	
6 - 12	B	10YR 4/2	10YR 4/4	10% C, M	Sandy Loam	

Hydric Soil Indicators: (check all that apply)

_____ Histosol
_____ Histic Epipedon
_____ Sulfidic Odor
_____ Aquic Moisture Regime
_____Reducing Conditions
_____ Gleyed or Low-Chroma (=1) matrix
_____ Matrix chroma ≤ 2 with mottles
_____ Mg or Fe Concretions
_____ High Organic Content in Surface Layer of Sandy Soils
_____ Organic Streaking in Sandy Soils
_____ Listed on National/Local Hydric Soils List
_____ Other (explain in remarks)

Hydric soils present? Rationale for decision/Remarks: **yes** ☐ **no** ☒

Wetland Determination (circle)

Hydrophytic vegetation present? yes ☒ no ☐
Hydric soils present? yes ☐ no ☒
Wetland hydrology present? yes ☐ no ☒

Is the sampling point within a wetland? yes ☐ no ☒

Rationale/Remarks:

Revised 4/97

Data Form 2: Atypical Situations

Applicant Name: _____ Applicant Number: _____ Project Name: _____
Location: _____ Plot Number: _____ Date: _____

A. **Vegetation:**

1. Type of Alteration: _____
2. Effect on Vegetation: _____
3. Previous Vegetation: _____
   (Attach documentation)_____
4. Hydrophytic Vegetation? Yes_____No_____

B. **Soils:**

1. Type of Alteration: _____
2. Effect on Soils: _____
3. Previous Soils:_____
   (Attach documentation)_____
4. Hydric Soils? Yes_____No_____

C. **Hydrology:**

1. Type of Alteration: _____
2. Effect on Hydrology: _____
3. Previous Hydrology: _____
   (Attach documentation) _____
4. Wetland Hydrology? Yes_____No_____
   Characterized By: _____

Print Form

DATA FORM 1 *(Revised)*
Routine Wetland Determination
(WA State Wetland Delineation Manual or
1987 Corps Wetland Delineation Manual)

Project/Site: Westside Park	Date: 10/31/2019
Applicant/owner: City of Redmond	County: King State: Washington
Investigator(s): K. Kosters, A. Clark, A. Rossi	S/T/R: S14 / T25 / R5
Do Normal Circumstances exist on the site? yes ☒ no ☐ Is the site significantly disturbed (atypical situation)? yes ☐ no ☒ Is the area a potential Problem Area? yes ☐ no ☒ Explanation of atypical or problem area:	Community ID: Transect ID: SP 4 Plot ID: In wet area adjacent to sport court.

VEGETATION (For strata, indicate T = tree; S = shrub; H = herb; V = vine)

Dominant Plant Species	Stratum	% cover	Indicator	Dominant Plant Species	Stratum	% cover	Indicator
No trees or shrubs				Poa pratensis	H	90	FAC
				Ranunculus repens	H	10	FAC

HYDROPHYTIC VEGETATION INDICATORS:

% of dominants OBL, FACW, & FAC 90%

Check all indicators that apply & explain below:

Visual observation of plant species growing in areas of prolonged inundation/saturation	_____	Physiological/reproductive adaptations	_____
		Wetland plant database	_____
Morphological adaptations	_____	Personal knowledge of regional plant communities	_____
Technical Literature	_____	Other (explain)	_____

Hydrophytic vegetation present? **yes** ☒ **no** ☐
Rationale for decision/Remarks:

60% of present of dominant vegetation is hydrophytic.

HYDROLOGY

Is it the growing season? yes ☐ no ☒	Water Marks: yes ☐ no ☒ on _____	Sediment Deposits: yes ☐ no ☒
Based on: _____ soil temp (record temp _____) October other (explain)	Drift Lines: ☐ ☒	Drainage Patterns: yes ☐ no ☒
Dept. of inundation: None	Oxidized Root (live roots) Channels <12 in. yes ☐ no ☒	Local Soil Survey: yes ☐ no ☒
Depth to free water in pit: Depth to saturated soil:	FAC Neutral: yes ☐ no ☒	Water-stained Leaves yes ☐ no ☒
Check all that apply & explain below: Stream, Lake or gage data: _____ Aerial photographs: _____ Other: ____	Other (explain):	

Wetland hydrology present? **yes** ☐ **no** ☒
Rationale for decision/Remarks:

SOILS

Map Unit Name Alderwood Gravelly Sandy Loam

Drainage Class Moderately well-drained

(Series & Phase)

Field observations confirm mapped type? Yes ☒ No ☐

Taxonomy (subgroup) _____

Profile Description

Depth (inches)	Horizon	Matrix color (Munsell moist)	Mottle colors (Munsell moist)	Mottle abundance size & contrast	Texture, concretions, structure, etc.	Drawing of soil profile (match description)
0 - 4	A	10YR 3/2	None		Sandy Loam	
4 - 12	B	5Y 5/1	10YR 3/6	20% C, M	Silt Loam	

Hydric Soil Indicators: (check all that apply)

_____ Histosol
_____ Histic Epipedon
_____ Sulfidic Odor
_____ Aquic Moisture Regime
_____ Reducing Conditions
_____ Gleyed or Low-Chroma (=1) matrix
_X_ Matrix chroma ≤ 2 with mottles
_____ Mg or Fe Concretions
_____ High Organic Content in Surface Layer of Sandy Soils
_____ Organic Streaking in Sandy Soils
_____ Listed on National/Local Hydric Soils List
_____ Other (explain in remarks)

Hydric soils present? Rationale for decision/Remarks: **yes** ☒ **no** ☐

At 4 inches depth, encountered chunk of asphalt suggesting soils contain fill.

Wetland Determination (circle)

Hydrophytic vegetation present? yes ☒ no ☐
Hydric soils present? yes ☒ no ☐
Wetland hydrology present? yes ☐ no ☒

Is the sampling point within a wetland? yes ☐ no ☒

Rationale/Remarks:

Revised 4/97

Data Form 2: Atypical Situations

Applicant Name: _____ Applicant Number: _____ Project Name: _____
Location: _____ Plot Number: _____ Date: _____

A. **Vegetation:**

1. Type of Alteration: _____
2. Effect on Vegetation: _____
3. Previous Vegetation: _____
   (Attach documentation)_____
4. Hydrophytic Vegetation? Yes_____No_____

B. **Soils:**

1. Type of Alteration: _____
2. Effect on Soils: _____
3. Previous Soils:_____
   (Attach documentation)_____
4. Hydric Soils? Yes_____No_____

C. **Hydrology:**

1. Type of Alteration: _____
2. Effect on Hydrology: _____
3. Previous Hydrology: _____
   (Attach documentation) _____
4. Wetland Hydrology? Yes_____No_____
   Characterized By: _____

CITY OF REDMOND
HABITAT UNIT ASSESSMENT FORM

HABITAT UNIT: Westside Park
LOCATION: S14 T25N R5E NW 1/4 of NE 1/4
TOTAL SCORE: 19

Habitat Parameter	Scoring Criteria	Habitat Unit Score
Size	• >50 acres = 3 points • 10-50 acres = 2 points • 0-10 acres = 1 point	2
Vegetation Community Types	≥ 4 types = 3 points • 2-3 types = 2 points • 1 type = 1 point • None = 0 points	3
Community Interspersion	• High = 3 points • Medium = 2 points • Low = 1 point • None = 0 points	2
Priority Species Presence	• Threatened & Endangered Species = 3 points • Candidate Species = 2 points • Monitor Species = 1 point • None = 0 points	2
Priority Species Habitat Use	• Breeding = 3 points • Roosting = 2 points • Foraging = 1 point • None = 0 points	2
Habitat Continuity	• Links protected habitats = 3 points • Links unprotected habitats = 2 points • Extends habitat corridor = 1 point • None = 0 points	1
Forest Vegetation Layers	• 3 layers = 3 points • 2 layers = 2 points • 1 layers = 1 point • None = 0 points	2
Forest Age	• Mature = 3 points • Pole = 2 points • Seedling/Shrub = 1 point • None = 0 points	2
Invasive Species Presence	• 0-25% = 3 points • 26-50% = 2 points • 51-75% = 1 point • 75-100% = 0 points	3

CITY OF REDMOND
HABITAT UNIT ASSESSMENT FORM

VEGETATION COMMUNITY TYPES:

Cover types include: 1)Mowed grass with sparse remnant trees 2)Mixed Coniferous/Deciduous Forest 3) Deciduous-dominated Forest 4) Coniferous-Dominated Forest

INVASIVE PLANTS:

Invasive plants seen on-site include Himalayan Blackberry, Reed Canarygrass, Thistle, Butterfly Bush, and Nightshade. Generally sparse coverage by these invasive species.

HABITAT FEATURES (snags, perches, downed logs, etc):

Many snags and large downed woody logs scattered throughout the site. Approximately 22 snags observed during our field investigation. Many of these had excavations by cavity nesting species - including one snag seen on-site with a potential Pileated Woodpecker nesting cavity - although no signs of nesting were observed during our field visit. Some large, blown over trees creating pit-and-mound topography. Stream channels and associated wetlands also present on-site.

WILDLIFE OBSERVATIONS (direct or indirect):

Species (or signs thereof) observed during our field visit include: Northern flicker, Pileated woodpecker, Dark-eyed junco, American crow, Song sparrow, Hairy woodpecker, Pacific wren, Golden-crowned kinglet, Chestnut-backed chickadee, Anna's hummingbird, Stellar's jay, Black-capped chickadee, Red-breasted nuthatch, Red-breasted sapsucker, American Robin, Bushtit, Douglas squirrel, Black-tailed deer, Townsend mole. 16 bird species and 3 mammal species in total.

THREATS TO HABITAT INTEGRITY:

Invasive plant growth. Habitat degradation due to hiker foot traffic/garbage. Contaminants from fertilizers used on mowed grass.

OTHER NOTES:

Some very large remnant trees on-site. Observed a number of 25-35" dbh large Douglas-fir trees and one very large (approx 60" dbh) Big leaf maple tree. Some areas of forest have more sparse canopy cover than others with some larger (100 foot-wide) clearing areas over wetlands.

STREAM SUMMARY SHEET

Stream Summary			Buffer Summary			Riparian Corridor Summary		
Label[1]	Type[2]	Linear Feet[3]	Required[4]	Proposed[5]	Averaging[6]	Disturbed Area[7]	Filled Area[8]	Mitigation Area[9]
1	III	~600	100ft	100ft	na			
2	III	0	100ft	100ft	na	na	na	na

[1] Stream A, B, C, etc.
[2] Stream type per City stream classification system.
[3] Length of stream on the property.
[4] Required buffer width in feet per RCDG.
[5] Proposed buffer width in feet.
[6] Note if buffer averaging is used. If so, identify minimum and maximum buffer widths in feet as well as area in square feet contained within the buffer prior to and after averaging.
[7] Area of buffer that is disturbed in square feet.
[8] Area of buffer to be filled in square feet, such as for a road crossing.
[9] Location and size in square feet of riparian corridor mitigation.

WETLAND SUMMARY SHEET

Wetland Summary			Buffer Summary				Wetland Impacts		Mitigation Summary		
Label[1]	Category[2]	Size[3]	Required[4]	Proposed[5]	Increase[6] Reduce[7]	Averaging[8]	Fill[9]	Paper Fill[10]	Ratio[11]	Area[12]	Location[13]
1	II	0.39ac	110ft	110ft	NA	NA	NA	NA	NA	NA	NA
2	II	0.01ac	110ft	110ft	NA	NA	NA	NA	NA	NA	NA

[1] Wetland A, B, C, etc.
[2] Wetland category per City wetland classification system.
[3] Area of wetland.
[4] Required buffer width in feet per RCDG.
[5] Proposed buffer width in feet.
[6] Does the uniqueness of the wetland require an increased buffer? If so, what is the width in feet.
[7] Is there a request to reduce the buffer width? If so, what is the width in feet.
[8] Is buffer averaging being used? If so, what is the average buffer width in feet.
[9] Amount of wetland fill.
[10] Amount of paper fill.
[11] Required ratio for wetland mitigation per RCDG.
[12] Size of mitigation area.
[13] Note location of mitigation area (keyed to the mitigation map).

APPENDIX B

Washington Department of Ecology (2014) Wetland Rating Form
Wetland 1

Wetland name or number WL - 1

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland 1 Date of site visit: 10/31/19

Rated by K. Kosters Trained by Ecology? ✓ Yes ___No Date of training March 2014

HGM Class used for rating Riverine Wetland has multiple HGM classes? ✓ Y ____N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.
Source of base aerial photo/map Riverine

OVERALL WETLAND CATEGORY II (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

_____**Category IV** – Total score = 9 - 15

FUNCTION	Improving Water Quality			Hydrologic			Habitat			
	Circle the appropriate ratings									
Site Potential	H	**M**	L	H	**M**	L	H	**M**	L	
Landscape Potential	**H**	M	L	H	**M**	L	H	M	**L**	
Value	**H**	M	L	**H**	M	L	**H**	M	L	**TOTAL**
Score Based on Ratings	8			7			6			21

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	**I** **II**
Wetland of High Conservation Value	**I**
Bog	**I**
Mature Forest	**I**
Old Growth Forest	**I**
Coastal Lagoon	**I** **II**
Interdunal	**I** **II** **III** **IV**
None of the above	NA

Wetland name or number WL - 1

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	1
Hydroperiods	H 1.2	1
Ponded depressions	R 1.1	1
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	1
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	1
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	1
Map of the contributing basin	R 2.2, R 2.3, R 5.2	2
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	3
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	4
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	5

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number WL - 1

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the 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.

Wetland name or number WL - 1

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 WL - 1

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

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

R 1.0. Does the site have the potential to improve water quality?	
R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event: Depressions cover > $^3/_4$ area of wetland — points = 8 Depressions cover > ½ area of wetland — points = 4 Depressions present but cover < ½ area of wetland — points = 2 No depressions present — points = 0	2
R 1.2. Structure of plants in the wetland (areas with >90% cover at person height, **not** Cowardin classes) Trees or shrubs > $^2/_3$ area of the wetland — points = 8 Trees or shrubs > $^1/_3$ area of the wetland — points = 6 Herbaceous plants (> 6 in high) > $^2/_3$ area of the wetland — points = 6 Herbaceous plants (> 6 in high) > $^1/_3$ area of the wetland — points = 3 Trees, shrubs, and ungrazed herbaceous < $^1/_3$ area of the wetland — points = 0	6
Total for R 1 — Add the points in the boxes above	8

Rating of Site Potential If score is: ___**12-16 = H** ✓ **6-11 = M** ___**0-5 = L** *Record the rating on the first page*

R 2.0. Does the landscape have the potential to support the water quality function of the site?	
R 2.1. Is the wetland within an incorporated city or within its UGA? Yes = 2 No = 0	2
R 2.2. Does the contributing basin to the wetland include a UGA or incorporated area? Yes = 1 No = 0	1
R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years? Yes = 1 No = 0	0
R 2.4. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	0
R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4 Other sources _____ Yes = 1 No = 0	0
Total for R 2 — Add the points in the boxes above	3

Rating of Landscape Potential If score is: ✓ **3-6 = H** ___**1 or 2 = M** ___**0 = L** *Record the rating on the first page*

R 3.0. Is the water quality improvement provided by the site valuable to society?	
R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi? Yes = 1 No = 0	1
R 3.2. Is the wetland along a stream or river that has TMDL limits for nutrients, toxics, or pathogens? Yes = 1 No = 0	1
R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (*answer YES if there is a TMDL for the drainage in which the unit is found*) Yes = 2 No = 0	2
Total for R 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 WL - 1

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

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

R 4.0. Does the site have the potential to reduce flooding and erosion?	
R 4.1. Characteristics of the overbank storage the wetland provides: *Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).* If the ratio is more than 20 points = 9 If the ratio is 10-20 points = 6 If the ratio is 5-<10 points = 4 If the ratio is 1-<5 points = 2 If the ratio is < 1 points = 1	4
R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have >90% cover at person height. These are NOT Cowardin classes).* Forest or shrub for > $^1/_3$ area OR emergent plants > $^2/_3$ area points = 7 Forest or shrub for > $^1/_{10}$ area OR emergent plants > $^1/_3$ area points = 4 Plants do not meet above criteria points = 0	7
Total for R 4 Add the points in the boxes above	11

Rating of Site Potential If score is: ___ **12-16 = H** ✓ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

R 5.0. Does the landscape have the potential to support the hydrologic functions of the site?	
R 5.1. Is the stream or river adjacent to the wetland downcut? Yes = 0 No = 1	0
R 5.2. Does the up-gradient watershed include a UGA or incorporated area? Yes = 1 No = 0	1
R 5.3. Is the up-gradient stream or river controlled by dams? Yes = 0 No = 1	1
Total for R 5 Add the points in the boxes above	2

Rating of Landscape Potential If score is: ___ **3 = H** ✓ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

R 6.0. Are the hydrologic functions provided by the site valuable to society?	
R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site*. The sub-basin immediately down-gradient of the wetland has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2 Surface flooding problems are in a sub-basin farther down-gradient points = 1 No flooding problems anywhere downstream points = 0	2
R 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 R 6 Add the points in the boxes above	2

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

Wetland name or number WL - 1

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.*

____Aquatic bed	4 structures or more: points = 4
____Emergent	3 structures: points = 2
✓ Scrub-shrub (areas where shrubs have > 30% cover)	2 structures: points = 1
✓ Forested (areas where trees have > 30% cover)	1 structure: points = 0

If the unit has a Forested class, check if:

____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

1

H 1.2. Hydroperiods

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*).

____Permanently flooded or inundated	4 or more types present: points = 3
____Seasonally flooded or inundated	3 types present: points = 2
____Occasionally flooded or inundated	2 types present: points = 1
✓ Saturated only	1 type present: points = 0
____Permanently flowing stream or river in, or adjacent to, the wetland	
✓ Seasonally flowing stream in, or adjacent to, the wetland	
____**Lake Fringe wetland**	**2 points**
____**Freshwater tidal wetland**	**2 points**

1

H 1.3. Richness of plant species

Count the number of plant species in the wetland that cover at least 10 ft^2.

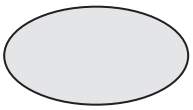
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

If you counted: > 19 species	points = 2
5 - 19 species	points = 1
< 5 species	points = 0

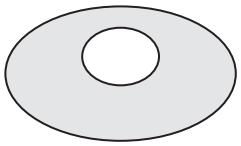
1

H 1.4. Interspersion of habitats

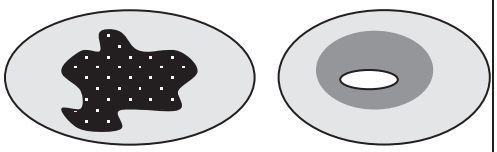
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points

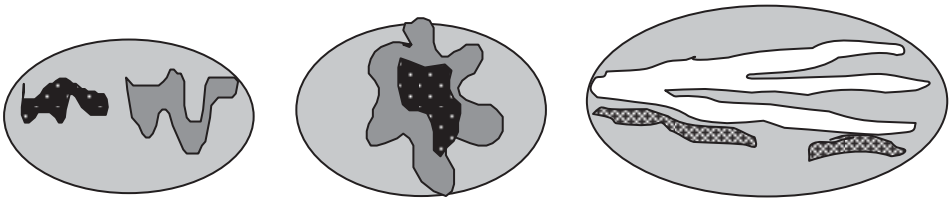


Low = 1 point



Moderate = 2 points

All three diagrams in this row are **HIGH** = 3points



2

Wetland name or number WL - 1

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ✓ Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ✓ Standing snags (dbh > 4 in) within the wetland ✓ 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) ____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)* ____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)* ____Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	3
Total for H 1 Add the points in the boxes above	8

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 functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** 4 % If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	1
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km 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.* Site meets ANY of the following criteria: points = 2 ✓ It has 3 or more priority habitats within 100 m (see next page) — It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) — It is mapped as a location for an individual WDFW priority species — It is a Wetland of High Conservation Value as determined by the Department of Natural Resources — 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 Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	2

Rating of Value If score is: ✓ **2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number WL - 1

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.

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 WL - 1

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	Category
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt 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? Yes = **Category I** No - Go to **SC 1.2**	**Cat. I**
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? — 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) — 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 has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to **SC 2.2** No – Go to **SC 2.3** SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = **Category I** No = **Not a WHCV** SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes – **Contact WNHP/WDNR and go to SC 2.4** No = **Not a WHCV** 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? Yes = **Category I** No = **Not a WHCV**	**Cat. I**
SC 3.0. Bogs 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.*** 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? Yes – Go to **SC 3.3** No – Go to **SC 3.2** 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? Yes – Go to **SC 3.3** No = **Is not a bog** 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? Yes = **Is a Category I bog** No – Go to **SC 3.4** **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. 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? Yes = **Is a Category I bog** No = **Is not a bog**	**Cat. I**

Wetland name or number WL - 1

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**	**Cat. I**
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**	**Cat. I** **Cat. 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**	**Cat I** **Cat. II** **Cat. III** **Cat. IV**
Category of wetland based on Special Characteristics If you answered No for all types, enter "Not Applicable" on Summary Form	NA

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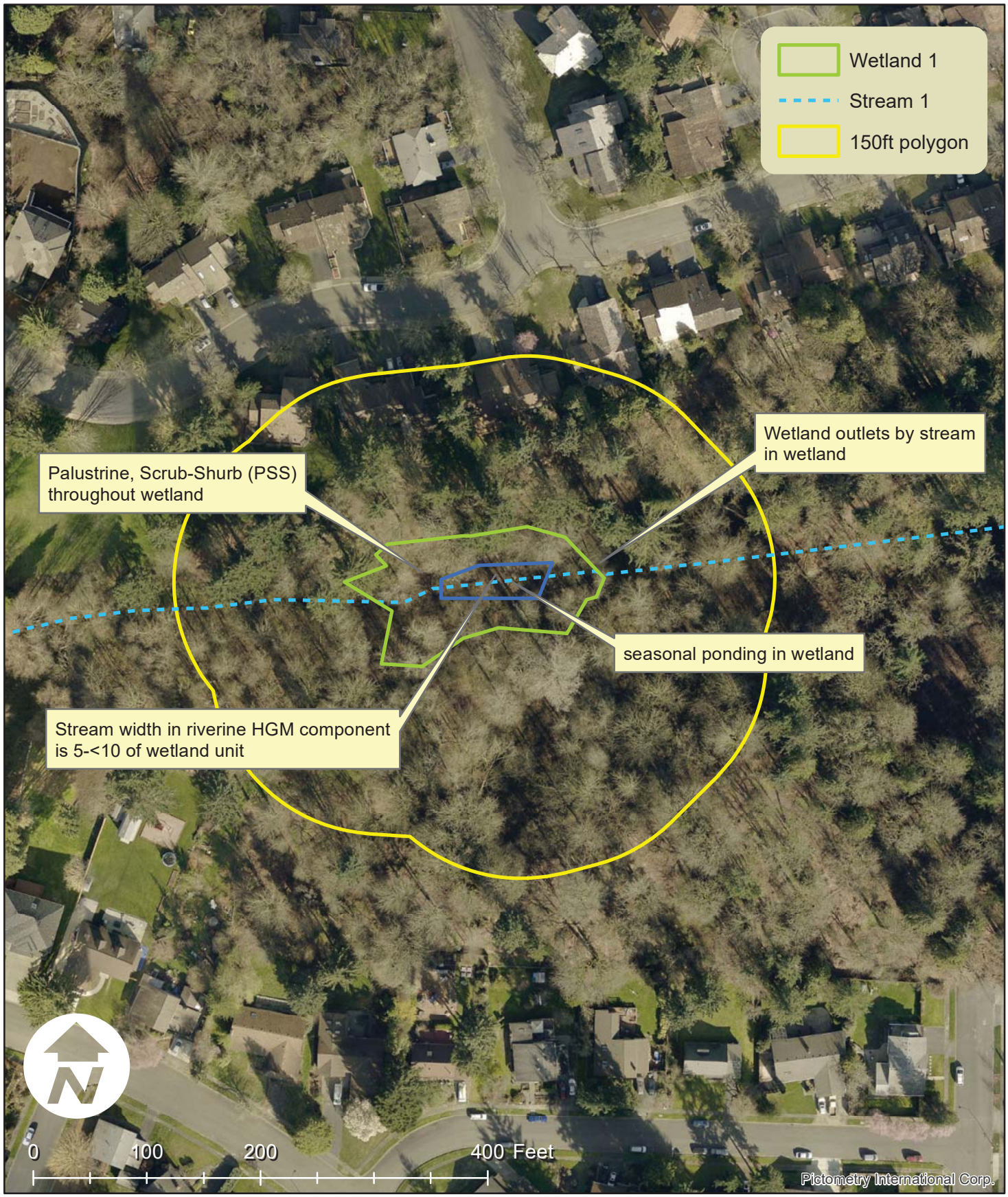


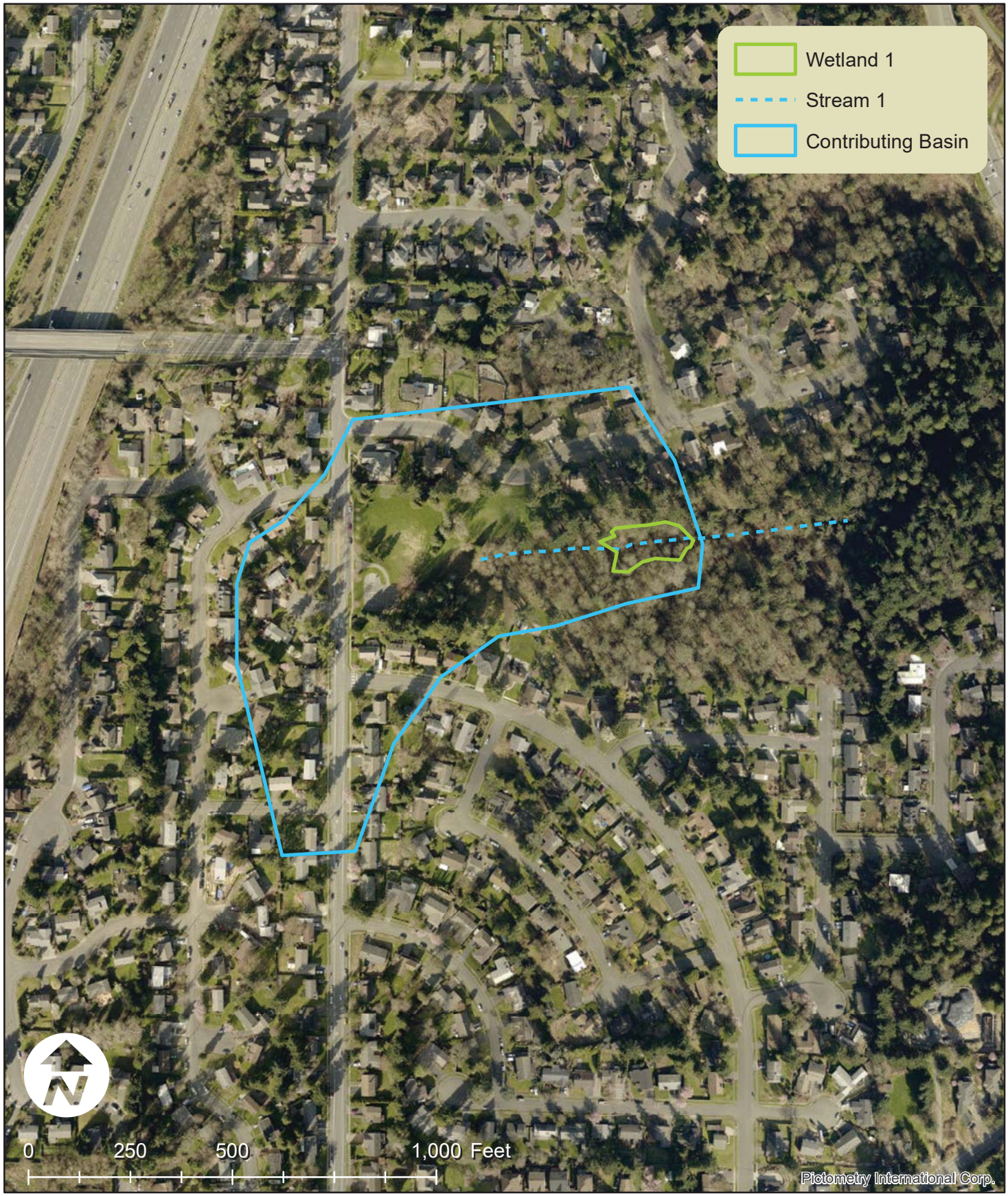
Westside Park Redmond - Wetland 1
2014 WDOE Rating

Figure 1

Questions: R1.1, R1.2, R2.2 R2.3, R2.4, R4.1, R4.2, H1.1, H1.2, H1.4

Date: 11-25-19
RAI Project No, 2019-082
Data Source: King County 2015 Aerial Imagery
Projection: NAD_1983_HARN_StatePlane_Washington_North_FIPS_4601_Feet

Raedeke Associates, Inc.
2111 N. Northgate Way, Ste. 219
Seattle, WA 98133
Phone 206-526-8122
Wetland Science
Wildlife Biology
Landscape Architecture



Westside Park Redmond - Wetland 1
2014 WDOE Rating

Figure 2
Questions: R2.2, R2.3, R5.2

Date: 11-25-19
RAI Project No, 2019-082
Data Source: King County 2015 Aerial Imagery
Projection: NAD_1983_HARN_StatePlane_Washington_North_FIPS_4601_Feet
USGS StreamStat Database

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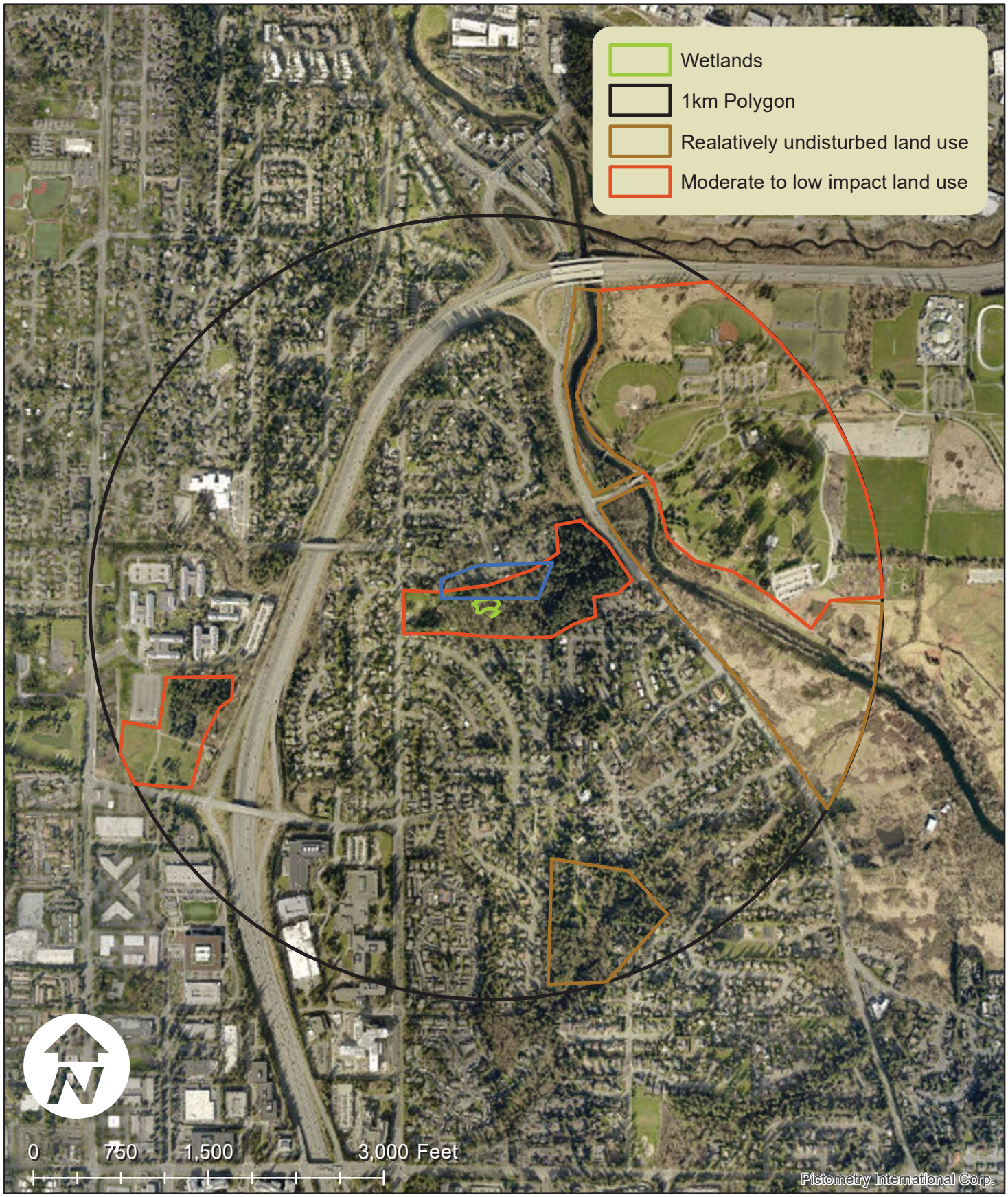

Westside Park Redmond - Wetland 2
2014 WDOE Rating

Figure 3
Questions: H2.1, H2.2, H2.3

Date: 11-25-19
RAI Project No, 2019-082
Data Source: King County 2015 Aerial Imagery
Projection: NAD_1983_HARN_StatePlane_Washington_North_FIPS_4601_Feet

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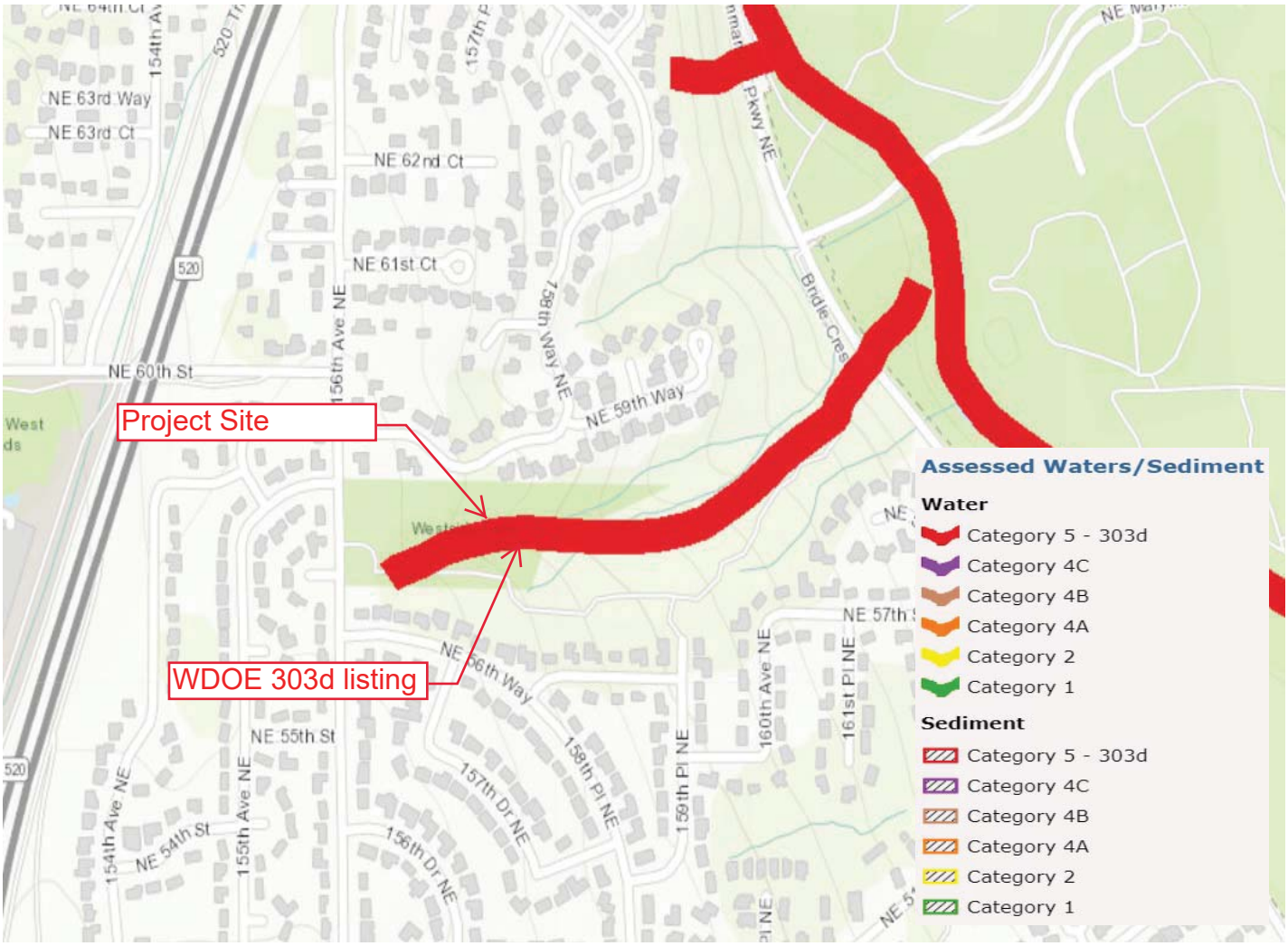
Landscape Architecture



Westside Park Redmond - Wetland 1
2014 WDOE Rating

Figure 4
Questions: R3.1, R3.2

Date: 11-25-19
RAI Project No, 2019-082
Data Source: WDOE Water Quality Atlas

Raedeke Associates, Inc.
2111 N. Northgate Way, Ste. 219 Wetland Science
Seattle, WA 98133 Wildlife Biology
Phone 206-526-8122 Landscape Architecture

Westside Park Redmond - Wetland 1
2014 WDOE Rating

Figure 5
Questions: R3.3

Date: 11-25-19
RAI Project No, 2019-082
Data Source: WDOE Water Quality Atlas

Raedeke Associates, Inc.
2111 N. Northgate Way, Ste. 219 Wetland Science
Seattle, WA 98133 Wildlife Biology
Phone 206-526-8122 Landscape Architecture

Wetland name or number WL - 2

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland 2 (Off-Site) Date of site visit: 10/31/19

Rated by K. Kosters Trained by Ecology? ✓ Yes ___No Date of training March 2014

HGM Class used for rating Riverine Wetland has multiple HGM classes? ✓ Y ____N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.
Source of base aerial photo/map Riverine

OVERALL WETLAND CATEGORY II (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

_____**Category IV** – Total score = 9 - 15

FUNCTION	Improving Water Quality			Hydrologic			Habitat			TOTAL
	Circle the appropriate ratings									
Site Potential	H	**M**	L	H	**M**	L	H	**M**	L	
Landscape Potential	**H**	M	L	H	**M**	L	H	M	**L**	
Value	**H**	M	L	**H**	M	L	**H**	M	L	
Score Based on Ratings	8			7			6			21

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	**I** **II**
Wetland of High Conservation Value	**I**
Bog	**I**
Mature Forest	**I**
Old Growth Forest	**I**
Coastal Lagoon	**I** **II**
Interdunal	**I** **II** **III** **IV**
None of the above	NA

Wetland name or number WL - 2

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	1
Hydroperiods	H 1.2	1
Ponded depressions	R 1.1	1
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	1
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	1
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	1
Map of the contributing basin	R 2.2, R 2.3, R 5.2	2
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	3
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	4
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	5

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

Wetland name or number WL - 2

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the 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.

Wetland name or number WL - 2

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 WL - 2

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

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

R 1.0. Does the site have the potential to improve water quality?		
R 1.1. Area of surface depressions within the Riverine wetland that can trap sediments during a flooding event: Depressions cover >$^{3}/_{4}$ area of wetland Depressions cover > ½ area of wetland Depressions present but cover < ½ area of wetland No depressions present	 points = 8 points = 4 points = 2 points = 0	2
R 1.2. Structure of plants in the wetland (areas with >90% cover at person height, **not** Cowardin classes) Trees or shrubs > $^{2}/_{3}$ area of the wetland Trees or shrubs > $^{1}/_{3}$ area of the wetland Herbaceous plants (> 6 in high) > $^{2}/_{3}$ area of the wetland Herbaceous plants (> 6 in high) > $^{1}/_{3}$ area of the wetland Trees, shrubs, and ungrazed herbaceous < $^{1}/_{3}$ area of the wetland	 points = 8 points = 6 points = 6 points = 3 points = 0	6
Total for R 1 Add the points in the boxes above		8

Rating of Site Potential If score is: ___**12-16 = H** ✓ **6-11 = M** ___**0-5 = L** *Record the rating on the first page*

R 2.0. Does the landscape have the potential to support the water quality function of the site?		
R 2.1. Is the wetland within an incorporated city or within its UGA?	Yes = 2 No = 0	2
R 2.2. Does the contributing basin to the wetland include a UGA or incorporated area?	Yes = 1 No = 0	1
R 2.3. Does at least 10% of the contributing basin contain tilled fields, pastures, or forests that have been clearcut within the last 5 years?	Yes = 1 No = 0	0
R 2.4. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants?	Yes = 1 No = 0	0
R 2.5. Are there other sources of pollutants coming into the wetland that are not listed in questions R 2.1-R 2.4 Other sources _____	Yes = 1 No = 0	0
Total for R 2 Add the points in the boxes above		3

Rating of Landscape Potential If score is: ✓ **3-6 = H** ___**1 or 2 = M** ___**0 = L** *Record the rating on the first page*

R 3.0. Is the water quality improvement provided by the site valuable to society?		
R 3.1. Is the wetland along a stream or river that is on the 303(d) list or on a tributary that drains to one within 1 mi?	Yes = 1 No = 0	1
R 3.2. Is the wetland along a stream or river that has TMDL limits for nutrients, toxics, or pathogens?	Yes = 1 No = 0	1
R 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? (*answer YES if there is a TMDL for the drainage in which the unit is found*)	Yes = 2 No = 0	2
Total for R 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 WL - 2

RIVERINE AND FRESHWATER TIDAL FRINGE WETLANDS

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

R 4.0. Does the site have the potential to reduce flooding and erosion?	
R 4.1. Characteristics of the overbank storage the wetland provides: *Estimate the average width of the wetland perpendicular to the direction of the flow and the width of the stream or river channel (distance between banks). Calculate the ratio: (average width of wetland)/(average width of stream between banks).* If the ratio is more than 20 points = 9 If the ratio is 10-20 points = 6 If the ratio is 5-<10 points = 4 If the ratio is 1-<5 points = 2 If the ratio is < 1 points = 1	4
R 4.2. Characteristics of plants that slow down water velocities during floods: *Treat large woody debris as forest or shrub. Choose the points appropriate for the best description (polygons need to have >90% cover at person height. These are NOT Cowardin classes).* Forest or shrub for > $^1/_3$ area OR emergent plants > $^2/_3$ area points = 7 Forest or shrub for > $^1/_{10}$ area OR emergent plants > $^1/_3$ area points = 4 Plants do not meet above criteria points = 0	7
Total for R 4 Add the points in the boxes above	11

Rating of Site Potential If score is: ___ **12-16 = H** ✓ **6-11 = M** ___ **0-5 = L** *Record the rating on the first page*

R 5.0. Does the landscape have the potential to support the hydrologic functions of the site?	
R 5.1. Is the stream or river adjacent to the wetland downcut? Yes = 0 No = 1	0
R 5.2. Does the up-gradient watershed include a UGA or incorporated area? Yes = 1 No = 0	1
R 5.3. Is the up-gradient stream or river controlled by dams? Yes = 0 No = 1	1
Total for R 5 Add the points in the boxes above	2

Rating of Landscape Potential If score is: ___ **3 = H** ✓ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

R 6.0. Are the hydrologic functions provided by the site valuable to society?	
R 6.1. Distance to the nearest areas downstream that have flooding problems? *Choose the description that best fits the site*. The sub-basin immediately down-gradient of the wetland has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) points = 2 Surface flooding problems are in a sub-basin farther down-gradient points = 1 No flooding problems anywhere downstream points = 0	2
R 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 R 6 Add the points in the boxes above	2

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

Wetland name or number WL - 2

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.*

____Aquatic bed	4 structures or more: points = 4
____Emergent	3 structures: points = 2
✓ Scrub-shrub (areas where shrubs have > 30% cover)	2 structures: points = 1
✓ Forested (areas where trees have > 30% cover)	1 structure: points = 0

If the unit has a Forested class, check if:

____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

1

H 1.2. Hydroperiods

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*).

____Permanently flooded or inundated	4 or more types present: points = 3
____Seasonally flooded or inundated	3 types present: points = 2
____Occasionally flooded or inundated	2 types present: points = 1
✓ Saturated only	1 type present: points = 0
____Permanently flowing stream or river in, or adjacent to, the wetland	
✓ Seasonally flowing stream in, or adjacent to, the wetland	
____**Lake Fringe wetland**	**2 points**
____**Freshwater tidal wetland**	**2 points**

1

H 1.3. Richness of plant species

Count the number of plant species in the wetland that cover at least 10 ft^2.

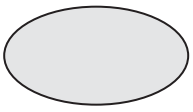
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

If you counted: > 19 species	points = 2
5 - 19 species	points = 1
< 5 species	points = 0

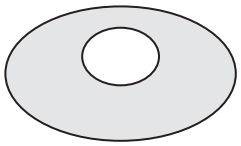
1

H 1.4. Interspersion of habitats

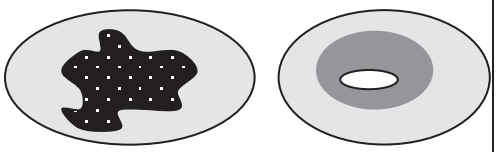
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points

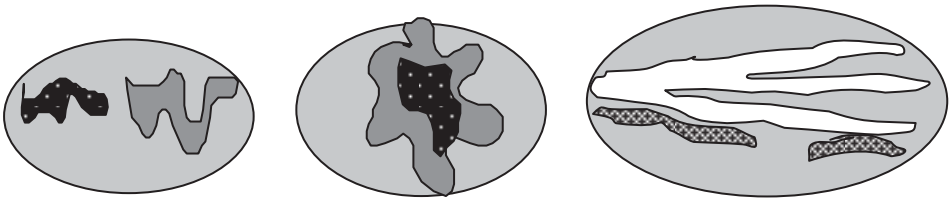


Low = 1 point



Moderate = 2 points

All three diagrams in this row are **HIGH** = 3points



2

Wetland name or number WL - 2

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ✓ Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ✓ Standing snags (dbh > 4 in) within the wetland ✓ 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) ____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)* ____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)* ____Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	3
Total for H 1 Add the points in the boxes above	8

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 functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** 4 % If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat___ **+** [(% moderate and low intensity land uses)/2]___ **=** _____% Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	1
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km 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.* Site meets ANY of the following criteria: points = 2 ✓ It has 3 or more priority habitats within 100 m (see next page) — It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) — It is mapped as a location for an individual WDFW priority species — It is a Wetland of High Conservation Value as determined by the Department of Natural Resources — 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 Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	2

Rating of Value If score is: ✓ **2 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number WL - 2

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.

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 WL - 2

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	Category
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt 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? Yes = **Category I** No - Go to **SC 1.2**	**Cat. I**
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? — 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) — 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 has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes – Go to **SC 2.2** No – Go to **SC 2.3** SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes = **Category I** No = **Not a WHCV** SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes – **Contact WNHP/WDNR and go to SC 2.4** No = **Not a WHCV** 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? Yes = **Category I** No = **Not a WHCV**	**Cat. I**
SC 3.0. Bogs 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.*** 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? Yes – Go to **SC 3.3** No – Go to **SC 3.2** 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? Yes – Go to **SC 3.3** No = **Is not a bog** 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? Yes = **Is a Category I bog** No – Go to **SC 3.4** **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. 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? Yes = **Is a Category I bog** No = **Is not a bog**	**Cat. I**

Wetland name or number WL - 2

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**	**Cat. I**
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**	**Cat. I** **Cat. 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**	**Cat I** **Cat. II** **Cat. III** **Cat. IV**
Category of wetland based on Special Characteristics If you answered No for all types, enter "Not Applicable" on Summary Form	NA

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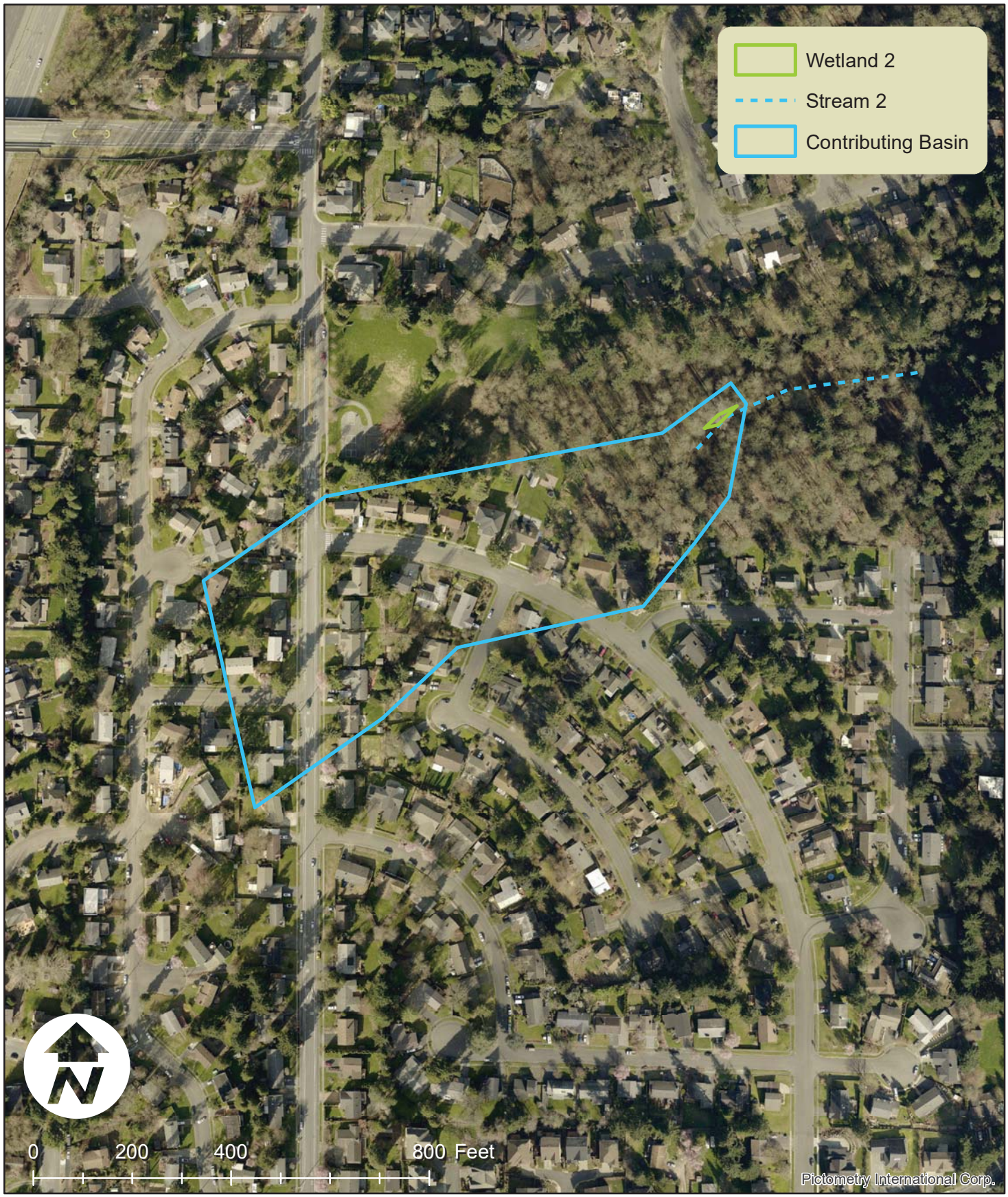
Westside Park Redmond - Wetland 1
2014 WDOE Rating

Figure 1

Questions: R1.1, R1.2, R2.2 R2.3, R2.4, R4.1, R4.2, H1.1, H1.2, H1.4

Date: 11-25-19
RAI Project No, 2019-082
Data Source: King County 2015 Aerial Imagery
Projection: NAD_1983_HARN_StatePlane_Washington_North_FIPS_4601_Feet

Raedeke Associates, Inc.
2111 N. Northgate Way, Ste. 219 Seattle, WA 98133 Phone 206-526-8122
Wetland Science
Wildlife Biology
Landscape Architecture



Westside Park Redmond - Wetland 1
2014 WDOE Rating

Figure 2

Date: 11-25-19
RAI Project No, 2019-082
Data Source: King County 2015 Aerial Imagery
Projection: NAD_1983_HARN_StatePlane_Washington_North_FIPS_4601_Feet
USGS StreamStat Database

Questions: R2.2, R2.3, R5.2

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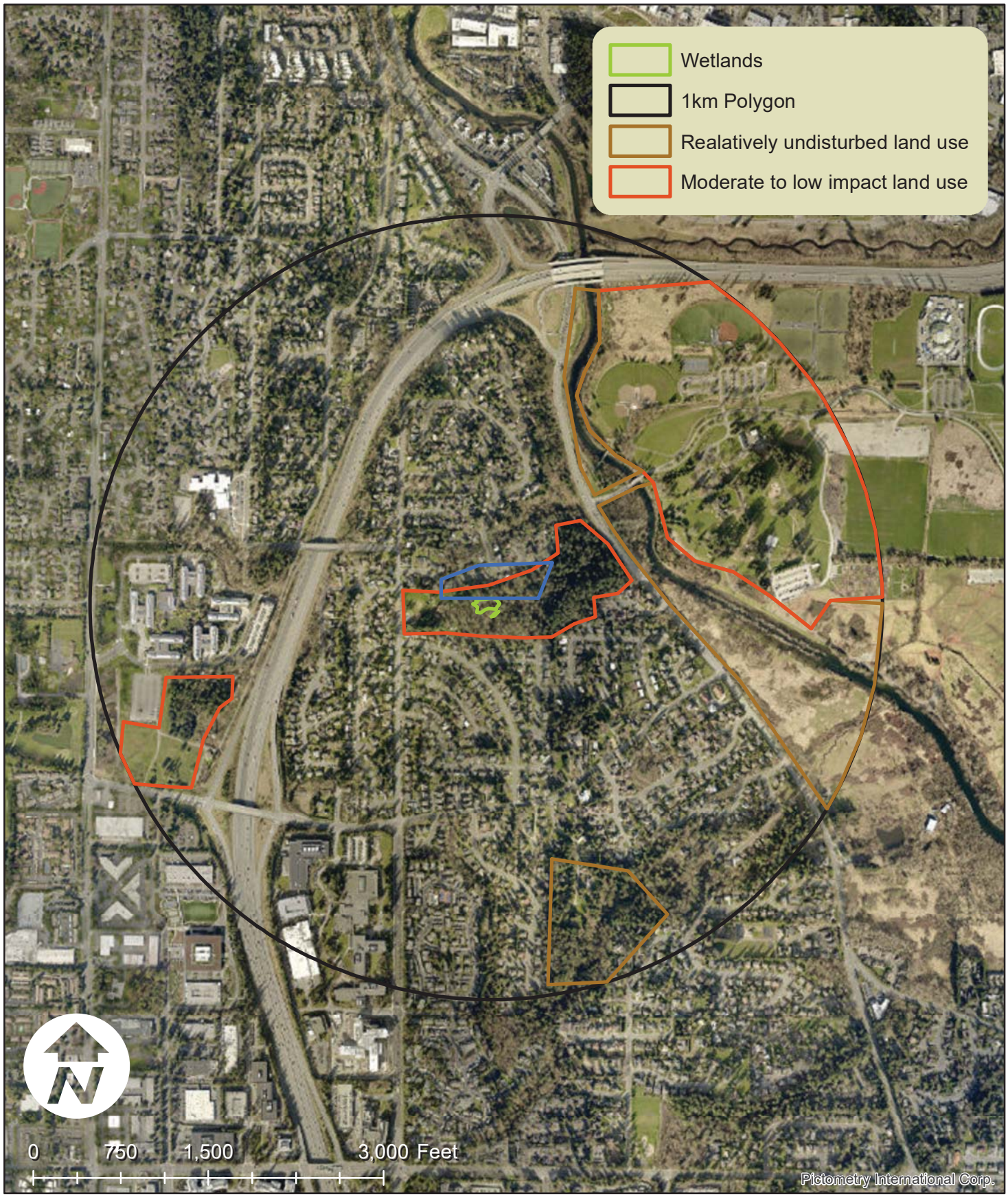
Wildlife Biology
Landscape Architecture



Westside Park Redmond - Wetland 2
2014 WDOE Rating

Figure 3
Questions: H2.1, H2.2, H2.3

Date: 11-25-19
RAI Project No, 2019-082
Data Source: King County 2015 Aerial Imagery
Projection: NAD_1983_HARN_StatePlane_Washington_North_FIPS_4601_Feet

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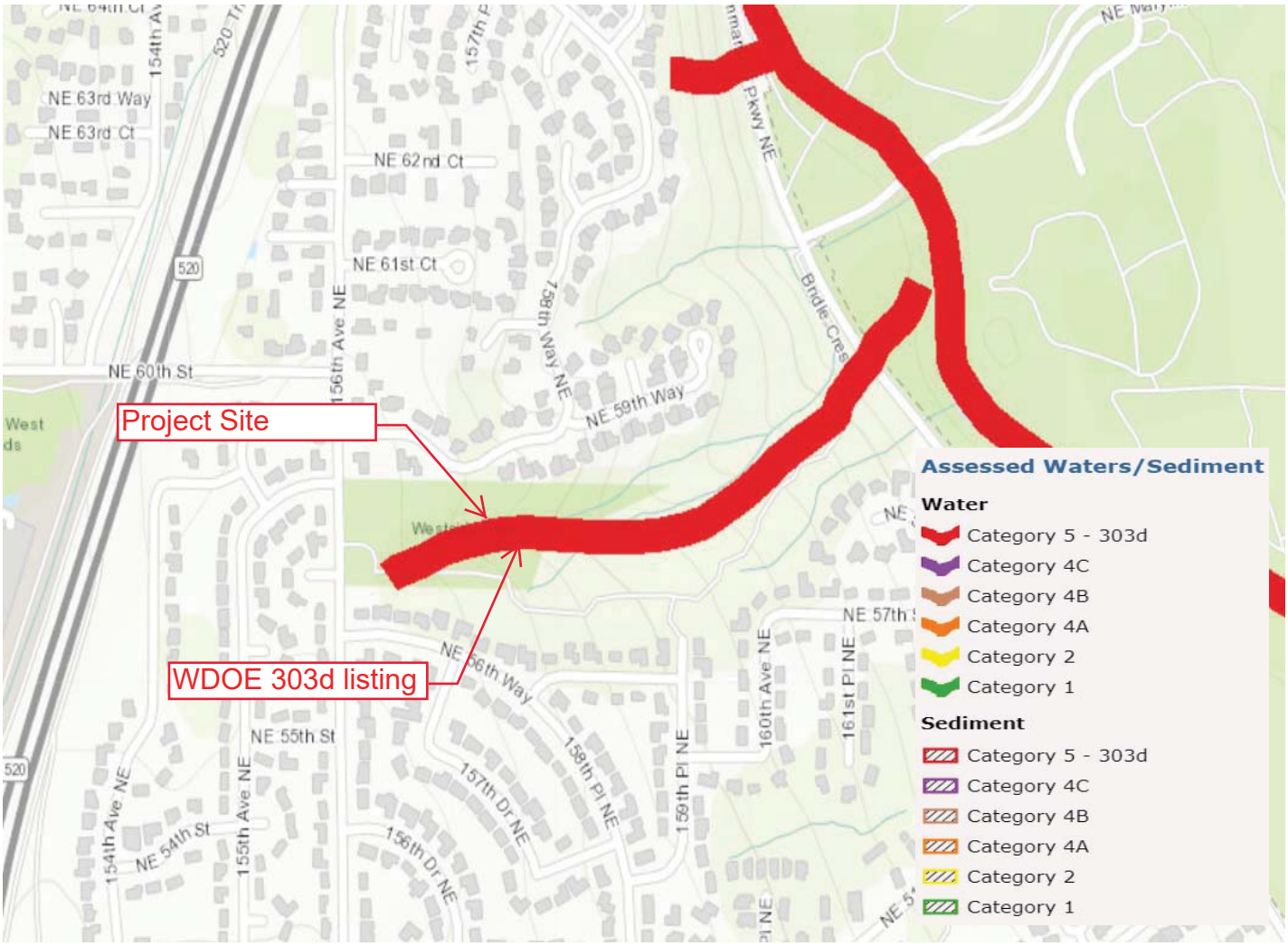
Wildlife Biology
Landscape Architecture



Westside Park Redmond - Wetland 2
2014 WDOE Rating

Figure 4
Questions: R3.1, R3.2

Date: 11-25-19
RAI Project No, 2019-082
Data Source: WDOE Water Quality Atlas

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Seattle, WA 98133 Wildlife Biology
Phone 206-526-8122 Landscape Architecture

Westside Park Redmond - Wetland 2
2014 WDOE Rating

Figure 5
Questions: R3.3

Date: 11-25-19
RAI Project No, 2019-082
Data Source: WDOE Water Quality Atlas

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Seattle, WA 98133 Wildlife Biology
Phone 206-526-8122 Landscape Architecture

APPENDIX C

Geologic Report

associated
earth sciences
incorporated

Subsurface Exploration, Infiltration Feasibility,
Geologic Hazard, and Geotechnical Engineering Report

WESTSIDE PARK

Redmond, Washington

Prepared For:

BOARD AND VELLUM

Project No. 20190366H001
April 24, 2020

Associated Earth Sciences, Inc.
911 5th Avenue
Kirkland, WA 98033
P (425) 827 7701

associated earth sciences incorporated

April 24, 2020
Project No. 20190366H001

Board and Vellum
115 15th Avenue East, Suite 100
Seattle, Washington 98112

Attention: Ms. Leslie Batten and Mr. Zack Thomas

Subject: Subsurface Exploration, Infiltration Feasibility,
Geologic Hazard, and Geotechnical Engineering Report
Westside Park
Redmond, Washington

Dear Ms. Batten and Mr. Thomas:

We are pleased to present the enclosed copies of the above-referenced report. This report summarizes the results of our subsurface exploration, infiltration feasibility, geologic hazard, and geotechnical engineering studies and offers recommendations for the design and development of the proposed project. This report updates our previous draft report dated January 23, 2020 based on current project plans.

We have enjoyed working with you on this study and are confident that the recommendations presented in this report will aid in the successful completion of your project. If you should have any questions, or if we can be of additional help to you, please do not hesitate to call.

Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

Jennifer H. Saltonstall, L.G., L.Hg.
Principal Geologist/Hydrogeologist

JHS/ld - 20190366H001-3

SUBSURFACE EXPLORATION, INFILTRATION FEASIBILITY, GEOLOGIC HAZARD, AND GEOTECHNICAL ENGINEERING REPORT

WESTSIDE PARK

Redmond, Washington

Prepared for:
Board and Vellum
115 15th Ave E. Suite 100,
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April 24, 2020
Project No. 20190366H001

I. PROJECT AND SITE CONDITIONS

1.0 INTRODUCTION

This report presents the results of Associated Earth Sciences, Inc.'s (AESI's) subsurface exploration, infiltration feasibility, geologic hazard, and geotechnical engineering study for the proposed upland improvements at Westside Park, in Redmond, Washington (Figure 1). The approximate locations of the explorations accomplished for this study are presented on the "Existing Site and Exploration Plan," Figure 2. We were provided a current project site plan dated April 20, 2020 by the project architects Board and Vellum (Figure 3). If significant changes are made to the current project plans, we recommend that the conclusions and recommendations contained in this report be reviewed and modified, or verified, as necessary.

1.1 Purpose and Scope

The purpose of this study was to assess infiltration feasibility and provide geotechnical engineering recommendations to be utilized in the design of the project. This study included a review of selected available geologic literature, observation of four exploration borings and one well completion, geologic reconnaissance of the on-site ravine, and performing geologic studies to assess the type, thickness, distribution, and physical properties of the subsurface sediments and depth of shallow groundwater. Geotechnical engineering studies were completed to establish recommendations for the type of suitable foundations and floors, allowable foundation soil bearing pressure, anticipated foundation and floor settlement, and drainage considerations. This report summarizes our fieldwork, and offers recommendations based on our present understanding of the project. We recommend that we be allowed to review the recommendations presented in this report, and revise them, if needed, prior to finalization of the project plans.

1.2 Authorization

Written authorization to proceed with this study was granted by means of a Subconsultant Agreement with Board and Vellum, dated October 25, 2019. Our study was accomplished in general accordance with our proposal. This report has been prepared for the exclusive use of Board and Vellum, and its agents, for specific application to this project. Within the limitations of scope, schedule, and budget, our services have been performed in accordance with generally accepted geotechnical engineering and engineering geology practices in effect in this area at the time our report was prepared. No other warranty, express or implied, is made.

2.0 PROJECT AND SITE DESCRIPTION

The subject site is Westside Park, located at 5810 156th Avenue NE in Redmond, Washington (King County Parcel No. 142505-9039), and is a park with an approximate area of 6½ acres. The upland, western portion of the park is developed with lawns, scattered evergreen and deciduous trees, and a paved playground and sport court area with a paved access path. The eastern portion of the parcel is generally forested, with an unpaved trail passing through the forest. The site is generally bordered to the north and south by single-family residences, to the west by 156th Avenue NE, and to the east by forested area.

The upland portion of the property slopes generally easterly to the top of a forested ravine, which slopes down to the east. At the bottom of the ravine is Clise Creek. The upland portion of the property ranges from elevations of approximately 272 feet to the south and west sides, to elevations of approximately 220 feet near the center of the site. The ravine ranges from elevations of approximately 260 feet on the upland to the west, to elevations of approximately 130 feet in the ravine on the northeastern edge of the site.

We understand that the proposed project will include new day-use facilities generally situated in the upland portion of the park, along with reconfigured access, improvements to a natural turf playfield, new playground areas and a sport court, and trails. The referenced site plan shows a proposed picnic shelter near the west property boundary. We have assumed that light to moderate foundation loads typical of wood-frame construction will be required for the picnic shelter. Stormwater will be managed in various ways including a playfield underdrain system that discharges to a dispersion trench and a sport court trench drain system that discharges to a bioretention cell. The bioretention cell is planned near the southeast extent of the upland park area, near the top of the slopes at the western end of the ravine. The bioretention cell is roughly rectangular in plan view, with bottom dimensions ranging from approximately 4 to 9 feet wide by 65 feet long. The sport court trench drain system, the bioretention cell, and other stormwater drain systems outlet for dispersion over the moderate slopes at the west end of the ravine. Minor cuts and fills are planned in areas, such as for the bioretention cell and along portions of the new trails. Should actual project design differ significantly from our current understanding, AESI should be allowed to review this report, and revise the recommendations, as appropriate.

3.0 SUBSURFACE EXPLORATION

Our field study included drilling a series of four exploration borings to gain subsurface information about the site. The various types of sediments, as well as the depths where characteristics of the sediments changed, are indicated on the exploration logs presented in the Appendix. The depths indicated on the logs where conditions changed may represent gradational variations between sediment types in the field. Our explorations were approximately located in the field relative to known site features shown on the topographic site plan. The approximate locations of the explorations are shown on Figure 2.

The conclusions and recommendations presented in this report are based, in part, on the exploration borings completed for this study. The number, locations, and depths of the explorations were completed within site and budgetary constraints. Because of the nature of exploratory work below ground, interpolation of subsurface conditions between field explorations is necessary. It should be noted that differing subsurface conditions may sometimes be present due to the random nature of deposition and the alteration of topography by past grading and/or filling. The nature and extent of variations between the field explorations may not become fully evident until construction. If variations are observed at that time, it may be necessary to re-evaluate specific recommendations in this report and make appropriate changes.

3.1 Exploration Borings

For this study, the exploration borings were completed by advancing an 8-inch, outside-diameter, hollow-stem auger using a rubber track-mounted limited-access drill. During the drilling process, samples were generally obtained at 2½- to 5-foot-depth intervals. The borings were continuously observed and logged by a geologist from our firm. The exploration logs presented in the Appendix are based on the field logs, drilling action, and observation of the samples collected.

Disturbed, but representative samples were obtained by using the Standard Penetration Test (SPT) procedure in accordance with *ASTM International* (ASTM) D-1586. This test and sampling method consists of driving a standard 2-inch, outside-diameter, split-barrel sampler a distance of 18 inches into the soil with a 140-pound hammer free-falling a distance of 30 inches. The number of blows for each 6-inch interval is recorded, and the number of blows required to drive the sampler the final 12 inches is known as the Standard Penetration Resistance ("N") or blow count. If a total of 50 is recorded within one 6-inch interval, the blow count is recorded as the number of blows for the corresponding number of inches of penetration. The resistance, or

N-value, provides a measure of the relative density of granular soils or the relative consistency of cohesive soils; these values are plotted on the attached exploration boring logs.

The samples obtained from the split-barrel sampler were classified in the field and representative portions placed in watertight containers. The samples were then transported to our laboratory for further visual classification and laboratory testing, as necessary.

3.2 Monitoring Well

The monitoring well, EB-1W, was drilled with a subcontracted Diedrich D-50 turbo drill rig, operated by Advance Drill Technologies, Inc. The borehole was drilled using an 8-inch outside-diameter hollow-stem auger, and the well was completed as a 2-inch inside-diameter, Schedule 40, polyvinyl chloride (PVC) monitoring well with 10 feet of 0.020-inch machine-slotted well screen installed from 59.5 to 69.5 feet below ground surface. The annular space around the well screen was backfilled with clean, 10-20 graded sand, and the upper portion of annulus was sealed with bentonite chips and bentonite grout. A flush-mount, locking, steel well monument was installed over the monitoring well. The as-built configuration of the well is illustrated on the boring log (Appendix).

The monitoring well EB-1W was developed by flushing with water to provide a good hydraulic connection between the monitoring well and the surrounding formation. Well development was conducted by surging for approximately 30 minutes with water pumped down a rigid PVC pipe to move water through the well screen and sand filter pack, and mobilize the fine-grained sediments from the well-bore skin.

4.0 SUBSURFACE CONDITIONS

Subsurface conditions at the project site were inferred from the field explorations accomplished for this study, our visual reconnaissance of the site, and review of selected applicable geologic literature. As shown on the exploration logs, the exploration borings generally encountered topsoil and/or fill over dense glacial sediments. “Hydrogeologic Cross-Section A-A’ “ and “ Longitudinal Stream Profile B-B’ “ summarize surface and subsurface geology relative to topography, and are presented as Figure 4 and Figure 5. The following section presents more detailed subsurface information organized from the youngest to the oldest sediment types.

Because of the nature of exploratory work below ground, extrapolation of subsurface conditions between field explorations is necessary. It should be noted that differing subsurface conditions may sometimes be present due to the random nature of deposition and the

alteration of topography by past grading and/or filling. The nature and extent of any variations between the field explorations may not become fully evident until construction begins.

4.1 Stratigraphy

Topsoil

An organic topsoil layer was encountered at the ground surface at exploration borings EB-1W through EB-4. The thickness of the topsoil layer observed in our explorations ranged from approximately 1 foot in EB-1W to approximately 3 inches in EB-4. The organic topsoil is not suitable for foundation support, pavement subgrades, or for use in a structural fill.

Fill

Sediment interpreted as artificially placed fill was encountered below the topsoil to a depth of approximately 4 feet in EB-2 and 6 feet in EB-3, both generally in the southern portion of the park area near the ravine. Fill soils are likely present in unexplored areas of the site, such as in existing utility trench areas and at previously graded areas. Existing fill soils are likely variable in density and composition and not suitable for structural support. Excavated existing fill material may be suitable for reuse in structural fill applications if such reuse is specifically allowed by project plans and specifications, if excessively organic and any other deleterious materials are removed, and if moisture content is adjusted to allow compaction to the specified level and to a firm and unyielding condition. Existing fill is not considered suitable for infiltration of stormwater runoff due to its high variability.

Vashon Lodgement Till

Sediments encountered in EB-1W and EB-4 below the surficial topsoil, generally consisted of dense, unsorted silty sand with some gravel, and extended to a depth of approximately 12 feet in EB-4 and 7 feet in EB-1W. We interpret these sediments to be representative of Vashon lodgement till. The Vashon lodgement till was deposited directly from basal, debris-laden glacial ice during the Vashon Stade of the Fraser Glaciation approximately 12,500 to 15,000 years ago. Vashon lodgement till is suitable for support of structural loads and pavement subbase when prepared as recommended in this report. Vashon lodgement till is not suitable as a receptor horizon for stormwater infiltration.

Vashon Advance Outwash

Below the lodgement till observed in exploration boring EB-1W, we obtained one sample at 10 feet of massive fine to medium sand, with some silt, tentatively interpreted as Vashon

advance outwash. No other sediments interpreted as advance outwash were observed in any of our other explorations onsite. Advance outwash was deposited by meltwater streams from an advancing ice sheet. Vashon advance outwash is suitable for support of structural loads and pavement subbase when prepared as recommended in this report. Due to the limited thickness and lateral extent, the Vashon advance outwash sediments observed in EB-1W are not suitable as a receptor horizon for stormwater infiltration.

Pre-Fraser Fine-Grained Deposits

All four exploration borings encountered very stiff to hard, generally stratified silt interpreted as pre-Fraser fine-grained deposits which extended below the maximum depths explored in EB-2 through EB-4, and to approximately 51 feet in EB-1W. The upper portion was weathered to a medium stiff condition in EB-2 and EB-3. In EB-1W, near the base of the unit, occasional stratified layers ranged to fine to medium sand with trace silt, and unsorted deposits of silty fine sand were present. Occasional oxidized layers were observed. Pre-Fraser fine-grained deposits are interpreted to have formed in a lake setting prior to the Vashon Stade of the Fraser Glaciation and subsequently compacted by the weight of the overlying glacial ice. The very stiff to hard, unweathered material is generally considered suitable for support of light to heavily loaded foundations when in an intact, undisturbed condition, but is not suitable as a receptor horizon for stormwater infiltration.

Pre-Fraser Coarse-Grained Deposits

Below the pre-Fraser fine-grained deposits in EB-1W at 51 feet, we encountered very dense, generally massive, gray, fine to medium sand with trace silt ranging to silty sand, which extended below the maximum depth explored of 71.5 feet. At the time of exploration, these sediments were saturated from 55 feet below ground surface. Occasional oxidized layers were observed. The pre-Fraser coarse-grained sediments were deposits by flowing water prior to the Vashon Stade of the Fraser Glaciation and subsequently compacted by the weight of the overlying glacial ice.

Published Geologic Map

Review of the regional geologic map titled *Geologic Map of the Kirkland Quadrangle, Washington* (1983, J.P. Minard, U.S. Geological Survey [USGS], scale 1:100,000) indicates that the sediment underlying the upper portion of the site to be Vashon till (Qgt), with Vashon advance outwash (Qva) and pre-Fraser fine-grained sediments mapped outcropping in the slopes of the ravine and on the slope east of the site. Our interpretation of the sediments encountered at the project site is in general agreement with the published geologic mapping of the site and vicinity.

4.2 Hydrology

We encountered groundwater at approximately 55 feet below ground surface, in the pre-Fraser coarse-grained sediments in EB-1W at the time of exploration. We observed several layers of oxidation in between stratified layers in the pre-Fraser fine-grained sediments at shallower depths, which may be caused by water perching at these depths. We expect groundwater seepage across much of the site at shallower depths to be limited to interflow. Interflow occurs when surface water percolates down through the surficial weathered or higher-permeability sediments and becomes perched atop underlying, lower-permeability sediments. It should be noted that the occurrence and level of groundwater seepage at the site may vary in response to such factors as changes in season, precipitation, and site use.

5.0 GEOLOGIC RECONNAISSANCE

AESI completed a geologic reconnaissance to observe the ravine on and near the site. The geologic reconnaissance was completed to obtain geomorphic information along the ravine, observe and measure the condition of any incised channel where present, observe any sources of groundwater seepage, and observe any visible outcrops within the ravine. During the geologic reconnaissance, AESI also observed landform features for visual indications of slope failure. Several features observed during our geologic reconnaissance are indicated on Figure 5, "Longitudinal Stream Profile B-B'."

Within the upper portion of the ravine, west of the existing trail, we observed subsidence in the base of the ravine, over a buried approximately 4-inch-diameter white PVC pipe. We observed no incised channel in the upper portion of the ravine, and, traveling downslope from the upper portion of the ravine, first observed an incised channel at an elevation of approximately 220 feet. Where first observed, this incised channel was dry. No water was observed within the base of the ravine above an elevation of approximately 180 feet. At and below an elevation of approximately 180 feet, the base of the ravine widened, and AESI observed soft, wet sediments across the base of the ravine. AESI interprets this water as representative of groundwater seepage.

At an elevation of approximately 160 to 170 feet, AESI observed an outcrop of fine-grained sediments. These fine-grained sediments are interpreted to stratigraphically underlie the coarse-grained sediments encountered in the lower portion of EB-1, as shown on Figure 5.

Slopes within the ravine generally became steeper to the east. Offsite to the east of the site, AESI observed evidence of landslide activity in the slopes of the ravine. AESI observed no evidence of landslide activity in the upper portion of the ravine, west of the existing trail.

II. GEOLOGIC HAZARDS AND MITIGATIONS

The following discussion of potential geologic hazards is based on the geologic, slope, and shallow groundwater conditions as observed and discussed herein.

6.0 LANDSLIDE HAZARDS AND MITIGATION

The gently sloping upland area of the site is not mapped by the City of Redmond as a Landslide Susceptible Area on the *Landslide Hazard* map (2016). The slopes on the upland area do not meet the definition of landslide hazards.

A portion of the incised ravine on the east side of the site is mapped by the City of Redmond as a Landslide Susceptible Area on the *Landslide Hazard* map (2016). Some slopes within the ravine onsite meet the definition of steep slopes. The *City of Redmond Zoning Code* (RZC) 21.64 defines landslide hazard areas as follows:

1. Areas of historic failures, such as:
    a. Areas designated as quaternary slumps of landslides on maps published by the United States Geologic Survey (USGS); or
    b. Those areas designated by the United States Department of Agriculture (USDA) Soil Conservation Service (SCS) as having a "severe" limitation for building site development;
2. Areas containing a combination of slopes steeper than 15 percent, springs or groundwater seepage, and hillsides intersecting geologic contacts with a relatively permeable sediment overlying a relatively impermeable sediment or bedrock;
3. Areas that have shown movement during the Holocene Epoch (from 10,000 years ago to the present) or which are underlain or covered by mass wastage debris of that epoch;
4. Slopes that are parallel or subparallel to planes of weakness in subsurface materials;
5. Slopes having gradients steeper than 80 percent subject to rockfall during seismic shaking;
6. Areas potentially unstable as a result of rapid stream incision, stream bank erosion, and undercutting by wave action; or
7. Any area with a slope 40 percent or steeper with a vertical relief of 10 feet or more.

The ravine slopes west of the existing trail range to approximately 14 feet in height with inclinations typically varying from approximately 25 percent near EB-2 and EB-3, with small portions of the slope ranging to 40 percent closer to the trail. East of the trail, onsite, the slopes

range to approximately 60 feet high, with slopes of up to approximately 70 percent. These slope inclinations and heights classify these slopes as a Landslide Hazard Area according to the *Redmond Municipal Code* (RMC) where the slopes are over 40 percent. During our reconnaissance, we observed evidence of past landslide activity on the slopes within the ravine north and east of the site, in areas where slopes of up to 70 percent are present.

The western end of the ravine next to EB-2 and EB-3 (Figure 2), where slopes are approximately 25 percent, does not present a landslide hazard per the RZC. The subject slopes in the upper portion of the ravine do not exhibit indications of past or present shallow- or deep-seated earth movement other than normal soil creep commonly observed on slopes in this area. Soil creep is the gradual, non-episodic, downslope movement of weathered soil on slopes due to gravity.

Per RZC 21.64 the prescribed buffer for a landslide hazard area is 50 feet. Due to the limited nature of the ravine slopes near EB-2 and EB-3, the lack of evidence of historic slope movement, the high density of the native soils that core the slopes, and the lack of persistent groundwater seepage in the upper portion of the ravine, we recommend that the buffers be reduced to the allowed minimum of 15 feet in the upper portion of the ravine west of the existing path.

6.1 Proposed Development

Based on the explorations, document review, and site reconnaissance conducted for this study, it is AESI's opinion that a minimum 15-foot combined buffer/building setback from the top of the ravine slopes near EB-2 and EB-3 should provide a suitable buffer to protect future structures and associated improvements at this time. The top of slope shall be defined by where the grade breaks from the gently sloped park area into the ravine.

Logging, clearing, and placement of ancillary structures or landscaping features (cuts and fills no greater than 1 foot in height) to within 15 feet of the top of the ravine slope may be conducted. Logging, clearing, cutting, and filling are not recommended on steep slopes themselves. All stormwater from impervious surfaces should not discharge directly onto steep slopes. Surface water drainage should be directed away from the slopes, discharged through a stormwater system designed in accordance with RZC, or tightlined to the bottom of the slopes. Further recommendations are discussed in the "Drainage Considerations" section of this report. The steep slopes at the site were vegetated with native underbrush. This vegetation serves to protect the face of the slopes from soil erosion. We recommend that this vegetation remain in place to provide root support for the near-surface soils along the slopes.

It is our opinion that the risk of landslides, debris flows, or slope erosion affecting the proposed improvements is low if the above recommendations are followed and proposed upland structures are kept back the recommended 15 feet or more from the top of slope. For the upland improvements, no other geologic hazard mitigation efforts are anticipated other than those required under current building codes.

7.0 SEISMIC HAZARDS AND MITIGATIONS

Earthquakes occur in the Puget Lowland with great regularity. The vast majority of these events are small and are usually not felt by people. However, large earthquakes do occur, as evidenced by the 1949, 7.2-magnitude event; the 1965, 6.5-magnitude event; and the 2001, 6.8-magnitude event. The 1949 earthquake appears to have been the largest in this region during recorded history and was centered in the Olympia area. Evaluation of earthquake return rates indicates that an earthquake of the magnitude between 5.5 and 6.0 is likely within a given 20-year period.

Generally, there are four types of potential geologic hazards associated with large seismic events: 1) surficial ground rupture, 2) seismically induced landslides, 3) liquefaction, and 4) ground motion. The potential for each of these hazards to adversely impact the proposed project is discussed below.

7.1 Surficial Ground Rupture

The nearest known fault trace to the project site is the South Whidbey Island Fault Zone (SWIFZ) located approximately 10 miles to the east.

A 2005 study by the USGS (Sherrod et al., 2005) reported that “strong” evidence of prehistoric earthquake activity has been observed along two fault strands thought to be part of the southeastward extension of the SWIFZ. The study suggests as many as nine earthquake events along the SWIFZ may have occurred within the last 16,400 years. The recognition of this fault splay is relatively new, and data pertaining to it are limited. The recurrence interval of movement along this fault system is still unknown, although it is hypothesized to be in excess of one thousand years.

Due to the suspected long recurrence intervals for this fault zone, the potential for surficial ground rupture is considered to be low during the expected life of the proposed structures.

7.2 Seismically Induced Landslides

Due to the field and subsurface observations noted in Section 5.0, and the medium dense to dense or medium stiff to hard characteristics of the native soils encountered in our explorations, it is our opinion that the risk of seismically induced landslides affecting the proposed upland structures is low if the recommendations in this report are followed and proposed upland structures are kept back the recommended 15 feet or more from the top of slope.

7.3 Liquefaction

It is our opinion that the risk of damage to the proposed structures by liquefaction is low due to the high relative density of the underlying sediments, and the lack of adverse groundwater conditions. No mitigation of liquefaction hazards is recommended for the project.

7.4 Ground Motion

Structural design of the buildings should follow 2015 *International Building Code* (IBC) standards using Site Class "D" as defined in Table 20.3-1 of *American Society of Civil Engineers* (ASCE) *7 – Minimum Design Loads for Buildings and Other Structures*.

8.0 EROSION HAZARDS AND MITIGATIONS

The on-site sediments contain a high percentage of silt and fine sand and are sensitive to erosion. In order to control erosion and reduce the amount of sediment transport off the site during construction, the following recommendations should be followed:

1. Construction activity should be scheduled or phased as much as possible to reduce the amount of earthwork activity that is performed during the winter months.

2. The winter performance of a site is dependent on a well-conceived plan for control of site erosion and stormwater runoff. The project temporary erosion and sediment control (TESC) plan should include ground-cover measures, access roads, and staging areas. The contractor must implement and maintain the required measures. A site maintenance plan should be in place in the event stormwater turbidity measurements are greater than the Washington State Department of Ecology (Ecology) standards.

3. TESC measures for a given area to be graded or otherwise worked should be installed soon after ground clearing. The recommended sequence of construction within a given

area after clearing would be to install sediment traps and/or ponds and establish perimeter flow control prior to starting mass grading.

4. During the wetter months of the year, or when large storm events are predicted during the summer months, each work area should be stabilized so that if showers occur, the work area can receive the rainfall without excessive erosion or sediment transport. The required measures for an area to be "buttoned-up" will depend on the time of year and the duration the area will be left unworked. During the winter months, areas that are to be left unworked for more than 2 days should be mulched or covered with plastic. During the summer months, stabilization will usually consist of seal-rolling the subgrade. Such measures will aid in the contractor's ability to get back into a work area after a storm event. The stabilization process also includes establishing temporary stormwater conveyance channels through work areas to route runoff to the approved treatment facilities.

5. All disturbed areas should be revegetated as soon as possible. If it is outside of the growing season, the disturbed areas should be covered with mulch, as recommended in the erosion control plan. Straw mulch provides a cost-effective cover measure and can be made wind-resistant with the application of a tackifier after it is placed.

6. Surface runoff and discharge should be controlled during and following development. Uncontrolled discharge may promote erosion and sediment transport.

7. Soils that are to be reused around the site should be stored in such a manner as to reduce erosion from the stockpile. Protective measures may include, but are not limited to, covering with plastic sheeting, the use of low stockpiles in flat areas, or the use of silt fences around pile perimeters.

8. On-site erosion control inspections and turbidity monitoring (when required) should be performed in accordance with Ecology requirements. Weekly and monthly reporting to Ecology should be performed on a regularly-scheduled basis. Temporary and permanent erosion control and drainage measures should be adjusted and maintained, as necessary, for the duration of project construction.

It is our opinion that with the proper implementation of the TESC plans and by field-adjusting appropriate mitigation elements (best management practices [BMPs]) throughout construction, as recommended by the erosion control inspector, the potential adverse impacts from erosion hazards on the project may be mitigated.

III. DESIGN RECOMMENDATIONS

9.0 INTRODUCTION

Our exploration indicates that, from a geotechnical standpoint, the parcel is suitable for the proposed improvements provided the recommendations contained herein are properly followed. The foundation bearing stratum is relatively shallow and conventional spread footing foundations may be utilized. Consequently, foundations bearing on either the medium dense to dense, or medium stiff to hard, natural glacial sediments or on structural fill placed over these sediments are capable of providing suitable building support. Infiltration is not considered feasible.

10.0 SITE PREPARATION

Plans show relatively minor cuts and fills will be needed to achieve final grades for project features such as the bioretention cell, play area, and pathways. Our earthwork recommendations are presented in the following sections.

10.1 Clearing and Stripping

Site preparation of the planned building areas should include removal of all trees, brush, debris, and any other deleterious materials. These unsuitable materials should be properly disposed of offsite. Additionally, all organic topsoil within proposed building areas, or areas to receive structural fill should be removed and the remaining roots grubbed. Areas where loose surficial soils exist due to grubbing operations should be considered as fill to the depth of disturbance and treated as subsequently recommended for structural fill placement. Any existing fill soils below foundation, slab, pavement, or structural fill areas should be stripped down to the underlying, medium dense to dense natural sediments.

10.2 Temporary and Permanent Slopes

In our opinion, stable construction slopes should be the responsibility of the contractor and should be determined during construction based on the local conditions encountered at that time. For estimating purposes, however, we anticipate that temporary, unsupported cut slopes in the existing fill or weathered till can be made at a maximum slope of 1.5H:1V (Horizontal:Vertical) or flatter. Temporary, unsupported cut slopes within the underlying dense/hard natural sediments can be planned up to a 1H:1V inclination.

Permanent cut and structural fill slopes should not exceed an inclination of 2H:1V. Permanent non-structural landscape fill should not exceed a 3H:1V inclination. As is typical with earthwork operations, some sloughing and raveling may occur, and cut slopes may have to be adjusted in the field. In addition, WISHA/OSHA regulations should be followed at all times.

10.3 Site Disturbance

The on-site sediments contain a high percentage of fine-grained material, which makes them moisture-sensitive and subject to disturbance when wet. The contractor must use care during site preparation and excavation operations so that the underlying soils are not softened. If disturbance occurs, the softened soils should be removed and the area brought to grade with structural fill. If crushed rock is considered for the access and staging areas, it should be underlain by stabilization fabric (such as Mirafi 500X or approved equivalent) to reduce the potential of fine-grained materials pumping up through the rock and turning the area to mud. The fabric will also aid in supporting construction equipment, thus reducing the amount of crushed rock required. We recommend that at least 10 inches of rock be placed over the fabric; however, due to the variable nature of the near-surface soils and differences in wheel loads, this thickness may have to be adjusted by the contractor in the field. Crushed rock used for access and staging areas should be of at least 2-inch size.

11.0 STRUCTURAL FILL

Placement of structural fill may be necessary to establish desired grades in some areas. All references to structural fill in this report refer to subgrade preparation, fill type, and placement and compaction of materials as discussed in this section. If a percentage of compaction is specified under another section of this report, the value given in that section should be used.

11.1 Subgrade Compaction

After overexcavation/stripping has been performed to the satisfaction of the geotechnical engineer/engineering geologist, the exposed ground should be recompacted to a firm and unyielding condition. If the subgrade contains too much moisture, suitable recompaction may be difficult or impossible to attain and should probably not be attempted. In lieu of recompaction, the area to receive fill should be blanketed with washed rock or quarry spalls to act as a capillary break between the new fill and the wet subgrade. Where the exposed ground remains soft and further overexcavation is impractical, placement of an engineering stabilization fabric may be necessary to prevent contamination of the free-draining layer by silt

migration from below. After recompaction of the exposed ground is tested and approved, or a free-draining rock course is laid, structural fill may be placed to attain desired grades.

11.2 Structural Fill Compaction

Structural fill is defined as non-organic soil, acceptable to the geotechnical engineer, placed in maximum 10-inch loose lifts, with each lift being compacted to at least 95 percent of the modified Proctor maximum dry density using ASTM D-1557 as the standard. Utility trench backfill should be placed and compacted in accordance with applicable municipal codes and standards. The top of the compacted fill should extend horizontally a minimum distance of 3 feet beyond footings or pavement edges before sloping down at an angle no steeper than 2H:1V. Fill slopes should either be overbuilt and trimmed back to final grade or surface-compacted to the specified density.

11.3 Moisture-Sensitive Fill

Soils in which the amount of fine-grained material (smaller than No. 200 sieve) is greater than approximately 5 percent (measured on the minus No. 4 sieve size) should be considered moisture-sensitive. Use of moisture-sensitive soil in structural fills should be limited to favorable dry weather conditions. The on-site sediments are generally suitable for use as structural fill; however, these sediments contain significant amounts of silt and are considered moisture-sensitive. If the moisture content of these sediments is elevated at the time of construction, moisture-conditioning would be recommended prior to their use as structural fill. Such moisture-conditioning could consist of spreading out and aerating the soil out during periods of warm, dry weather.

Construction equipment traversing the site when the soils are very moist or wet can cause considerable disturbance. If fill is placed during wet weather or if proper compaction cannot be attained, a select import or on-site material consisting of a clean, free-draining gravel and/or sand should be used. Free-draining fill consists of non-organic soil with the amount of fine-grained material limited to 5 percent by weight when measured on the minus No. 4 sieve fraction.

11.4 Structural Fill Testing

The contractor should note that any proposed fill soils must be evaluated by AESI prior to their use in fills. This would require that we have a sample of the material at least 3 business days in advance to perform a Proctor test and determine its field compaction standard.

A representative from our firm should observe the stripped subgrade and be present during placement of structural fill to observe the work and perform a representative number of in-place density tests. In this way, the adequacy of the earthwork may be evaluated as filling progresses and any problem areas may be corrected at that time. It is important to understand that taking random compaction tests on a part-time basis will not assure uniformity or acceptable performance of a fill. As such, we are available to aid the owner in developing a suitable monitoring and testing frequency.

12.0 FOUNDATIONS

12.1 Allowable Soil Bearing Pressure

Spread footings may be used for building support when founded either directly on the medium dense to dense, or medium stiff to hard, natural glacial sediments, or on structural fill placed over these materials. Sediments suitable for foundation support were encountered in our explorations at depths of approximately 2 to 6 feet, but may be locally deeper. For footings founded either directly upon the medium dense to dense or medium stiff to hard glacial sediments, or on structural fill as described above, we recommend that an allowable bearing pressure of 2,500 pounds per square foot (psf) be used for design purposes, including both dead and live loads. We recommend that the footing subgrade be recompacted to a firm and unyielding condition prior to footing placement. An increase in the allowable bearing pressure of one-third may be used for short-term wind or seismic loading. If structural fill is placed below footing areas, the structural fill should extend horizontally beyond the footing edges a distance equal to or greater than the thickness of the fill.

12.2 Footing Depths

Perimeter footings for the proposed structures should be buried a minimum of 18 inches into the surrounding soil for frost protection. No minimum burial depth is required for interior footings; however, all footings must penetrate to the prescribed stratum, and no footings should be founded in or above loose, organic, or existing fill soils.

12.3 Footings Adjacent to Cuts

The area bounded by lines extending downward at 1H:1V from any footing must not intersect another footing or intersect a filled area that has not been compacted to at least 95 percent of ASTM D-1557. In addition, a 1.5H:1V line extending down from any footing must not daylight

because sloughing or raveling may eventually undermine the footing. Thus, footings should not be placed near the edges of steps or cuts in the bearing soils.

12.4 Footing Settlement

Anticipated settlement of footings founded as described above should be on the order of 1 inch or less. However, disturbed soil not removed from footing excavations prior to footing placement could result in increased settlements.

12.5 Footing Subgrade Bearing Verification

All footing areas should be observed by AESI prior to placing concrete to verify that the exposed soils can support the design foundation bearing capacity and that construction conforms with the recommendations in this report. Foundation bearing verification may also be required by the governing municipality.

12.6 Foundation Drainage

Perimeter footing drains should be provided as discussed under the "Drainage Considerations" section of this report.

13.0 FLOOR SUPPORT

Slab-on-grade floors may be constructed either directly on the medium dense to dense natural sediments, or on structural fill placed over these materials. Areas of the slab subgrade that are disturbed (loosened) during construction should be recompacted to an unyielding condition prior to placing the pea gravel, as described below.

If moisture intrusion through slab-on-grade floors is to be limited, the floors should be constructed atop a capillary break consisting of a minimum thickness of 4 inches of washed pea gravel or washed crushed rock. The pea gravel/crushed rock should be overlain by a 10-mil (minimum thickness) plastic vapor retarder.

14.0 DRAINAGE CONSIDERATIONS

The lodgement till sediments and pre-Fraser fine-grained sediments both contain a high percentage of silt and are considered to be moisture-sensitive. Traffic from vehicles and

construction equipment across these materials when they are very moist or wet will result in disturbance of the otherwise firm stratum. Therefore, prior to site work and construction, the contractor should be prepared to provide drainage and subgrade protection, as necessary. Under no circumstances should runoff be directed onto or above the steep slopes either during or after construction.

All footings and foundation walls should be provided with a drain at the footing elevation. Drains should consist of rigid, perforated, PVC pipe surrounded by washed gravel. The level of the perforations in the pipe should be set downward and at the bottom of the footing at all locations, and the drain collectors should be constructed with sufficient gradient to allow gravity discharge away from the proposed structure. Roof and surface runoff should not discharge into the footing drain system, but should be handled by a separate, rigid, tightline drain. In planning, exterior grades adjacent to foundations should be sloped downward away from the structure to achieve surface drainage.

15.0 STORMWATER INFILTRATION AND DISPERSION CONSIDERATIONS

15.1 Stormwater Infiltration Feasibility

In its *Stormwater Technical Notebook*, dated April 1, 2019, the City of Redmond has adopted the Washington State Department of Ecology's 2012 *Stormwater Management Manual for Western Washington* (SWMMWW), amended in December 2014, which specifies infeasibility criteria for on-site infiltration. Soils suitable for stormwater infiltration were not encountered at the site. The materials encountered in our explorations consisted of topsoil, and fill, overlying Vashon till, overlying pre-Fraser fine-grained sediments, overlying generally saturated pre-Fraser coarse-grained sediments. The till and pre-Fraser fine-grained sediments generally act as a hydraulically restrictive layer due to the high silt content and compact nature of the deposit, perching shallow groundwater near the ground surface. A limited deposit of Vashon advance outwash was observed, but was only present in EB-1W and is relatively thin and of a limited lateral extent. Infiltrated water would move laterally in the very shallow subsurface, increasing the potential for adverse effects of lateral seepage such as emergent seepage or accumulation of seepage in building crawl spaces and basements, below floor slabs, or around building foundations either on the subject site or on nearby properties.

It is AESI's opinion that infiltration is not feasible and stormwater infiltration BMPs are not recommended at the project site due to the low-permeability nature of the Vashon till and pre-Fraser fine-grained sediments, and limited thickness and extent of Vashon advance outwash sediments present.

15.2 Dispersion

Dispersion is planned for disposal of stormwater from the bioretention cell, the sport court trench drains, the play area and playfield dispersion systems, and from paved pathways via sheet flow over adjacent vegetated areas.

AESI observed the slopes onsite during out geological reconnaissance. Outside of the incised ravine, slopes generally range from less than 5 percent to approximately 15 percent. In the area outside of the incised ravine, dispersion is feasible.

Near the west end of the ravine, immediately downslope of EB-2 and EB-3, the slopes within the ravine are approximately 25 percent. These slopes increase to approximately 40 percent to the east near the existing trail, and increase farther east of the trail.

The fine-grained deposits observed exhibit a relatively high shear strength and are not typically prone to landsliding under the topographic conditions present in the upper portion of the ravine near EB-2 and EB-3 where slopes are approximately 25 percent. Given the topographic conditions present in the upper portion of the ravine west of the existing trail, the subsurface conditions observed, the presence of dense, established vegetation, and the lack of any indications of historical landslide activity west of the existing trail, it is our opinion that the conditions on the site are suitable for stormwater dispersion where the slopes are inclined up to approximately 25 percent and that the risk of landsliding or accelerated erosion on the site as a result of dispersion is low.

AESI recommends that we review any specific plans which call for dispersion within the uppermost portion of the ravine adjacent to EB-2 and EB-3. AESI recommends that dispersion not be used on any steep slopes (over 40 percent slope) or within the ravine without review of specific plans.

15.3 Bioretention

The soils underlying the proposed bioretention cell are not suitable for infiltration; therefore, we recommend that the bioretention cell be constructed with an underdrain system. The underdrain should outlet to an approved stormwater collection facility or dispersion area. Due to the proximity to the slopes of the western edge of the ravine, a maximum ponding depth of 12 inches should be part of the facility design. As described in the “Landslide Hazard and Mitigation” section of this report, fills within 15 feet from the top of the adjacent slope should be limited to a height of 1 foot; the current configuration shows a maximum fill depth of about 2 feet will be needed over a limited area of approximately 12 feet by about 2 feet to construct

the cell. Because of the limited extent of this fill, we consider it to meet the intent of our recommendations.

Bioretention Soil

Imported fill for bioretention facilities will consist of bioretention soil and often includes underdrain pipe bedding. We also recommend incorporating a media filter gradation layer in the bioretention cell between the bioretention soil and underdrain pipe bedding. The contractor should note that any proposed fill soils must be provided to AESI a minimum of 72 hours prior to placement for conformance with project specifications. We recommend that laboratory testing be performed on the bioretention mixture that will be used to verify conformance with the designer's specification. In our opinion, a grain-size analysis and organic content determination should be performed on a representative sample of the bioretention mixture.

The filter gradation layer should consist of 6 inches of free-draining medium filter sand, as shown in Table 1. Inclusion of media filter gradation layers that meet the recommended gradation will provide additional filtration of fine particulate matter from the bioretention soil that could increase the service life of the bioretention swales. Based on our experience with bioretention system outflows, suspended particles remaining in stormwater after treatment through bioretention soils can result in sedimentation or plugging over time.

Table 1
Medium Filter Sand Specification

U.S. Sieve Number	Percent Passing
4	95-100
8	70-100
16	40-90
30	25-75
50	2-25
100	<2
200	<1

16.0 FIELD SUBSURFACE AND SURFACE WATER DRAINAGE

Due to the low permeability of the underlying fill, till, and pre-Fraser fine-grained sediments, we recommend that subsurface drainage systems be provided below the improved playfield and play area. The new underdrain system should consist of perforated, PVC pipes, a minimum

of 4 inches in diameter, placed approximately 10 to 20 feet apart. The pipes should have an invert of at least 12 inches below grade and be fully enveloped in at least 6 inches of free-draining material containing less than 3 percent fines. The diameter of the drainage material should be larger than the size of the perforations in the drainpipe. The remainder of the drainage trench backfill should consist of free-draining material conforming to the 2018 Washington State Department of Transportation (WSDOT) *Standard Specifications for Road, Bridge, and Municipal Construction*, Section 9-03.12(4) "Gravel Backfill for Drains," which freely communicates with the field surfacing. The underdrain system should outlet to a dispersion trench. We defer to the field designer for specification of the improved field's natural turf surfacing material and planting mix.

Subsurface Drain Trenching

Construction of the subsurface drains will require trenching into the underlying sediments. The borings EB-1 at the east end of the playfield and EB-4 at the west end of the playfield provide preliminary information on sediment density and ease of trenching. In both borings, till was encountered near the surface underlying a surficial layer of topsoil. Near the southeast end of the play area, EB-2 and EB-3 encountered loose fill over dense native sediments that we anticipate are present at gradually shallower depths heading northwest across the play area. The surficial overlying topsoil materials and existing fill are in a loose condition and should, therefore, be backhoe-excavated with limited difficulty. The till is very dense and will be more difficult to excavate. During winter and times of wet weather, the till may also perch groundwater within overlying fill sediments. The contractor should be prepared with appropriate excavation and dewatering equipment to trench through areas underlain by very dense till soils.

17.0 PROJECT DESIGN AND CONSTRUCTION MONITORING

We are available to provide additional geotechnical consultation as the project design develops. We recommend that AESI perform a geotechnical review of the plans prior to final design completion. In this way, our earthwork and foundation recommendations may be properly interpreted and implemented in the design.

We are also available to provide geotechnical engineering and monitoring services during construction. The integrity of the foundations depends on proper site preparation and construction procedures. In addition, engineering decisions may have to be made in the field in the event that variations in subsurface conditions become apparent. Construction monitoring

services are not part of this current scope of work. If these services are desired, please let us know, and we will prepare a proposal.

We have enjoyed working with you on this study and are confident these recommendations will aid in the successful completion of your project. If you should have any questions, or require further assistance, please do not hesitate to call.

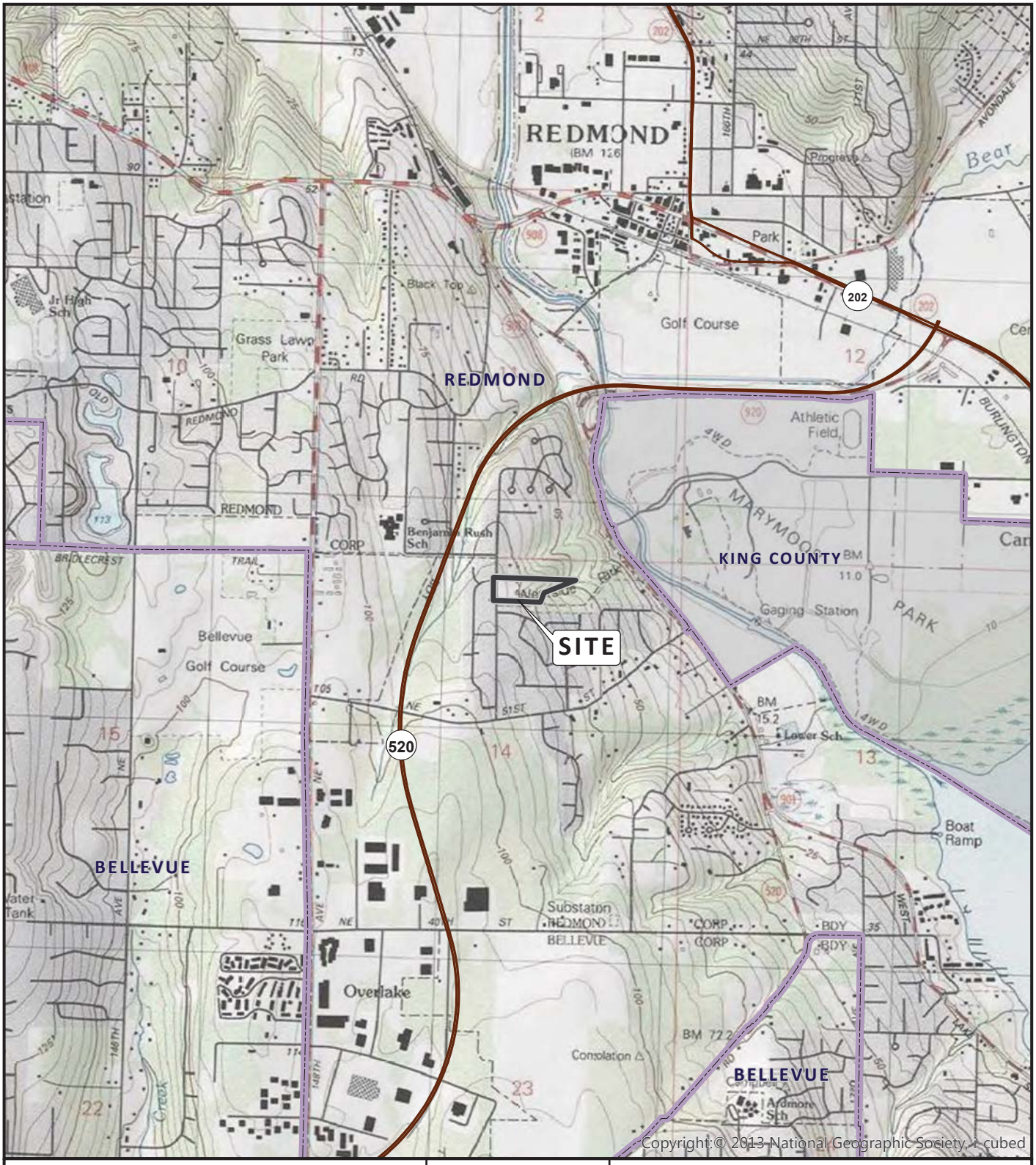
Sincerely,
ASSOCIATED EARTH SCIENCES, INC.
Kirkland, Washington

Nicki Shobert
Senior Staff Engineer

Jennifer H. Saltonstall, L.G., L.Hg.
Principal Geologist/Hydrogeologist

Bruce L. Blyton, P.E.
Senior Principal Engineer

Attachments:
Figure 1: Vicinity Map
Figure 2: Site and Exploration Plan
Figure 3: Proposed Site and Exploration Locations
Figure 4: Hydrogeologic Cross-Section A-A'
Figure 5: Longitudinal Stream Profile B-B'
Appendix: Exploration Logs



DATA SOURCES / REFERENCES:
USGS: 7.5' SERIES TOPOGRAPHIC MAPS, ESRI/I-CUBED/NGS 2013
KING CO: STREETS, CITY LIMITS 1/19, PARCELS 4/19
LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE

N

0 1000 2000
FEET

NOTE: BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION

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VICINITY MAP

WESTSIDE PARK
REDMOND, WASHINGTON

PROJ NO.	DATE:	FIGURE:
190366H001	11/19	1

Document Path: G:\GIS_Projects\aaY2019\190366 Westside Park\aprx_mxd\190366H001 F1 VM_WestsidePark.aprx

SITE
EXPLORATION BORING
MONITORING WELL
CROSS SECTION
PARCEL
TRAIL
CONTOUR 10 FT
CONTOUR 2 FT

DATA SOURCES / REFERENCES:
CITY OF REDMOND: CONTOURS 2012, STREAM 7/19

KING CO: STREETS, 1/19, PARCELS 4/19, PARKS 4/19
AERIAL PICTOMETRY INT. 2017,

LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE

N

0 150
FEET

BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION

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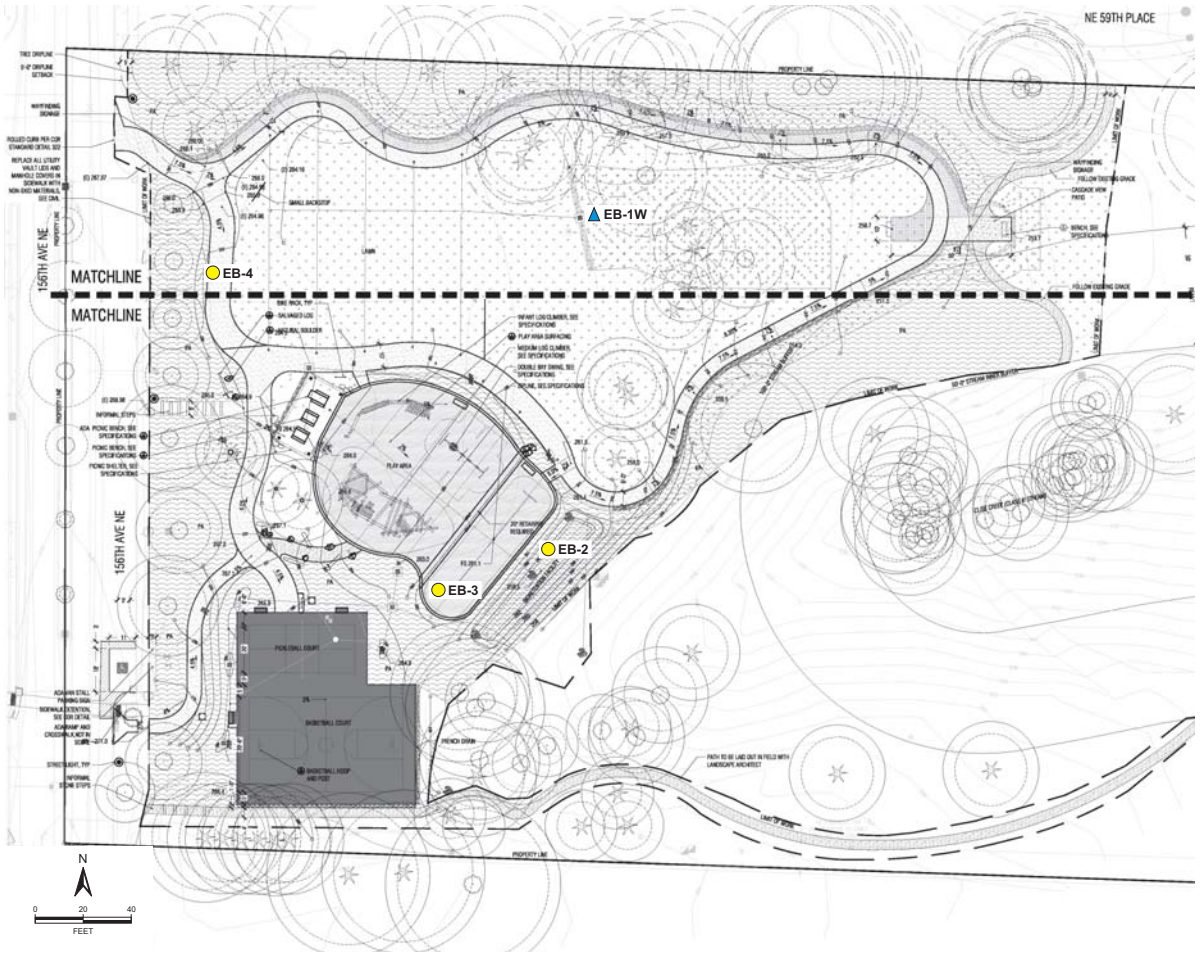
EXISTING SITE AND EXPLORATION PLAN

WESTSIDE PARK
REDMOND, WASHINGTON

PROJ NO.	DATE:	FIGURE:
190366H001	11/19	2

Path: G:\GIS_Projects\aar\2019\190366 Westside Park\aprx_mxd\190366H001 F2 ESPL Westside Park.aprx



LEGEND:

- EB EXPLORATION BORING
- EBW MONITORING WELL

CONTOUR INTERVAL = 2'

NOTE: LOCATION AND DISTANCES SHOWN ARE APPROXIMATE.

NOTES:

1. BASE MAP REFERENCE: BOARD AND VELLUM, REDMOND WESTSIDE PARK RENOVATION PROJECT, 60% PLANS, SITE PLAN NORTH, SHEET L2.0, AND SITE PLAN SOUTH, SHEET L2.1, 4/20/20.

BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION.

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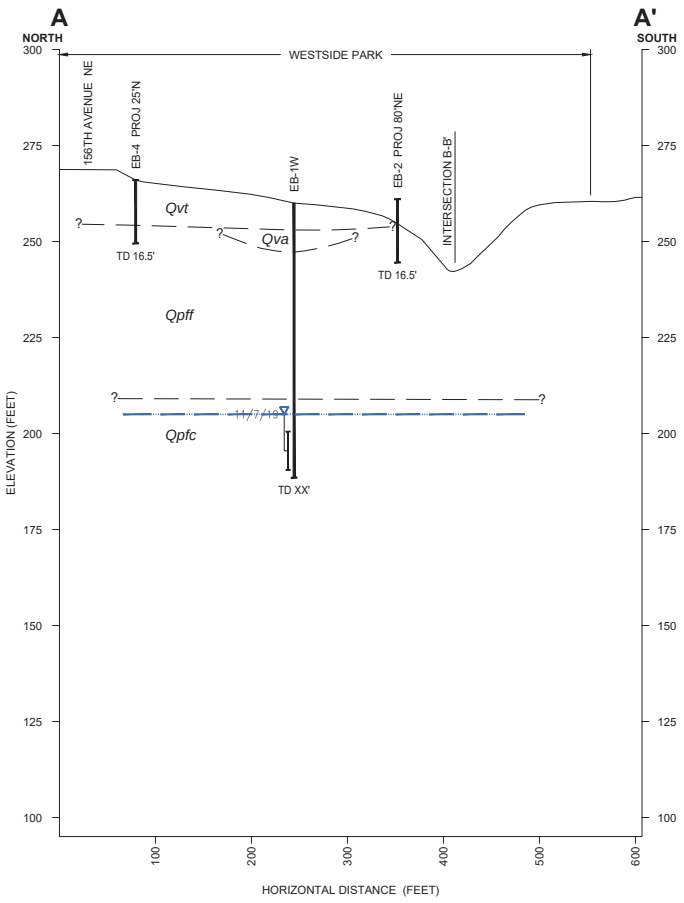
PROPOSED SITE AND EXPLORATION PLAN

WESTSIDE PARK
REDMOND, WASHINGTON

PROJ NO.	DATE:	FIGURE:
20190366H001	4/20	3

I:\0366 Westside Park \ 20190366H001 F3 Prop Site.cdr



LEGEND:

Qvt	VASHON LODGEMENT TILL
Qva	VASHON ADVANCE OUTWASH
Qpf$_f$	PRE-FRASER DEPOSITS - PREDOMINATELY FINE GRAINED
Qpf$_c$	PRE-FRASER DEPOSITS - PREDOMINATELY COARSE GRAINED UNDIFFERENTIATED
	BORING
	SCREENED INTERVAL
TD	TOTAL DEPTH OF BORING
	GEOLOGIC CONTACT
	INFERRED GROUNDWATER TABLE
	SEEP

VERTICAL EXAGGERATION = 0.8

NOTE: LOCATION AND DISTANCES SHOWN ARE APPROXIMATE

NOTES:

1. THE SUBSURFACE CONDITIONS PRESENTED IN THIS GEOLOGIC CROSS-SECTION ARE BASED ON AN INTERPRETATION OF CONDITIONS ENCOUNTERED IN WIDELY SPACED EXPLORATIONS COMPLETED AT THE SUBJECT SITE AND RELEVANT SITE INFORMATION DEVELOPED AND PROVIDED BY OTHERS. THE SUBSURFACE INTERPRETATIONS PRESENTED IN THIS GEOLOGIC CROSS-SECTION SHOULD NOT BE CONSTRUED AS A WARRANTY OF ACTUAL SUBSURFACE CONDITIONS AT THE SITE. OUR EXPERIENCE HAS SHOWN THAT SOIL AND GROUNDWATER CONDITIONS CAN VARY SIGNIFICANTLY OVER SMALL DISTANCES.

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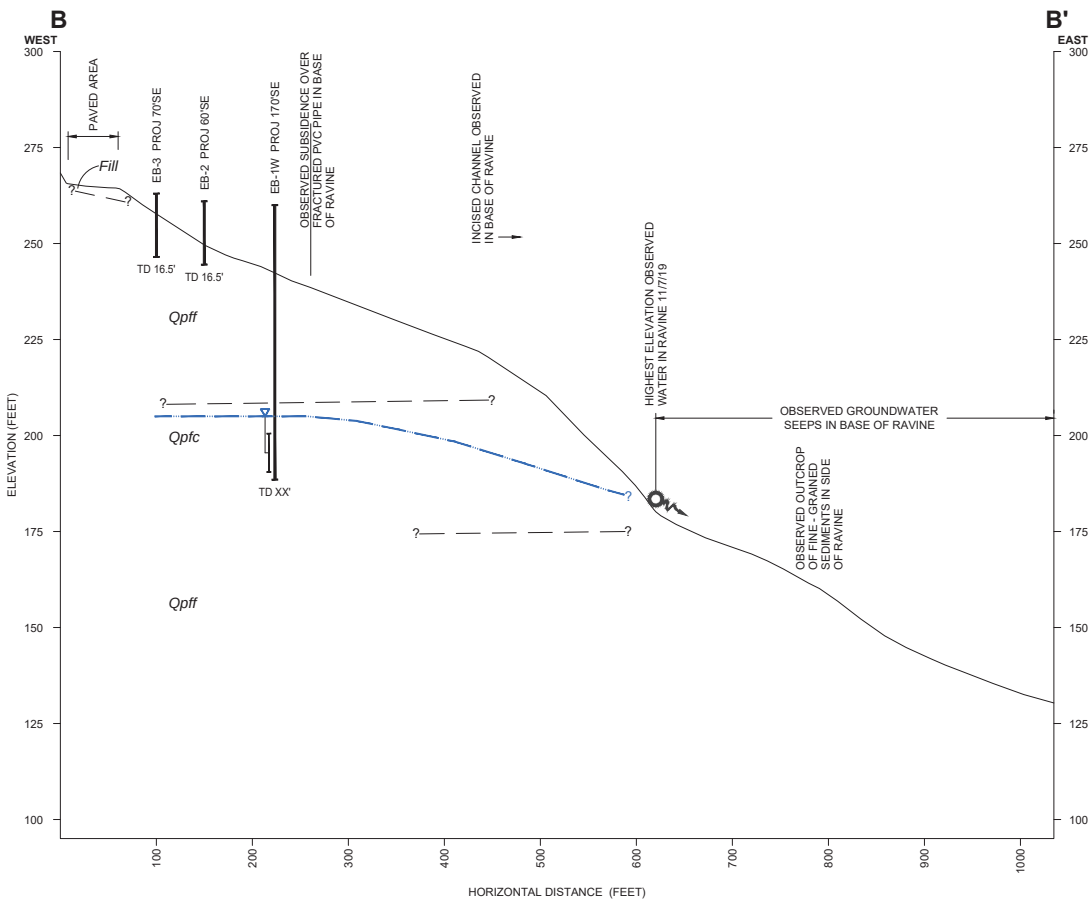
SCHEMATIC HYDROGEOLOGIC CROSS-SECTION A - A'

WESTSIDE PARK
REDMOND, WASHINGTON

PROJ NO.	DATE:	FIGURE:
20190366H001	4/20	4

190366 Westside Park \ GeoSects.dwg LAYOUT: F4 Sect A-A 4-20



LEGEND:

Qvt	VASHON LODGEMENT TILL
Qva	VASHON ADVANCE OUTWASH
Qpf_f	PRE-FRASER DEPOSITS - PREDOMINATELY FINE GRAINED
Qpf_c	PRE-FRASER DEPOSITS - PREDOMINATELY COARSE GRAINED UNDIFFERENTIATED
	BORING
	SCREENED INTERVAL
TD	TOTAL DEPTH OF BORING
	GEOLOGIC CONTACT
	INFERRED GROUNDWATER TABLE
	SEEP

VERTICAL EXAGGERATION = 0.8

NOTE: LOCATION AND DISTANCES SHOWN ARE APPROXIMATE

NOTES:

1. THE SUBSURFACE CONDITIONS PRESENTED IN THIS GEOLOGIC CROSS-SECTION ARE BASED ON AN INTERPRETATION OF CONDITIONS ENCOUNTERED IN WIDELY SPACED EXPLORATIONS COMPLETED AT THE SUBJECT SITE AND RELEVANT SITE INFORMATION DEVELOPED AND PROVIDED BY OTHERS. THE SUBSURFACE INTERPRETATIONS PRESENTED IN THIS GEOLOGIC CROSS-SECTION SHOULD NOT BE CONSTRUED AS A WARRANTY OF ACTUAL SUBSURFACE CONDITIONS AT THE SITE. OUR EXPERIENCE HAS SHOWN THAT SOIL AND GROUNDWATER CONDITIONS CAN VARY SIGNIFICANTLY OVER SMALL DISTANCES.

BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION

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SCHEMATIC HYDROGEOLOGIC CROSS-SECTION B - B'

WESTSIDE PARK
REDMOND, WASHINGTON

PROJ NO.	DATE:	FIGURE:
20190366H001	4/20	5

190366 Westside Park \ GeoSecds.dwg LAYOUT: F5 Sect B-B 4-20

APPENDIX

Exploration Logs

Coarse-Grained Soils - More than 50% [1] Retained on No. 200 Sieve	Gravels - More than 50% [1] of Coarse Fraction Retained on No. 4 Sieve	≤5% Fines [5]	GW	Well-graded gravel and gravel with sand, little to no fines
			GP	Poorly-graded gravel and gravel with sand, little to no fines
		≥12% Fines [5]	GM	Silty gravel and silty gravel with sand
			GC	Clayey gravel and clayey gravel with sand
	Sands - 50% [1] or More of Coarse Fraction Passes No. 4 Sieve	≤5% Fines [5]	SW	Well-graded sand and sand with gravel, little to no fines
			SP	Poorly-graded sand and sand with gravel, little to no fines
		≥12% Fines [5]	SM	Silty sand and silty sand with gravel
			SC	Clayey sand and clayey sand with gravel
Fine-Grained Soils - 50% [1] or More Passes No. 200 Sieve	Silts and Clays Liquid Limit Less than 50		ML	Silt, sandy silt, gravelly silt, silt with sand or gravel
			CL	Clay of low to medium plasticity; silty, sandy, or gravelly clay, lean clay
			OL	Organic clay or silt of low plasticity
	Silts and Clays Liquid Limit 50 or More		MH	Elastic silt, clayey silt, silt with micaceous or diatomaceous fine sand or silt
			CH	Clay of high plasticity, sandy or gravelly clay, fat clay with sand or gravel
			OH	Organic clay or silt of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

Terms Describing Relative Density and Consistency

	Density	SPT [2] blows/foot
Coarse-Grained Soils	Very Loose	0 to 4
	Loose	4 to 10
	Medium Dense	10 to 30
	Dense	30 to 50
	Very Dense	>50
	Consistency	**SPT [2] blows/foot**
Fine-Grained Soils	Very Soft	0 to 2
	Soft	2 to 4
	Medium Stiff	4 to 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	>30

Test Symbols

G = Grain Size
M = Moisture Content
A = Atterberg Limits
C = Chemical
DD = Dry Density
K = Permeability

Component Definitions

Descriptive Term	Size Range and Sieve Number
Boulders	Larger than 12"
Cobbles	3" to 12"
Gravel	3" to No. 4 (4.75 mm)
Coarse Gravel	3" to 3/4"
Fine Gravel	3/4" to No. 4 (4.75 mm)
Sand	No. 4 (4.75 mm) to No. 200 (0.075 mm)
Coarse Sand	No. 4 (4.75 mm) to No. 10 (2.00 mm)
Medium Sand	No. 10 (2.00 mm) to No. 40 (0.425 mm)
Fine Sand	No. 40 (0.425 mm) to No. 200 (0.075 mm)
Silt and Clay	Smaller than No. 200 (0.075 mm)

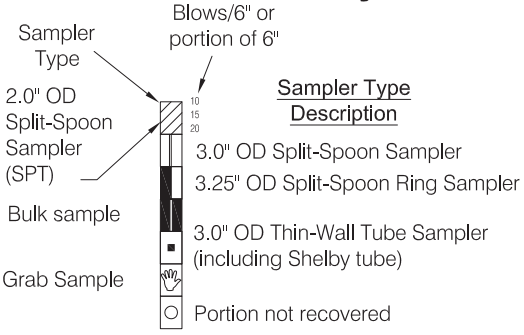
[3] Estimated Percentage

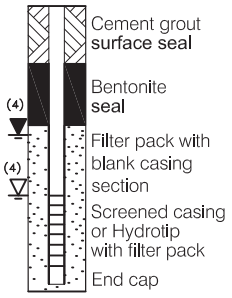
Component	Percentage by Weight
Trace	<5
Some	5 to <12
Modifier (silty, sandy, gravelly)	12 to <30
Very *modifier* (silty, sandy, gravelly)	30 to <50

Moisture Content

Dry - Absence of moisture, dusty, dry to the touch
Slightly Moist - Perceptible moisture
Moist - Damp but no visible water
Very Moist - Water visible but not free draining
Wet - Visible free water, usually from below water table

Symbols





(1) Percentage by dry weight
(2) (SPT) Standard Penetration Test (ASTM D-1586)
(3) In General Accordance with Standard Practice for Description and Identification of Soils (ASTM D-2488)
(4) Depth of ground water
▼ ATD = At time of drilling
▽ Static water level (date)
(5) Combined USCS symbols used for fines between 5% and 12%

Classifications of soils in this report are based on visual field and/or laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual and/or laboratory classification methods of ASTM D-2487 and D-2488 were used as an identification guide for the Unified Soil Classification System.

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Geologic & Monitoring Well Construction Log

Project Number	Well Number	Sheet
190366H001	EB-1W	1 of 2

Project Name	Westside Park	Location	Redmond, WA
Elevation (Top of Well Casing)	259.8 ft	Surface Elevation (ft)	260
Water Level Elevation	205 ft	Date Start/Finish	10/29/19,10/29/19
Drilling/Equipment	ADT / HSA	Hole Diameter (in)	8
Hammer Weight/Drop	140# / 30"		

Depth (ft)	Water Level	WELL CONSTRUCTION	ST	Blows/ 6"	Graphic Symbol	DESCRIPTION
		Cement / flush mount monument with locking J-plug cap at ground surface				**Topsoil** Loose, moist, dark brown, silty, fine SAND, some gravel; sampled with hand tools (SM).
		Bentonite chips 0 to 1.5 feet				**Vashon Lodgement Till**
5				12 24 27		Slightly moist, brownish gray, silty, fine SAND, some gravel; gravel is primarily fractured pieces of larger gravels; unsorted (SM).
						Vashon Advance Outwash Driller notes less gravel below 7 feet.
10		2-inch I.D. Sch 40 PVC casing 0 to 59.5 feet		14 25 28		Slightly moist, brownish gray, fine to medium SAND, some silt; massive (SP-SM).
						Pre-Fraser Fine Grained
15		Bentonite grout 12 to 52 feet		7 13 16		Slightly moist, tan, SILT, some fine sand ranging to very silty, fine SAND; stratified in layers (~4 inches thick); occasional light oxidation observed above silt layers (SM-ML).
				10 12 18		Slightly moist, brownish gray with occasional layers of oxidation, SILT, some fine sand to sandy; stratified; no micas or dropstones observed (ML).
20				7 10 14		As above; stratified layers range to 6 inches thick.
				13 18 24		Slightly moist, brownish gray with occasional light layers of oxidation, sandy, SILT; finely stratified (ML).
25				8 13 20		As above.
30				10 17 27		Slightly moist, brownish gray with occasional light oxidation in layers (<1/4 inch thick), fine sandy, SILT (ML) ranging to very silty, fine SAND (SM); faintly stratified.
35				7 16 20		As above.

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture

Water Level (11/7/19)

Water Level at time of drilling (ATD)

Logged by: ADY

Approved by: JHS

NWWELL- B 190366H001.GPJ BORING.GDT 12/18/19

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Geologic & Monitoring Well Construction Log

Project Number	Well Number	Sheet
190366H001	EB-1W	2 of 2

Project Name	Westside Park	Location	Redmond, WA
Elevation (Top of Well Casing)	259.8 ft	Surface Elevation (ft)	260
Water Level Elevation	205 ft	Date Start/Finish	10/29/19,10/29/19
Drilling/Equipment	ADT / HSA	Hole Diameter (in)	8
Hammer Weight/Drop	140# / 30"		

Depth (ft)	Water Level	WELL CONSTRUCTION	ST	Blows/ 6"	Graphic Symbol	DESCRIPTION
				5 7 9		Upper 12 inches: moist, brownish gray, fine sandy, SILT; massive (ML). Lower 6 inches: grades to moist, blue gray, SILT; mica present; massive (ML).
45				6 14 29		Upper 6 inches: moist, tan, SILT, some fine sand (ML). Lower 6 inches consist of stratified layers (up to 2 inches thick) ranging from SILT with some sand to fine to medium SAND, trace silt. Gravel present in sampler tip (quartzite). Layer (~1/4 inch thick) of oxidation present above layer (2 inches thick) of fine to medium sand.
50				17 31 41		Upper 6 inches: moist, tan with layer (1 inch thick) of oxidation, silty, fine SAND; one piece of gravel; massive (SM). Lower 6 inches: moist, tan, silty, fine SAND, some gravel; unsorted (SM). Driller notes "feels gravelly" at 51 feet. **Pre-Fraser Coarse Grained**
55	▽	Bentonite chips 52 to 57.5 feet		29 40 47		Drill string wet below 55 feet. Wet, grayish brown, fine to medium SAND, trace to some silt (SP-SM/SP); faintly stratified; layer (1/4 inch thick) of silt (ML); sand grades from fine to medium in upper portion of sampler to fine in base.
		10/20 filter sand pack 57.5 to 71.5 feet				
60				35 50/5"		Wet, brownish gray, fine to medium SAND, some silt, trace gravel; massive (SP-SM). With drill at 65 feet, water level in hole at 62.5 feet.
65		2-inch I.D. Sch 40 PVC well screen 0.020-inch slot width with threaded end cap 59.5 to 69.5 feet		34 50/6"		Wet, brownish gray, silty, fine SAND; massive (SM). Driller notes gravels at 68 feet.
70				31 50/5"		Wet, gray to dark gray, fine to medium SAND, some gravel, trace silt (SP).
75		Well tag # BKU 971				Boring terminated at 71.5 feet Well completed at feet on 10/29/19. Groundwater encountered at 55 feet on 11/7/19.

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture

▽ Water Level (11/7/19)

▼ Water Level at time of drilling (ATD)

Logged by: ADY

Approved by: JHS

NWWELL- B 190366H001.GPJ BORING.GDT 12/18/19

associated earth sciences incorporated

Exploration Boring

Project Number	Exploration Number	Sheet
190366H001	EB-2	1 of 1

Project Name	Westside Park	Ground Surface Elevation (ft)	261
Location	Redmond, WA	Datum	NAVD 88
Driller/Equipment	ADT / HSA	Date Start/Finish	10/30/19,10/30/19
Hammer Weight/Drop	140# / 30"	Hole Diameter (in)	8

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
		S-1		**Topsoil - 6 inches** Upper 6 inches: moist, dark brown, silty, fine SAND, trace gravel; organic rich; abundant fine roots present (SM).			4 3 3	▲6	
				Fill Lower 6 inches: brown, silty, fine SAND, some gravel; few fine roots (SM).					
		S-2		Brown, moist, silty, fine SAND; fine roots present; asphalt fragment in sampler tip (SM).			4 4 5	▲9	
				Pre-Fraser Fine Grained					
5		S-3		Light brown with occasional mottling, moist, fine sandy, SILT (ML).			3 2 2	▲4	
		S-4		Light brown, moist, fine sandy, SILT (ML).			4 8 11	▲19	
10		S-5		Light brown, gray, moist, fine sandy, SILT, trace gravel; dropstones (ML).			4 9 11	▲20	
15		S-6		Moist, light brown, silty, fine SAND; few fractures with oxidation visible (SM).			6 10 14	▲24	
				Bottom of exploration boring at 16.5 feet No groundwater encountered.					
20									
25									
30									
35									

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

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Approved by: JHS

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Exploration Boring

Project Number	Exploration Number	Sheet
190366H001	EB-3	1 of 1

Project Name	Westside Park	Ground Surface Elevation (ft)	263
Location	Redmond, WA	Datum	NAVD 88
Driller/Equipment	ADT / HSA	Date Start/Finish	10/30/19,10/30/19
Hammer Weight/Drop	140# / 30"	Hole Diameter (in)	8

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
		S-1		**Topsoil - 4 inches** Upper 4 inches: moist, dark brown, silty, fine SAND; abundant fine roots (SM).			2 2 2	▲4	
				Fill					
		S-2		Lower 12 inches: moist, brown, silty, fine SAND, some gravel; unsorted (SM). Excavated to 1.5 feet with hand tools; sampler driven adjacent to hand excavation.			1 2 2	▲4	
5		S-3		Moist, brown, silty, fine SAND, some gravel; unsorted (SM). Upper 6 inches: very moist, dark brown, silty, fine SAND, trace gravel; unsorted (SM). Abrupt change at 6 inches in sampler.			1 1 6	▲7	
				Pre-Fraser Fine Grained					
		S-4		Lower 6 inches: very moist, grayish brown, sandy, SILT, trace gravel; massive; granite fragments in sampler tip (ML). Moist, grayish brown with occasional light mottling, fine sandy, SILT, some gravel; unsorted (ML).			6 12 15	▲27	
10		S-5		Moist, grayish brown, very silty, fine SAND, trace gravel; unsorted (SM).			8 12 15	▲27	
15		S-6		Moist, grayish brown, silty, fine SAND, some gravel; sand is coarser in layer (6 inches thick) in center of sampler (SM).			11 19 36	▲55	
				Bottom of exploration boring at 16.5 feet No groundwater encountered.					
20									
25									
30									
35									

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample
- M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

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Exploration Boring

Project Number	Exploration Number	Sheet
190366H001	EB-4	1 of 1

Project Name	Westside Park	Ground Surface Elevation (ft)	266
Location	Redmond, WA	Datum	NAVD 88
Driller/Equipment	ADT / HSA	Date Start/Finish	10/30/19,10/30/19
Hammer Weight/Drop	140# / 30"	Hole Diameter (in)	8

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
		S-1		**Topsoil - 3 inches** Moist, dark brown, silty, fine SAND; organic rich; abundant fine roots; removed with hand tools (SM).			3 6 9	▲15	
				Vashon Lodgement Till					
		S-2		Moist, brownish gray with oxidation, silty, fine SAND, some gravel; unsorted; cobbles in cuttings (SM). Slightly moist, brownish gray, silty, fine SAND, some gravel; unsorted (SM).			16 26 34	▲60	
5		S-3		Slightly moist, brownish gray, silty, fine SAND, some gravel; unsorted (SM).			14 26 44	▲70	
		S-4		Sampler on rock. As above.			50/4"	▲50/4"	
10		S-5		As above.			26 37 39	▲76	
				Pre-Fraser Fine Grained Driller notes less gravelly drilling action at 12 feet.					
15		S-6		Moist, brownish gray with layer (1/4 inch thick) of oxidation, SILT, some fine sand; faintly stratified (ML).			12 16 17	▲33	
				Bottom of exploration boring at 16.5 feet No groundwater encountered.					
20									
25									
30									
35									

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture

- Water Level ()
- Water Level at time of drilling (ATD)

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