CONFLUENCE
ENVIRONMENTAL COMPANY

September 19, 2022

Mr. Shazaad Jarrahian
Capital Project Manager
King County Parks and Recreation Division
201 S Jackson Street
Seattle, WA 98104

Re: Marymoor Park Stormwater Facility Improvements No Effect Letter

Dear Shazaad:

King County proposes to construct 2 stormwater treatment facilities within the western portion of Marymoor Park. These facilities would provide stormwater treatment for existing impervious surfaces in the park to improve water quality. This project proposes installation of an infiltrating bioretention channel and rain garden (collectively referred to as the "rain garden") and improvements to the existing east–west drainage collector channel ("channel improvements"). The project improvements lie within T25N, R05E, Section 12 at Longitude 47.66417N and Latitude 122.12083 W. The King County unincorporated area parcel designation for the site is 1225059037, with a site address of 16325 NE Marymoor Way, King County, WA 98052 (Figure 1).

Confluence Environmental Company (Confluence) has prepared this assessment on behalf of the U.S. Army Corps of Engineers in response to the current U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) Endangered Species Act (ESA) listings. We also evaluated the presence of Essential Fish Habitat (EFH) as indicated in the Magnuson Stevens Fishery Conservation and Management Act (Magnuson Stevens Act). The USFWS and NMFS species lists were accessed on the agencies' websites on April 21 and April 22, 2022, respectively. These databases indicated the potential presence of the species and critical habitat(s) shown in Table 1.

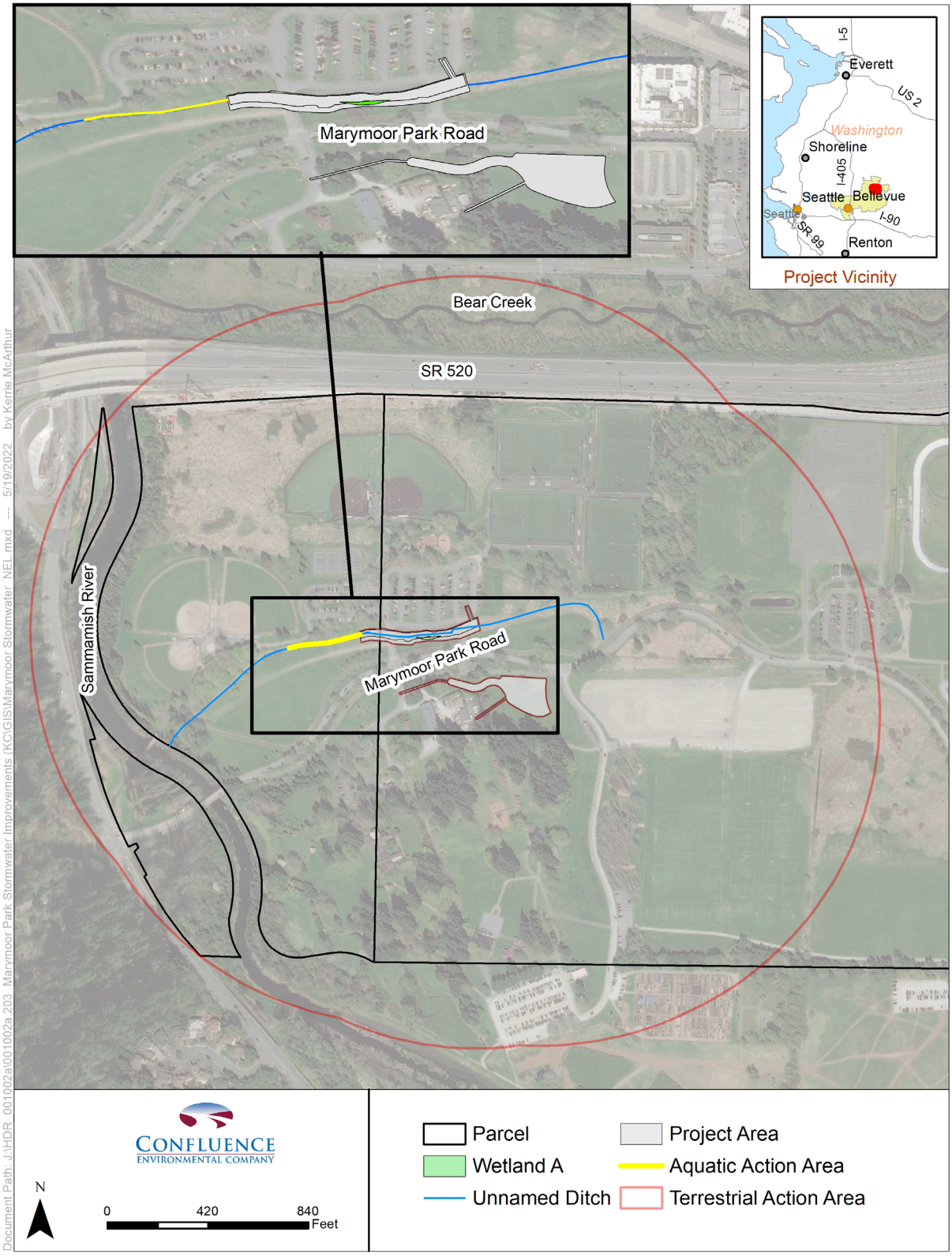

Figure 1. Project and action areas

Table 1. USFWS and NMFS ESA-listed species and critical habitats potentially present in the vicinity of the project (NMFS 2022a, USFWS 2022a)

Species	ESU/PDS	Federal Status	Critical Habitat has been designated
Bull Trout (*Salvelinus confluentus*)	Puget Sound	Threatened	Yes, but not in action area
Chinook Salmon (*Oncorhynchus tshawytscha*)	Puget Sound	Threatened	Yes, but not in action area
Steelhead Trout (*Oncorhynchus mykiss*)	Puget Sound	Threatened	Yes, but not in action area
Marbled Murrelet (*Brachyramphus marmoratus*)	USA	Threatened	Yes, but not in action area
Streaked Horned Lark (*Eremophila alpestris strigata*)	USA	Threatened	Yes, but not in action area
Yellow-Billed Cuckoo (*Coccyzus americanus*)	Western US	Threatened	Yes, but not in action area
ESU = evolutionarily significant unit; PDS = distinct population segment			

PROPOSED PROJECT

Rain Garden

The rain garden project is located south of Marymoor Park Road and proposes to install storm drainage diversion/conveyance piping, a pre-treatment vortex separator, a vegetated bioretention channel and planted rain garden (bioretention cell) and associated overflow outlet improvements to provide retrofit water quality treatment and infiltration of contributing impervious and pervious surfaces runoff. The drainage area to be intercepted includes the Marymoor Office Access Drive, Parking Lot area, Art Barn, Maintenance Building/Yard, and local access drives to those facilities. In total, the improvements will intercept runoff from about 8.7 acres of contributing park surfaces, of which about 1.9 acres comes from pollution generating impervious surface. The rain garden will be planted with native vegetation species, with emergent species being used along the channel bottom. A detailed description of the rain garden, including construction methods, sequencing, and timing as well as best management practices, is attached.

Channel Improvements

The channel improvements project is located north of Marymoor Park Road and proposes to replace 2 separate existing 18-inch corrugated metal pipe culverts under the west and east accesses to Parking Lot K with 8-foot wide by 3-foot high (internal dimensions) pre-cast box

culverts (split box sidewalls for substrate installation), with bottom slabs embedded 1.25 feet (42%) below the restored streamed channel.

The existing channel section between the culverts will be regraded and restored for water quality and enhancement habitat benefits, and similar for short sections of the channel downstream of the west culvert and upstream of the east culvert at tie-in to the existing channel. The channel bed substrate will be excavated and replaced with a streambed gravel/topsoil mix that will be planted with water-tolerant native species to enhance seasonal filtration treatment and infiltration as collective water quality benefits. The channel banks will be regraded at 3:1 side slopes with soil amendment provided and will be restored with native plantings. Beyond the channel banks, trees will be added along the south channel bank to provide added shading for water temperature reduction to benefit water quality.

The project will over-excavate approximately 3,685 square feet of the east–west drainage channel, which will be backfilled with appropriate stream sediment and replanted. Approximately 21 square feet of the adjacent wetland will be regraded and revegetated with native plants. Neither of these activities is expected to result in loss of ditch or wetland acreage.

A detailed description of the channel improvements, including construction methods, sequencing, and timing as well as best management practices, is attached.

PROJECT AND ACTION AREAS

Based upon the geographic extent of anticipated project impacts, the project area is defined as the construction footprint of the proposed project (Figure 1).

The action area is defined as the extent of all direct effects and delayed consequences related to the proposed action (as well as interdependent or interrelated activities) affecting both aquatic and terrestrial environments. The proposed project will replace culverts when the drainage collector channel is dry, so there will be no in-water, direct, or indirect effects. To determine the action area the potential effects from stormwater (both construction and operation), and construction-related noise were evaluated.

Stormwater management and treatment meets the requirements described in the 2021 King County Stormwater Pollution Prevention Manual (King County 2021). Under Chapter 90.48 RCW (ESSB 6415), water discharged from a stormwater management system designed to the King County Drainage Manual (King County 2021) standards is presumed to meet Washington State's surface water quality standards (Chapter 173-201A WAC), sediment management standards (Chapter 173-204 WAC), groundwater quality standards (Chapter 173-200 WAC), and human health-based criteria in the National Toxics Rule (40 CFR Part 131.36). Therefore,

stormwater runoff generated by the project is not expected to have measurable effects or impacts beyond 300 feet downstream of the project area. The aquatic area is defined as a linear length within the ditch, 300 feet downstream of the project area (Figure 1).

To determine where construction-related, terrestrial, noise attenuates to background noise levels, the Washington State Department of Transportation (WSDOT) methodology to calculate noise attenuation to background was used (WSDOT 2020). For the terrestrial noise calculation, the 3 loudest pieces of construction equipment were assumed to be an excavator, a dozer, and a backhoe. The action area was assumed to have a background noise level of 55 decibels (dBA), based on a population density for Redmond of just over 4,000 people per square mile.

Based on these assumptions and the WSDOT methodology to calculate noise attenuation, construction noise is expected to attenuate to background noise levels within 1,377 feet of the project area (WSDOT 2020). Thus, the terrestrial action area is defined 1,377 feet around the project area (Figure 1).

EXISTING SITE CONDITIONS

Existing site conditions are described in detail in the critical areas report (Confluence 2022). Marymoor Park is a 640-acre park used by more than 200 bird species, none of which are listed under ESA, during the year (Audubon 2022). The PHS (WDFW 2021) and SalmonScape (WDFW 2022) databases identified bull trout (*Salvelinus confluentus*), coho salmon (*Oncorhynchus kisutch*), Chinook salmon (*O. tshawytscha*), kokanee and sockeye (*O. nerka*), steelhead and rainbow trout (*O. mykiss*), and resident coastal cutthroat trout (*O. clarkii*) as occurring in the Sammamish River. PHS identified the park as a biodiversity area with freshwater wetlands (WDFW 2021).

Site visits were conducted on November 9, 2021, and January 4, 2022.

Rain Garden

No wetlands, streams, or the buffers were identified within the rain garden project area. The rain garden project area is primarily maintained lawn and unmaintained herbaceous areas dominated by reed canarygrass (*Phalaris arundinacea*), with scattered coniferous and deciduous trees.

Channel Improvements

One wetland, identified as Wetland A, and one unnamed ditch were identified within the channel improvements project area (Confluence 2022). Wetland A is located in the central portion of the project area (Figure 1) and is 626 square feet in size. According to the Cowardin classification (FGDC 2013), Wetland A is a palustrine emergent wetland. Wetland A is

dominated by reed canarygrass and mowed lawn. The boundary of Wetland A was determined by a distinct topographic break and evidence of standing water. According to the 2014 Wetland Rating System (Hruby 2014), Wetland A was rated as a Category IV wetland, with a water quality score of 6, hydrology score of 5, and habitat score of 3 (Confluence 2022).

The unnamed drainage ditch begins east of the action area, flows west through the project area, and discharges into the Sammamish River. The Washington State Department of Natural Resources (WDNR) Water Type GIS mapped this ditch as a non–fish-bearing watercourse (WDNR 2021). The PHS (WDFW 2021) and SalmonScape (WDFW 2022) databases did not identify any salmon species as occurring in the ditch. During the January 24, 2022, site visit, WDFW Area Habitat Biologist Miles Penk confirmed that the ditch has negligible fish access and habitat. Based on Mr. Penk's assessment, the ditch is an artificial feature that appears to have a surface water connection with the Sammamish River during low frequency recurrence interval flood events.

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

In addition, review of historical topographic maps and aerial imagery indicated that portions of the ditch may have been excavated in a relic channel of Bear Creek many years after Bear Creek had been relocated, but the ditch does not align with the historical main channel of Bear Creek. A detailed description of the historical analysis is in Appendix F of the Critical Areas Study (Confluence 2022).

Based on historical data and mapping, the current ditch is a wholly artificial channel, not used by salmonids. It does not represent an anthropogenic alteration and loss of historical stream channel habitat, since Bear Creek has been relocated and provides fish access to the upper watershed. The anthropogenically altered stream channel in this case is represented by the current alignment of Bear Creek to the north. For this reason, the ditch is an artificial feature distinct from an altered stream channel.

PROJECT IMPACTS

Rain Garden

The rain garden project will cause temporary ground disturbance and elevated terrestrial noise levels during construction. Based on these assumptions and the WSDOT methodology to calculate noise attenuation, construction noise is expected to attenuate to background noise levels within 1,377 feet of the project area (WSDOT 2020).

Best management practices, described in the attachment, will reduce impacts and prevent erosion or stormwater impacts from occurring outside of the project area. Once completed, the rain garden project is a passive system that will improve water quality and not have future terrestrial disturbance (i.e., the vegetation will be allowed to grow and vegetation maintenance will not be required). Therefore, there will be no adverse impacts from operation of the rain garden project.

Channel Improvements

The channel improvements project will cause temporary ground disturbance and elevated terrestrial noise levels during construction. Based on these assumptions and the WSDOT methodology to calculate noise attenuation, construction noise is expected to attenuate to background noise levels within 1,377 feet of the project area (WSDOT 2020). Best management practices, described in the attachment, will reduce impacts and prevent erosion or stormwater impacts from occurring outside of the action area. Like the rain garden project, once the channel improvements project is completed, it will be a passive system that will improve water quality and not have future terrestrial disturbance (i.e., the vegetation will be allowed to grow and vegetation maintenance will not be required). Therefore, there will be no adverse impacts from operation of the rain garden project.

EFFECTS ANALYSIS AND DETERMINATION

Fish

Listed species will not be susceptible to impacts related to project activities because they do not occur in the aquatic action area (i.e., within 300 feet downstream of the channel improvements project area), there is no suitable habitat present, and/or there is no possibility of effects to species or habitats from the project. Therefore, we have determined that this project will have "no effect" on listed fish species. Additionally, the project will have "no effect" on designated critical habitats for these species. Table 2 summarizes the potential listed species, their nearest known occurrence, the effect determination, and the rational for the determination.

Birds

Listed species will not be susceptible to impacts related to project activities because they do not occur in the action area, there is no suitable habitat present, and/or there is no possibility of effects to species or habitats from the project. Species use of the action area is limited to the occasional fly-over by marbled murrelets as they travel between nesting and foraging sites.

Therefore, we have determined that this project will have "no effect" on listed bird species. Additionally, the project will have "no effect" on designated critical habitats for these species. Table 2 summarizes the potential listed species, their nearest known occurrence, the effect determination, and the rational for the determination.

Table 2. Effects determination and rationale

Listed Species/Critical Habitat	Jurisdictional Agency	Nearest Suitable Habitat	Effect Determination	Effect Determination Rationale
Bull Trout (*Salvelinus confluentus*)	USFWS	1,110 feet (Sammamish River)	No effect	▪ Bull trout are not present within the unnamed ditch. ▪ During construction and operation, water quality or quantity will not be impacted in the Sammamish River, the closest known habitat. ▪ Critical habitat is not in action area (USFWS 2022b).
Chinook Salmon (*Oncorhynchus tshawytscha*)	NMFS	1,110 feet (Sammamish River)	No effect	▪ Chinook salmon are not present within the unnamed ditch. ▪ During construction and operation, water quality or quantity will not be impacted in the Sammamish River, the closest known habitat. ▪ Critical habitat is not in action area (NMFS 2022b).
Steelhead Trout (*Oncorhynchus mykiss*)	NMFS	1,110 feet (Sammamish River)	No effect	▪ Steelhead trout are not present within the unnamed ditch. ▪ During construction and operation, water quality or quantity will not be impacted in the Sammamish River, the closest known habitat. ▪ Critical habitat isnot in action area (NMFS 2022b).
Marbled Murrelet *(Brachyramphus marmoratus*)	USFWS	15 miles (foraging in Puget Sound)	No effect	▪ Suitable habitat is not present in the action area.

Listed Species/Critical Habitat	Jurisdictional Agency	Nearest Suitable Habitat	Effect Determination	Effect Determination Rationale
				▪ Critical habitat is not in action area (USFWS 2022c).
Streaked Horned Lark (*Eremophila alpestris strigata*)	USFWS	44 miles (Puget Sound Lowland site[1])	No effect	▪ Suitable habitat is not present in the action area. ▪ Critical habitat not within action area (USFWS 2022d)
Yellow-Billed Cuckoo (*Coccyzus americanus*)	USFWS	Extirpated in Washington[2]	No effect	▪ Suitable habitat is not present in the action area. ▪ Critical habitat is not within action area (USFWS 2022e).
[1] Stinson 2016; [2] Wiles and Kalasz 2017				

MAGNUSON-STEVENS ACT

The Magnuson-Stevens Act mandates that NMFS must identify EFH for federally managed marine fish. Federal agencies are required to consult with NMFS on all activities, or proposed activities, authorized, funded, or undertaken by the agency that may adversely affect EFH. The Pacific Fishery Management Council (PFMC) has designated EFH for the Pacific salmon fishery, federally managed ground fishes, and coastal pelagic fisheries (NOAA Fisheries 1999, PFMC 1999).

No designated EFH occurs in the action area. Thus, this project will have no effect for any designated EFH.

If you require additional information or clarification regarding this project, please feel free to contact me.

Respectfully yours,

KERRIE McARTHUR, PWS, CERP, FP-C
Managing Senior Biologist
206.999.6201
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cc: Beth Rood, HDR

ATTACHMENTS

Detailed Project Descriptions

REFERENCES

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

FGDC (Federal Geographic Data Committee). 2013. Classification of wetlands and deepwater habitats of the United States. Second Edition. Wetlands Subcommittee, Federal Data Committee and U.S. Fish and Wildlife Service, Publication FGDC-STD-004-2013, Washington, D.C.

Hruby, T. 2014. Washington State wetland rating system for western Washington, 2014 update. Washington State Department of Ecology, Olympia. Publication # 14-06-029.

King County. 2021. 2021 Stormwater pollution prevention manual: best management practices for commercial, multifamily and residential properties. King County Department of Natural Resources and Parks, Water and Land Resources Division, Stormwater Services Section. July 2021.

NMFS (National Marine Fisheries Service). 2022a. ESA threatened & endangered species directory [online database]. Available at: https://www.fisheries.noaa.gov/species-directory/threatened-endangered?title=&species_category=1000000031&species_status=any&regions=1000001126&items_per_page=25&sort= (accessed April 22, 2022).

NMFS. 2022b. National NMFS ESA Critical Habitat Mapper [online database]. Available at https://noaa.maps.arcgis.com/apps/webappviewer/index.html?id=68d8df16b39c48fe9f60640692d0e318 (accessed April 21, 2022).

NMFS (National Marine Fisheries Service). 1999. Essential Fish Habitat Consultation Guidance. NMFS, Office of Habitat Conservation, Silver Spring, Maryland.

PFMC. 1999. Amendment 14 to the Pacific Coast Salmon Plan – Appendix A, Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon (August 1999). PFMC, Portland, Oregon.

Marymoor Park Stormwater Facility Improvements
No Effect Letter
ATTACHMENT—PROPOSED PROJECT DETAILED DESCRIPTION

RAIN GARDEN

The rain garden project is located south of Marymoor Park Road and proposes to install storm drainage diversion/conveyance piping, a pre-treatment vortex separator, a vegetated bioretention channel and planted rain garden (bioretention cell) and associated overflow outlet improvements to provide retrofit water quality treatment and infiltration of runoff from contributing impervious and pervious surfaces. The drainage area to be intercepted includes the Marymoor Office Access Drive, Parking Lot area, Art Barn, Maintenance Building/Yard, and local access drives to those facilities. In total, the improvements will intercept runoff from about 8.7 acres of contributing park surfaces, of which about 1.9 acres comes from pollution generating impervious surfaces. Estimated peak runoff flows at the rain garden inlet conservatively range up to approximately 5.6 cubic feet per second (cfs) for the 100-year flood event (lower values apply to conveyance piping improvements). These improvements will capture, provide storage and bioretention soil mix (BSM) filtration treatment for, and infiltrate an estimated 99.5% or more of the annual runoff volume from the tributary drainage area.

To minimize the depth of bioretention channel and rain garden improvements excavation/ earthwork, excess disposal volume needs, and erosion potential, and to maximize high groundwater (approximate elevation 33 feet) separation, these improvements are being designed at very flat grades and slopes (0.15% to 0.25%). A full diversion of intercepted parking area runoff is proposed from the existing storm drain connection to the existing east–west drainage channel (located north of NE Marymoor Way). The rain garden will include an overflow spillway weir back to the east–west channel through an existing storm drain crossing NE Marymoor Way to the northeast (although overflow is not expected occur under project design criteria).

The bioretention channel is 370 feet in length, has a 4-foot bottom width, and 3:1 side slopes. The channel bottom will include an 18-inch depth of imported BSM material, and the native slide slope soils will be compost-amended. It will be planted with native vegetation species, with emergent species being used along the channel bottom.

The rain garden will be constructed in an existing depressional infiltration area within the park northeast of the Park Maintenance Facility. This area is current maintained lawn area, with a small area of reed canarygrass existing in the lowest elevation area. It will be excavated to a variable depth up to 4 feet below existing grade, then an imported drain sand (12-inch lift) and

BSM material (18-inch lift) will be placed for treatment functionality. Based on soils mapping and geotechnical investigation (including PIT testing), subgrade soil and permeability characteristics are favorable to achieving the targeted infiltration performance (mostly Type A soils). Finished grade bottom slopes on the rain garden will be variable, typically approximately 2.5%, but variable up to approximately 4%. The rain garden perimeter will be graded at side slopes of 4:1, and native side slope soils will be compost-amended. Similar to the bioretention channel, zoned native plantings will be installed in the rain garden, with emergent species used in the lowest elevation areas.

The overall proposed design area of the rain garden is approximately 25,000 square feet (0.57 acre). The maximum depth of storage impoundment in the rain garden will be less than 2.5 feet, although for frequent storms, the depth of short-duration water impoundment has been simulated to be less than 1 foot, with draw-down time expected to be less than 12 hours.

The diversion storm drain, bioretention channel, and rain garden will be constructed in upland areas, and beyond any mapped critical areas and their buffers. As such, these project improvements should not trigger any U.S. Army Corps of Engineers or Washington Department of Fish and Wildlife (WDFW) permitting needs/actions for work within the ordinary high water of waters or within wetlands or their buffers.

All work for these conveyance storm drain, bioretention channel, and rain garden improvements will occur within the identified King County parcel.

The next sections describe the expected construction methods and sequencing consistent with the 30% design plans.

Construction Overview and Methods

Construction will be completed using typical methods, sequencing, and protection methods for civil works construction around sensitive environments and critical areas. Existing trees (except 2 trees in the rain garden area that are to be removed) will be preserved with tree protection best management practices (BMPs) applied. Critical areas and their buffers adjacent to the construction work limits will be protected (no construction impacts within critical areas are expected). Temporary controls to manage accumulated waters within the work area will be installed.

Standard construction equipment and techniques are expected to be used for the storm conveyance storm drains, bioretention channel, and rain garden improvements installation. Equipment used will likely include an excavator, trench box, loader, compactor, dump trucks, concrete trucks, pavement saw-cutter, paving equipment, temporary pumps, and other handheld power tools. Existing site features to be demolished will be excavated and removed

from the site including any associated construction debris. Disturbed soils will be stabilized during construction using BMP control measures as described below (page 8).

Construction Sequencing

Construction of channel and culvert improvements are expected to follow this general sequence:

- Flag clearing limits and install temporary erosion and sediment control and spill control/prevention BMP measures in accordance with the Temporary Erosion and Sediment Control (TESC) Plan and Construction Stormwater Pollution Prevention Plan (CSWPPP).
- Install temporary pumps and force main used to isolate the work area and bypass any upstream channel flows (run-on) around the work area during construction of the improvements.
- Place dewatering sumps and pumps within the work area to remove any project area perched groundwater, incident precipitation runoff over the work area, and storm drain inflows.
- Install temporary flow dispersal systems on adjacent park lawn areas to manage and infiltrate the evacuated construction zone water.
- Sequence the storm drain improvements construction to keep a minimum of 1-lane access to the Marymoor Office Parking Lot open at all times.
- Relocate any utilities the conflict with the improvements (none currently are anticipated).
- Install diversion storm drain and pre-treatment (vortex separator) improvements.
- Maintain upstream Marymoor Office Parking Lot storm drain to the east–west drain channel during construction, with connection to the new diversion storm drain temporarily plugged until the end of construction.
- Complete bioretention channel grading and improvements with tie-in to the new diversion storm drain outfall.
- Complete rain garden grading and outlet storm drain overflow and conveyance connection improvements.
- Place sand underdrain layer and BSM material in the bottom of the bioretention channel and rain garden.
- Place and rotovate in amended soils on channel side slope restoration areas.

- Install new pavement base and asphalt concrete pavement course to restore access roadways and shoulders to their restored final configuration.
- Install plantings within the bioretention channel and rain garden, and complete final stabilization BMP measures.
- Remove TESC BMP measures and stabilize those areas.
- Complete final seeding of areas beyond the channel section.
- Demobilize and clean construction site.

Excavated material will be stockpiled on-site and any suitable material will be reused as backfill. Unused material will be hauled off-site (within the park) and disposal at upland locations to be designated by Parks operations staff.

CHANNEL IMPROVEMENTS

The channel improvements project is located north of Marymoor Park Road and proposes to replace 2 separate existing 18-inch corrugated metal pipe culverts under the west and east accesses to Parking Lot K with 8-foot wide by 3-foot high (internal dimensions) pre-cast box culverts (split box sidewalls for substrate installation), with bottom slabs embedded 1.25 feet (42%) below the restored streamed channel. The exposed culvert clear height is limited to 1.75 feet by road grade and channel invert elevations, but a substantial culvert cross-sectional area increase (from 1.8 square feet to 14.0 square feet) and associated hydraulic capacity gain will result. Culvert velocities will be reduced to less than 2.5 feet per second for design flows of up to 35 cfs for the east–west tributary channel. The project will also install pre-cast headwalls and wingwalls at the box culvert end sections to retain the adjacent road embankment side slopes.

The existing channel section between the culverts will be regraded and restored for water quality and enhancement habitat benefits, and similar for short sections of the channel downstream of the west culvert and upstream of the east culvert at tie-in to the existing channel. Multiple existing 8-inch to 12-inch storm drain outfalls to the channel will be maintained except for the realignment/replacement of an existing outfall at the east crossing. The existing channel bottom width varies up to approximately 6 feet. It exhibits a very flat hydraulic gradient (approximately 0.1%), and the resulting maximum channel velocities are less than 1.5 feet per second, which does not impart significant scour potential to the existing sand-size streambed substrate. The channel bed substrate will be excavated and replaced with a streambed gravel/topsoil mix that will be planted with water-tolerant native species to enhance seasonal filtration treatment and infiltration as collective water quality benefits. The channel banks will be regraded at 3:1 side slopes with soil amendment provided and will be restored with native plantings. Beyond the channel banks, trees will be added along the south channel bank to provide added shading for water temperature reduction to benefit water quality.

The 2 existing 18-inch culverts to be replaced along the east–west drainage ditch at the west and east Parking Lot K roadway access crossings have been identified by WDFW (Barnard et al. 2021) as fish passage barriers (based on depth). A larger 36-inch culvert that is downstream near the Sammamish River outfall (not proposed for improvement with this project) has a similar WDFW classification. The existing 18-inch culvert crossings are undersized to convey significant streamflow (currently limited to less than approximately 10 cfs) and result in frequent (annual) backwater flooding of the channel and Parking Lot K subgrade, as well as flooding of the fringes of the parking lot during larger events. The ditch is classified as a water of the state by regulatory definitions. Therefore, WDFW has Hydraulic Code Rules (WAC 220-660) authority over it, resulting in the need to secure a Hydraulic Project Approval for the channel and culvert improvements. However, due to various factors that limit the potential for off-channel fish passage from the Sammamish River, the limited extent of upstream channel habitat within the park, and concerns with potential fish stranding, WDFW has agreed to not require the replacement culverts to be designed for fish passage in accordance with their Water Crossings Guidelines (Barnard 2013).

The channel and culvert improvement project area is also subject to infrequent backwater inundation from the Sammamish River for events greater than approximately a 2-year flood recurrence interval. Based on Sammamish River hydraulic assessment by others (Tetra Tech 2018), the Sammamish River backwater influence at the larger 36-inch culvert crossing near the east–west channel mouth begins at flood elevations that occur less than 1% of the time, and at higher flood levels affecting the project area, less than 0.1% of the time. At the 100-year Sammamish River flood stage, the fringes of Parking Lot K will be marginally inundated without consideration of the hydraulic effects of the 3 culvert crossings moving upstream. Under existing conditions, those culvert hydraulic restrictions further increase the backwater flood elevation and frequency, and the culvert improvements will benefit project area flood levels by reducing hydraulic head losses at the crossings. Project area flood levels associated with the east–west drainage system peak flows will be reduced, although they will still be controlled by Sammamish River backwater flood levels during large flood events.

The project will over-excavate approximately 3,685 square feet of the east–west drainage channel, which will be backfilled with appropriate stream sediment and replanted. Approximately 21 square feet of the adjacent wetland will be regraded and revegetated with native plants. Neither of these activities is expected to result in loss of ditch or wetland acreage.

All work for the channel improvements and culvert replacements will occur within the identified King County parcel.

The next sections describe the expected construction methods and sequencing consistent with the 30% design plans.

Construction Overview and Methods

Construction will be completed using typical methods, sequencing, and protection methods for civil works construction in and around sensitive environments and critical areas. Existing trees to be preserved will be protected with tree protection BMPs. Critical areas and their buffers adjacent to the construction work limits will be protected (those areas not impacted and mitigated through project improvements). Temporary controls to isolate the construction area from run-on waters and to manage accumulated waters within the work area will be installed.

Standard construction equipment and techniques are expected to be used for the channel improvements and culverts replacement. Equipment used will likely include an excavator, trench box, loader, compactor, dump trucks, concrete trucks, pavement saw-cutter, paving equipment, temporary pumps, and other handheld power tools. Existing site features to be demolished will be excavated and removed from the site including any associated construction debris. Disturbed soils will be stabilized during construction using BMP control measures as described below.

Construction Sequencing

Construction of channel and culvert improvements are expected to follow this general sequence:

- Flag clearing limits and install temporary erosion and sediment control and spill control/prevention BMP measures in accordance with the TESC Plan and CSWPPP.
- Install temporary cofferdams within the east–west drainage ditch, upstream from the east crossing and downstream from the west crossing.
- Install temporary pumps and force main used to isolate the work area and bypass any upstream channel flows (run-on) around the work area during the installation of culverts and construction of channel improvements.
- Place dewatering sumps and pumps within the work area to remove any project area perched groundwater, incident precipitation runoff over the work area, and storm drain inflows (e.g., from adjacent parking area and roadway runoff).
- Install temporary flow dispersal systems on adjacent park lawn areas to manage and infiltrate the evacuated construction zone water.
- Sequence the culverts construction to keep 1 access to Parking Lot K open at all times, first completing the west (downstream) crossing, then completing the east crossing box culvert installation.
- For the west culvert, relocate the existing 6-inch water line in conflict with the new culvert installation.

- For each crossing, excavate and remove the existing 18-inch culvert, over-excavate to subgrade and place and compact new culvert stabilization and leveling course imported backfill materials.
- Install replacement 8-foot span and 3-foot rise pre-cast concrete box culvert, sequentially installing bottom section of split box, streambed material over the bottom slab, and then the top section of split box.
- Install box culvert pre-cast concrete headwalls and wingwalls, and place compacted structural backfill over the culvert to reestablished roadway subgrade elevations and new sidewalk grades.
- Install storm drain and outfall replacement at the east crossing.
- Complete channel improvements grading with tie-in to the existing channel downstream and upstream sections.
- Install channel bed replacement substrate with tie to new culverts installed substrate.
- Place and rotovate in amended soils on channel side slope restoration areas.
- Install replacement curbs and new sidewalk (west crossing), and complete access road shoulders finish grading.
- Install new pavement base and asphalt concrete pavement course to restore access roadways at their restored final configuration.
- Install plantings within and along the channel and complete final stabilization BMP measures.
- Remove temporary cofferdams and channel flow bypass facilities, allowing stream to flow within the new culverts and improved channel.
- Remove TESC BMP measures and stabilize those areas.
- Complete final seeding of areas beyond the channel section.
- Demobilize and clean construction site.

Due to the extent of stream channel improvements and excavation required for the pre-cast concrete replacement box culverts, if water is present in the ditch, work would require a temporary bypass for the length of the project improvements (approximately 450 linear feet). Construction disturbance limits within the park will be minimized to those only necessary for the channel and culvert improvements. Excavated material will be stockpiled on-site and any suitable material will be reused as backfill. Unused material may be hauled off-site and disposed of at an approved site to be selected by the contractor or it may be placed within the park property, outside of any critical areas or their buffers. Specified imported material will be placed in the reconstructed channel and culvert sections.

CONSTRUCTION TIMELINE

The projects are targeted to be constructed in fall 2023. All work for this project will adhere to the timing restrictions for construction that will be outlined in project permits to be secured. The prescriptive in-water work window established by WDFW for work in or adjacent to the Sammamish River is typically July 16 to October 15. Due to park use constraints, construction will be limited to starting in August and is expected to extend through end of September for ground-disturbing activities, with follow-up planting restoration extending through October. Therefore, an extension in the typical construction work window is expected to be needed and will be requested in permit application materials. Construction will generally adhere to the sequence described above.

BEST MANAGEMENT PRACTICES AND CONSERVATION MEASURES

The County will require application of appropriate BMP control measures to avoid and minimize adverse effects on aquatic resources. Though specific implementation means and methods will be determined by the contractor, the following key temporary BMPs and conservation measures are expected to be used in project construction:

- Construction clearing/working limits will be established and high-visibility fence installed, and all clearing and grading will occur within this designated area.
- Areas outside the construction limits will be left undisturbed.
- Silt fencing will be installed at the clearing limits that are downgradient from construction.
- Storm drain inlet protection in and near the construction zone will be provided.
- Existing trees to be preserved will be isolated using tree protection fencing.
- Stabilized construction exits (foreign object debris control mats) will be used to minimize sediment trackout, together with periodic roadway sweeping.
- Streamflow will be diverted around the construction area using cofferdams, pumps, and temporary piping.
- Groundwater and storm runoff within the work area will be extracted using dewatering. sumps and pumped to adjacent upland vegetated flow dispersal and infiltration areas.
- All stockpiles will be protected from erosion when not in frequent use by plastic covering, and perimeter protection will be provided.
- Concrete/pavement cutting water will be collected for off-site disposal at a permitted site.

- A lined concrete washout area will be provided (or washout will occur at the concrete plant), and accumulated water and materials will be hauled off-site for disposal at a permitted site.
- Dust suppression methods (watering) will be implemented.
- Temporary seeding and mulching and biodegradable erosion control products will be used where needed for construction phase soils stabilization.
- Permanent stabilization measures will be used including exposed soil compost amendment and revegetation plantings and seeding.
- Work will be completed during designated in-water work windows.

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