DCG WATERSHED

Conceptual Design Report

COTTAGE LAKE CREEK WEIR REMOVAL PROJECT

MID PUGET SOUND FISHERIES ENHANCEMENT GROUP

July 18, 2023

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Title-page image: Cottage Lake Creek flowing through an obsolete fish ladder and weir, to be removed to improve fish passage.

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Reference Number: **221032**

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Table of Contents

List of Figures

1 Introduction and Project Background

Mid Puget Sound Fisheries Enhancement Group (Mid Sound) is sponsoring a project to complete initial site assessment and conceptual design for removal of a weir on Cottage Lake Creek. A project location and general vicinity map is shown in Figure 1. The weir is an impediment to salmonid fish migration, and the project is undertaken primarily to improve fish passage. Grant funding for this initial stage of the project has been provided by the King County Flood Control District through its Flood Reduction Grant Program. Implementation of the project is tentatively scheduled for the summer of 2025. Final design and permitting will likely occur during 2024.

The project area is located within the Polo Club and Homestead communities, so the area surrounding the project is primarily residential. The weir was originally built as a low dam for an irrigation diversion, but it no longer serves that purpose. Its condition is deteriorating and, though it includes a fish ladder, it presents a partial barrier to upstream fish migration, as evaluated by the Washington Department of Fish and Wildlife (WDFW), see below. It is the farthest downstream fish passage barrier along Cottage Lake Creek.

The weir is a factor in sediment transport along the adjoining reaches. Removal of the structure would allow sediment transport to occur naturally again, reducing local aggradation upstream of the weir and sediment depletion immediately downstream. Due to the weir's age and condition, there is risk of failure unless action is taken. Such failure would likely occur during a high-flow event.

The project area consists primarily of Tracts 683880 and 344350 within the Polo Club and Homestead communities, respectively (see Figures 2 and 3). Possible, minor incursions onto adjoining parcels (as landowners permit) may also occur, this to be determined during a later, final design phase. The weir itself is located on the tract owned and administered by the Polo Club Homeowners Association (HOA), with access from the west. The Homestead HOA owns a similar parcel, providing access to the opposite creek bank, from the east.

1.1 History of the Weir

The weir was built to divert irrigation water for agriculture and is believed to be about 100 years old. However, details regarding its construction and history are lacking.

1.2 Fish Use of Cottage Lake Creek and Barrier Status of the Weir

Cottage Lake Creek supports Chinook, coho, and sockeye salmon, and steelhead, cutthroat, and resident trout (WDFW SalmonScape website accessed 2/23, WDFW Cottage Weir 08.0122

2.00 Barrier Report). Improving fish passage by removing the weir would benefit of all of these salmonid fish species. The weir is identified as site ID: 08.0122 2.00 on the WDFW Fish Passage Barrier website. It has been assessed as a partial barrier to upstream salmonid fish migration by the barrier report for the structure, rated at 67% passable by upstream-bound salmonid fish due to the height of water surface drops. However, the slats in the fish ladder sometimes fail due to high flows, so some winters it is a complete fish passage barrier until the fish ladder is repaired.

SalmonScape and WDFW fish migration barrier mapping also show a full barrier to upstream fish migration at NE 161st Pl, a mile upstream of the weir removal site, yet SalmonScape also shows Chinook, coho, steelhead, and sockeye (including kokanee), use above this barrier.

1.3 Project Goals and Intent

The primary goal of the project is to benefit salmonid fish by restoring full access and unimpeded passage access along Cottage Lake Creek. Most notably, for Puget Sound Chinook salmon which are federally-listed as threatened and serve as a primary food source for endangered Southern Resident Killer whales. In addition to improved fish passage, project goals include improved in-stream, floodplain, riparian, and upland habitats for the benefit of listed Chinook salmon and other fish and wildlife. Invasive vegetation will be removed and a native revegetation plan implemented throughout the entire project area. Additional salmonid fish species to benefit will include sockeye (including kokanee), coho, steelhead, sea-run cutthroat, and resident trout.

The goals of the first phase of work as described in this report are to complete a site assessment and conceptual design for removal of the weir along with subsequent in-stream and riparian restoration. In the process, requests and suggestions from the adjoining communities will be incorporated such that the design will acknowledge or maintain some of the weir's history and/or provide educational signage explaining the significance of removing fish passage barriers, and details on the restoration project. Several meetings with community members have been or will be undertaken to collect their feedback and suggestions for how or if they would like to have interpretive signage or a memorial-like structure as part of the design.

WRIA 8 Goals

The WRIA 8 Chinook Salmon Conservation Plan identifies the Cottage Lake Subarea as highest priority, Tier 1, with core Chinook use and high watershed function. Cottage Lake Creek is a Tier 1 main stem stream for Lake Washington/Issaquah Creek Chinook. In addition to improving fish passage, the weir removal and channel restoration project addresses the directives in the salmon conservation plan to: Protect and Restore Functional Riparian Vegetation; and Protect and Restore Channel Complexity.

This project will remove invasive plant species from the project area and revegetate with native species, thereby assisting in reaching the WRIA 8 near-term goal of increasing riparian cover in Tier 1 (including Cottage Lake Creek) and Tier 2 streams by 10 percent by 2025 (compared to 2015). This will also assist with the long-term goal for these streams' riparian areas to be of sufficient size and quality to help support sustainable and harvestable Chinook salmon populations in the watershed by 2055.

This project will place around 10 logs in and along Cottage Lake Creek and will support the short-term goal in Tier 1 and 2 streams for wood volume to double (over 2015 basin conditions) by 2025. This placement along with increased long-term recruitment will also support reaching long term wood density goals.

The project will take a channel segment which has been altered by past agricultural and other development and will first remove a migration barrier and then restore complexity and function. The stream channel at the weir location will be set on a pathway such that natural processes can take over to maintain highly-functional habitat on their own, with little assistance, over time. Bank vegetation coverage at the project site is moderate, but much of it is non-native.

A meaningful amount of wood will be imported and added to the channel during project implementation, but this heavy-equipment-placement of wood is not a natural process. However, it is needed as a stopgap measure to provide wood to the system until restored natural processes can take over once again with respect to wood recruitment. This is a long-term process. By the time the project-placed wood has reached its useful lifespan, planted trees along the banks will have reached a size suitable for meaningful recruitment.

Similarly, efforts to remove invasive and other non-native vegetation and replace it with native vegetation now, during project implementation, is necessary to set habitat-sustaining natural process on course. Once the planted native vegetation has matured (with an emphasis on native conifers), a future forested condition will be less susceptible to invasion by non-natives.

Rearing by naturally-spawned juvenile fall Chinook takes place in streams such as Cottage Lake Creek primarily during the late winter and spring months, January through June. For effective rearing, these juvenile Chinook need a complex habitat with quiet-water micro-habitat areas readily available across the entire range of flow levels or channel stages. Otherwise, they may be forced downstream prematurely by high-flow events and be unable to take advantage of available rearing habitat.

The proposed project will provide roughness and cover along the existing channel, resulting in quiet-water edge habitat for juvenile Chinook at low and moderate flow levels. These low-velocity areas are important for providing quiet-water refuge during extreme flow events, to

allow fish a means of avoiding being displaced downstream. But aside from providing low-velocity refuge during larger events, it is also necessary to provide other essential habitat functions including protective cover and food production so that juvenile Chinook can survive and grow during the weeks and months that they spend rearing in Cottage Lake Creek. Their size and condition as they move farther downstream through Bear Creek, the Sammamish River, Lake Washington, and then out to sea is a key factor in their rates of survival and eventual return as adults. The wood placement components of the proposed project will provide protective cover in pools and roughened, low-velocity edge habitats, and the native revegetation component will enhance food production for juveniles, both from terrestrial insect production as well as providing organic inputs to the channel in support of aquatic insect production.

1.4 Description of the Proposed Project

As described elsewhere in this report, the primary element of the proposed project is the removal of an obsolete concrete weir for the purpose of improving conditions for upstream salmonid fish migration. In addition, in-stream areas disturbed by this demolition will be restored, including streambed spawning gravel placement, log structure placement, and associated pool formation. The concrete walls forming the now-vertical streambanks adjoining the weir will be removed and the banks re-sloped at a more natural angle, comparable to the adjoining channel sections. Streambank areas graded or otherwise disturbed will be revegetated with native trees, shrubs and groundcover plant species to restore improved and more natural habitat conditions. Additional project details will be added during the subsequent permit-level and final design stages.

1.5 Basin Characteristics

Cottage Lake Creek is approximately 6.7 miles long, with the project area occurring approximately 2.1 miles upstream of the confluence with Bear Creek. The Cottage Lake Creek sub-basin is approximately 8,000 acres out of a total of about 32,100 acres for the entire Bear Creek basin (King County stream report website). About 6,535 acres of the sub-basin lie upstream of the project site (USGS StreamStats accessed on 1/25/23). Streamflow at the site is estimated at 182 cubic feet per second (cfs) for the 2-year event, 359 cfs for the 10-year event, and 606 cfs for the 100-yer event (StreamStats). Summer low flows are around 5 cfs at King County Stream Gauge 02L - Cottage Creek at NE 159th Street. Figure 5 shows the drainage area to Cottage Lake Creek within the overall Bear Creek basin.

2 Existing Conditions and Site Description

2.1 Project Location

The project area is located entirely in unincorporated King County, in Tract 683880, adjoining 19232 NE 149th St., Woodinville, WA 98077, Parcel #6838800130. Tract 344350 also provides access to the site from the east. See Figures 1 through 3 for vicinity, setting, and site maps and aerials.

Driving directions: Follow Avondale Rd. NE out of Redmond, turn right on NE 149th St. The weir and fishway are located on the left side via access Tract 683880, adjoining the reference parcel on the Polo Club Community side.

The site is situated in the Cedar-Sammamish Watershed, Water Resource Inventory Area (WRIA) 8. Specifically, within the Bear Creek subbasin, along Cottage Lake Creek, stream 08-0122. The Public Land Survey System defined location is Township 26 N, Range 06 E, Section 18, SE ¼, at coordinates 47.73465 N lat./ 122.07826 W long. Cottage Lake Creek is a tributary of Bear Creek which in succession drains to the Sammamish River, Lake Washington, Lake Union, the Lake Washington Ship Canal, and finally through the Hiram Chittenden Locks and into the marine waters of Puget Sound.

2.2 Topographic Survey of the Project Area

See Appendix A for the Existing Conditions Site Survey. Site elements depicted on the survey include the existing weir structure, topography significant trees, flagged wetland and stream channel (ordinary high water) boundaries, and an existing 8-inch water line which crosses under the stream just downstream of the weir. Also shown are the parcel layout and boundaries for a native growth protection easement (NGPE) on the west side of the creek and a drainage easement on the east.

2.3 Description and Condition of the Existing Weir and Incorporated Fish Ladder

The weir was originally built as an irrigation water diversion structure for agriculture, but it currently serves no function. The weir complex is a concrete structure with concrete weirs, concrete streambank retaining walls, and a timber weir-pool fishway. Downstream of the concrete weir, the retaining walls on both sides have been undermined and have active flow under and behind them, and they are starting to fail. See the photo figures below for various views of the weir and access routes; see Figures 16 and 18 for views of the failing retaining walls.

The weir is approximately 30 ft wide and 5 ft tall with a fish ladder including wood slats with pools. The retaining walls on either side are 7 ft high and 15 ft long. In the channel at the base of the weir is a concrete slab which formerly functioned as a footbridge support, but which fell into the creek when the footbridge failed in the 1990's (see photos, Figures 17 and 18, below). The former bridge footings and abutments which are still standing along either bank are beginning to fail and tilt over the stream.

2.4 Stream and Riparian Conditions Upstream and Downstream of the Weir

2.4.1 Fish Habitat

As described above in Section 1.2, Cottage Lake Creek generally provides excellent habitat for several salmonid fish species. Most notably, fall Chinook salmon which are listed as threatened under the endangered species act (ESA) and are the preferred food of endangered Southern Resident Killer Whales.

The proposed project will benefit these fish primarily by removing the most downstream fish passage barrier in the Cottage Lake Creek system. However, additional fish habitat benefits will also be realized in and near the project area as a result of implementing the project. The weir is currently reducing the quality of spawning habitat for the length of stream extending about 250 feet upstream of the weir by interrupting sediment transport and hyporheic (within-gravel) flows. Subsurface flows within the streambed gravel layer are crucial for salmonid fish egg incubation, in that they bring well-oxygenated water to those incubating eggs. Water being impounded on the upstream side of the weir (or low dam) has reduced flow velocities there and has caused deposition of fine sediments, which are very poor as a spawning substrate for salmonid fish. Removal of the weir is expected to consolidate flow into the main channel and lower the water surface level moderately upstream of the weir. In the process, accumulated fine sediment would be washed downstream, exposing higher quality spawning gravel which has been buried by the fines.

There is some native vegetation along the streambanks in the vicinity of the project site, but there is an opportunity for infill planting, and areas disturbed by the weir demolition and removal will be densely planted with native vegetation. Such vegetation contributes greatly to habitat value for salmonid fish by providing shade and recruitment of large wood, but also by providing organic material inputs overall in support of the aquatic food web.

Likewise, the in-stream and streambank areas disturbed by weir demolition and removal will provide the opportunity to place several large wood structures of several logs each within the

active channel. Such structures form and maintain pool habitat, with built-in protective cover, to provide rearing areas for juvenile fish as well as holding and resting areas for spawning adults. Suitable spawning gravel will be placed where the weir is now located. Spawning tends to occur in riffle areas, particularly near pools with cover where spawners can seek refuge when threatened.

2.4.2 Wetlands

The study area was evaluated for wetlands using methodology from the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region Version 2.0* (U.S. Army Corps of Engineers 2010). Presence or absence of wetlands was determined based on an examination of vegetation, soils, and hydrology. These parameters were sampled at several locations along the wetland boundary to determine the approximate wetland edge. Wetlands were classified using the Department of Ecology's *Washington State Wetland Rating System for Western Washington: 2014 Update* (Hruby 2014).

A riverine wetland (Wetland A), was found immediately upstream of the weir (Figure 4). It is an approximately 0.3-acre wetland with emergent, scrub-shrub, and forest Cowardin classifications. Several collected data points confirm the presence of hydrophytic vegetation, redoximorphic soils, and hydrology. Dominant vegetation includes Pacific willow (*Salix lucida*), red-osier dogwood (*Cornus sericea*), and reed canarygrass (*Phalaris arundinacea*). Hydric soil and hydrology indicators include hydrogen sulfide (A4) and a high water table (A2).

Critical areas in unincorporated King County are regulated by the County's *Critical Areas Regulations* [King County Code (KCC) Chapter 21A.24]. According to the code, wetlands are rated as one of four categories based on the 2014 Wetland Rating System. Under the Rating System, preliminary rating scores show that Wetland A receives eight points for water quality functions, eight points for hydrologic functions, and six points for habitat functions, for a total of 22 points. This score qualifies Wetland A as a Category II wetland.

Wetland buffer widths in King County are based on a combination of the wetland category, the habitat score, whether it is located within the urban growth area (UGA), and the intensity of the site's land use. The project is within an UGA, which is considered a high-intensity impact (KCC 21A.24.325(2)b(1)). Wetland A has a habitat score of 6-7 and is located in an area considered high-intensity land use, therefore Wetland A requires a 150-foot buffer (KCC 21A.24.325), with a 15-foot building setback.

2.4.3 Geomorphic Conditions

A limited geomorphic assessment of Cottage Lake Creek was made in the vicinity of the obsolete weir on February 4, 2023. LiDAR imagery (Figures 6 and 7) and geologic maps of the region were also reviewed for overall geomorphic context and setting. The surface geology in the vicinity of the weir is mapped as younger recessional outwash deposits, characterized typically by sand and gravel with some silt and clay deposited by meltwater flowing from the receding Vashon glacier (Minard and Booth, 1988). Gravel and sand deposited in Cottage Lake Creek is likely recruited from within the banks of the creek itself as it moves laterally and vertically. Tributaries that form Cottage Lake Creek (Daniels Creek and Cold Creek) are positioned in relatively gentle topography with few steep slopes and little landslide recruitment potential. Additionally, the two lakes upstream of the project site, Cottage Lake and Crystal Lake, represent sediment sinks, rather than sources of recruitment for stream gravel.

Existing stream conditions are typical of what one would expect to find with a full-spanning channel blockage. Due to the weir and slowed water velocity upstream of the weir, fine sediment has deposited approximately 100 feet upstream of the weir. Additionally, the flow has spread laterally as sediment has deposited over time, likely resulting in formation of the wetland that exists now. Farther upstream (at least 150 feet), the stream channel has a more varied flow environment (i.e., pools and faster-moving riffles), with gravel bars and less fine sediment (see photo, Figure 8). Downstream of the weir, the water velocity is very fast moving, gravel in the stream is clean and free of fine material, and the channel bankfull width is around 12 – 14 feet. Bankfull depth downstream of the weir is estimated to be around 3 – 4 feet. The stream channel upstream and downstream of the weir is relatively confined. See the LiDAR imagery in Figures 6 and 7 which shows channel dimensions relative to valley width.

The average slope of the channel from upstream of the impacted area due to the weir to approximately 185 feet downstream of the weir is about 2.5% (or a vertical drop of 2.5 feet per 100 linear feet of channel). The downstream slope from the weir to 185 feet downstream is approximately 4.6 %.

The stream channel, post-weir removal, is expected to re-equilibrate to a more natural stream channel configuration and natural sediment regime as observed farther upstream of the current depositional area/wetland in the near vicinity of the weir and observed downstream of the weir. Channel migration is not expected because of the existing confinement. However, localized downcutting and subsequent bank erosion could be expected as the channel reaches an equilibrated state and new adjusted slope. Mitigation to prevent significant downcutting and bank erosion can be accomplished through design and construction of channel features, such as log placement, grading, and planting plan.

2.4.4 Existing Project Area Vegetation

Existing vegetation within the project area consists of predominantly native vegetation including trees, shrubs, and groundcover. Tree canopy cover is mostly continuous along the banks except for an area northwest of the weir. The westside pathway to the weir is lined with ornamental shrub species including Thuja cultivars, Picea, and other deciduous shrub species. Mature trees throughout include western redcedar, alder, willow, spruce, and big leaf maple. Some of the older willows are ornamental species and were likely planted by previous homeowners. Evidence of previous restoration planting efforts include the establishment of young native trees and shrubs including western redcedar, Sitka spruce, snowberry, salmonberry, Nootka rose, Oregon grape, red-osier dogwood, and ninebark. The groundcover was sparser but included native sword fern, fringecup, and wild ginger. Due to the timing of the assessment in winter, it was not possible to determine if any other perennial groundcover is present in other seasons.

The transition from a more natural planted area adjacent to the creek edge to a more manicured and maintained residential landscape near the homes varies throughout the project area. The most common occurrence is an immediate transition to maintained lawn at the top of the bank. The natural areas along the creek banks downstream of the weir have areas overgrown with non-native Himalayan blackberry, some English ivy, and spots of herb Robert. A small mulch path to the creek on the west side downstream appears to be actively maintained, however there was no evidence of vegetation being maintained for creek access. Some pruning of the natural area vegetation was observed including topping of some of the young western redcedars.

The western edge of the riverine Wetland A upstream of the weir is sparse and lacking vegetation. Within the wetland itself on that side of the creek, the dominant vegetation is the invasive species reed canarygrass. The eastern edge of Wetland A is more densely vegetated with emergent plants and shrubs including Pacific willow and red-osier dogwood.

2.5 Soils and Geotechnical Conditions

Based on a review of existing publicly available geologic information, Cottage Lake Creek is located within recessional outwash deposits. These deposits typically consist of stratified sand, gravel, and cobbles with minor silt and clay interbeds. During our site walk on February 6th, we observed that surficial soils downstream of the weir are generally sand and gravel soils which is consistent with this geologic description. However, surficial soils upstream of the weir appear to be very soft fine grain alluvial soils which were likely deposited after the weir's construction. We anticipate that recessional outwash would be encountered below the alluvial soils.

The weir is located between Northeast 149th Street to the west and Bear Creek Lane Northeast to the east. There is a pathway leading to the weir from each of these streets and it appears there was a pedestrian bridge crossing just below the weir at one time. During our site walk we observed that the weir appeared to be in good overall condition; however, there are concrete abutments for the former pedestrian bridge on each side of the weir which are being undermined by the stream and have begun to mobilize away from the pathway. The other existing slopes along the creek are generally shallower than about 3:1 (H:V) and we did not observe other signs of distress or instability during our site walk.

After the creek has been diverted, we anticipate that sumps and pumps should be sufficient to manage groundwater during removal of the weir within excavations shallower than about 4 feet. We recommend that the existing walls on each side of the weir also be removed during construction and the retained material be sloped in conformance with our recommendations for the creek. We anticipate that the site soils are OSHA Class C and temporary slopes should be limited to no steeper than 1½:1 (H:V), otherwise the use of temporary shoring would be recommended. Permanent slopes above the high water mark for the creek should be sloped no steeper than 2:1 (H:V), permanent slopes below the high water mark should be as shallow as possible and, where possible, armored to minimize erosion.

We understand that habitat log structures are being considered for the project which may require earth anchors for support. Based on our observations the site soils can likely support these structures, however, we should be provided with the preliminary project plans to review the types of anchors and loading, and to evaluate if field explorations may be required to support the design of these structures.

2.6 Project Area Constraints – Utilities, Parcel Boundaries, and Native Growth Protection Areas

Site constraints to be observed and accounted for during final design include parcel boundaries, a native growth protection easement (NGPE) on the west side of the creek, a drainage easement on the east side, and an 8-inch water line crossing just downstream of the weir. An effort will also be made during the project design phases to retain existing native trees, where feasible.

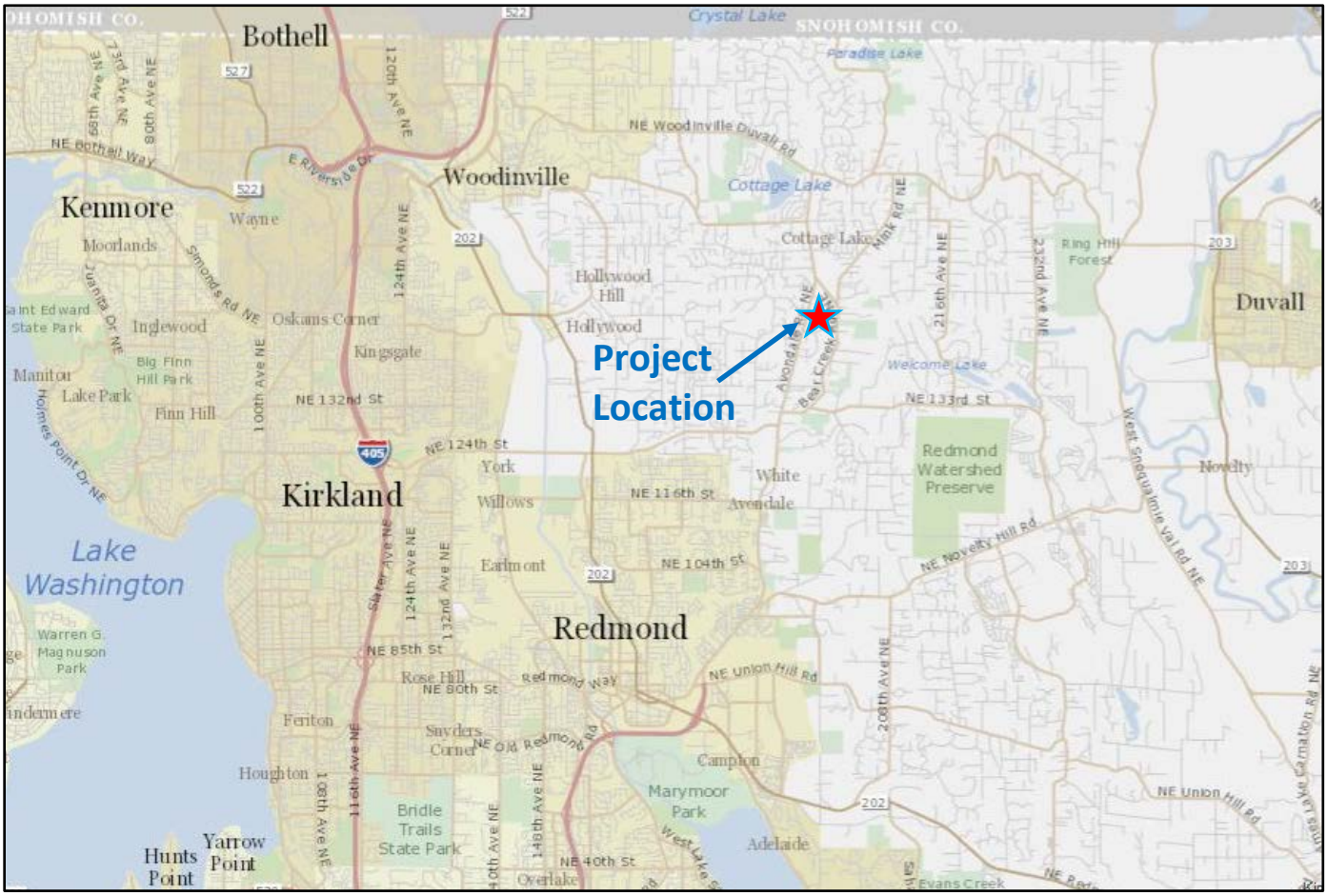


Figure 1. Project Location and Vicinity Map. King County iMap.

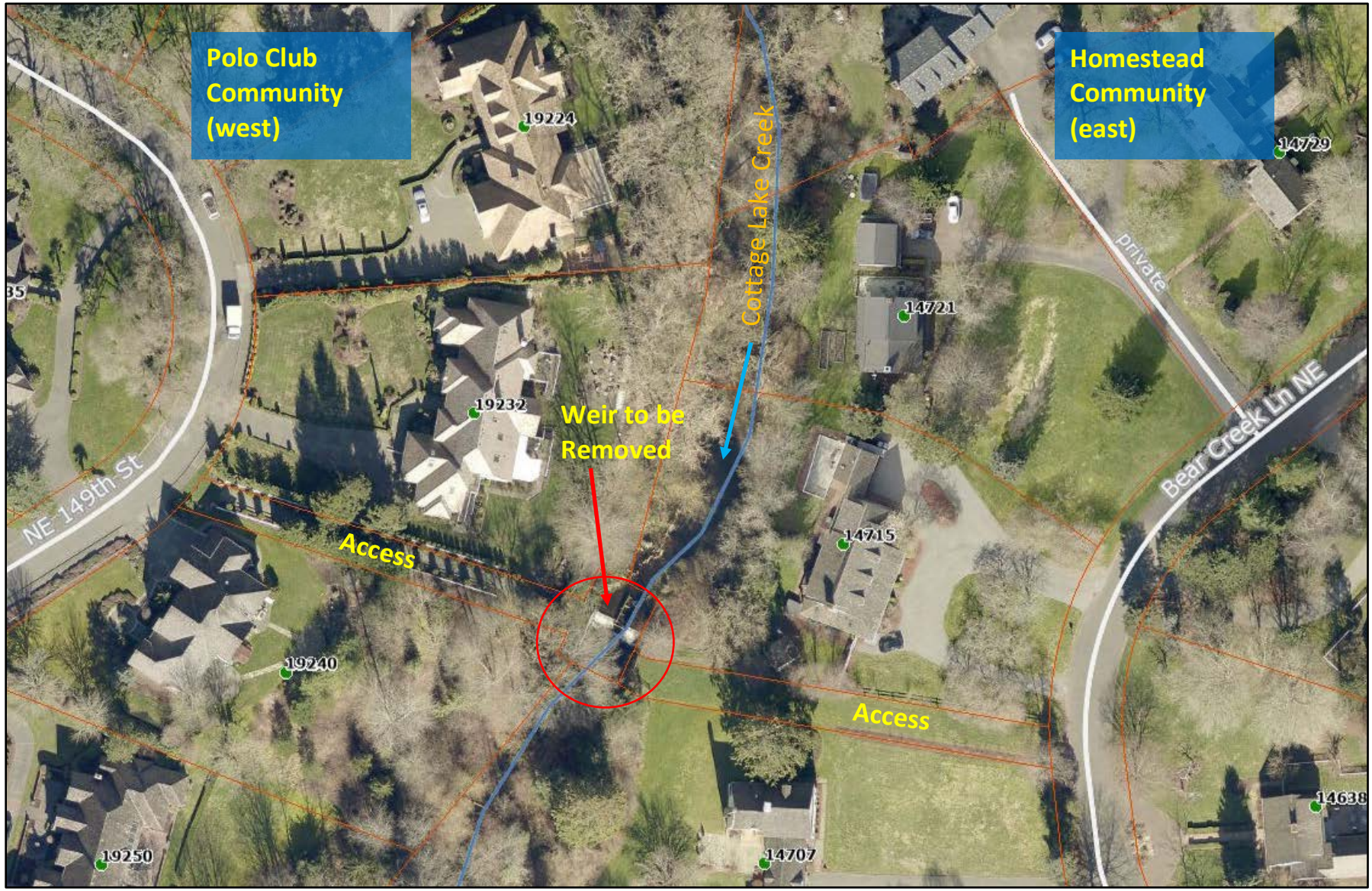


Figure 2. Project Setting in the Polo Club and Homestead Communities.

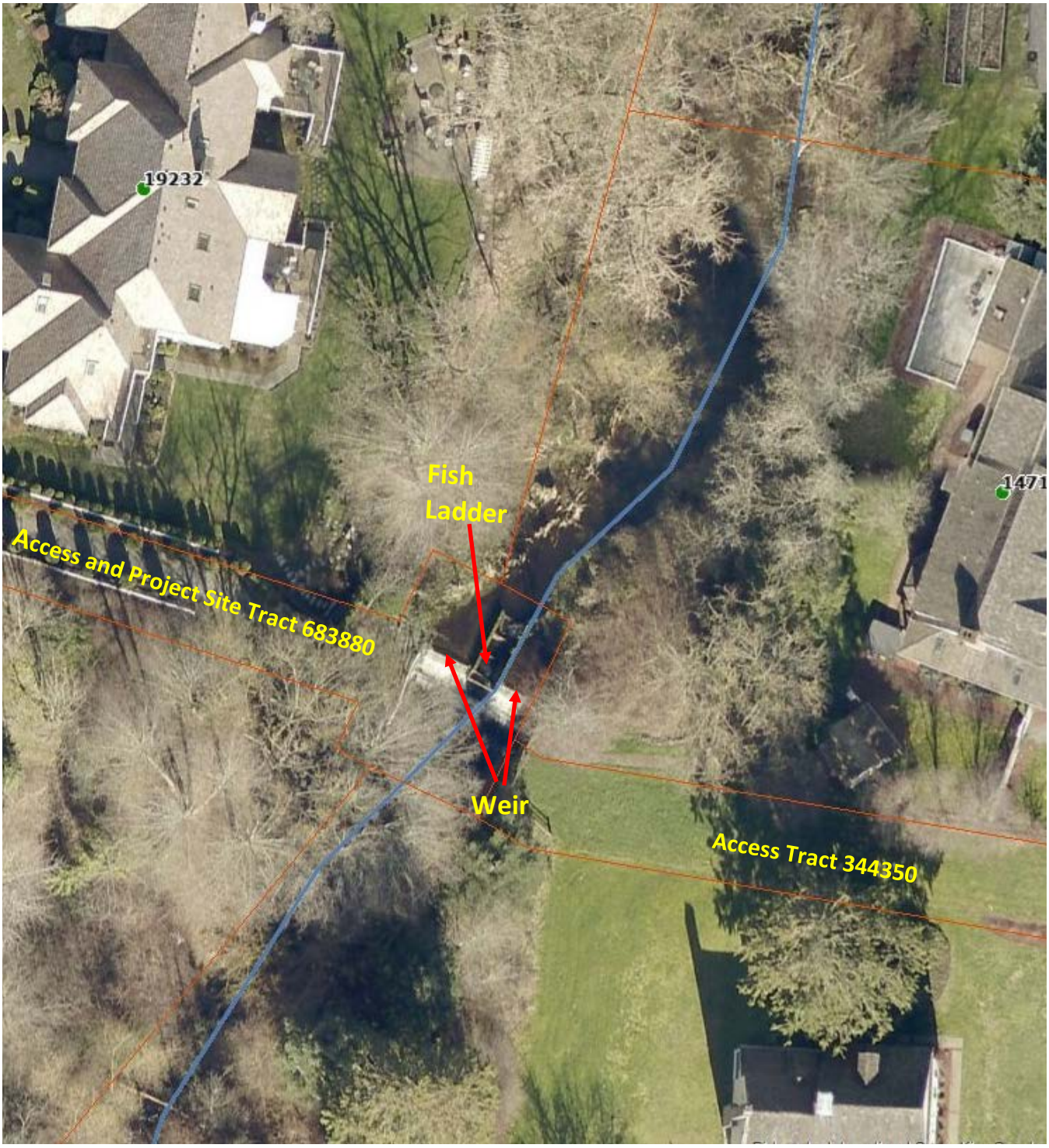


Figure 3. Project Site.

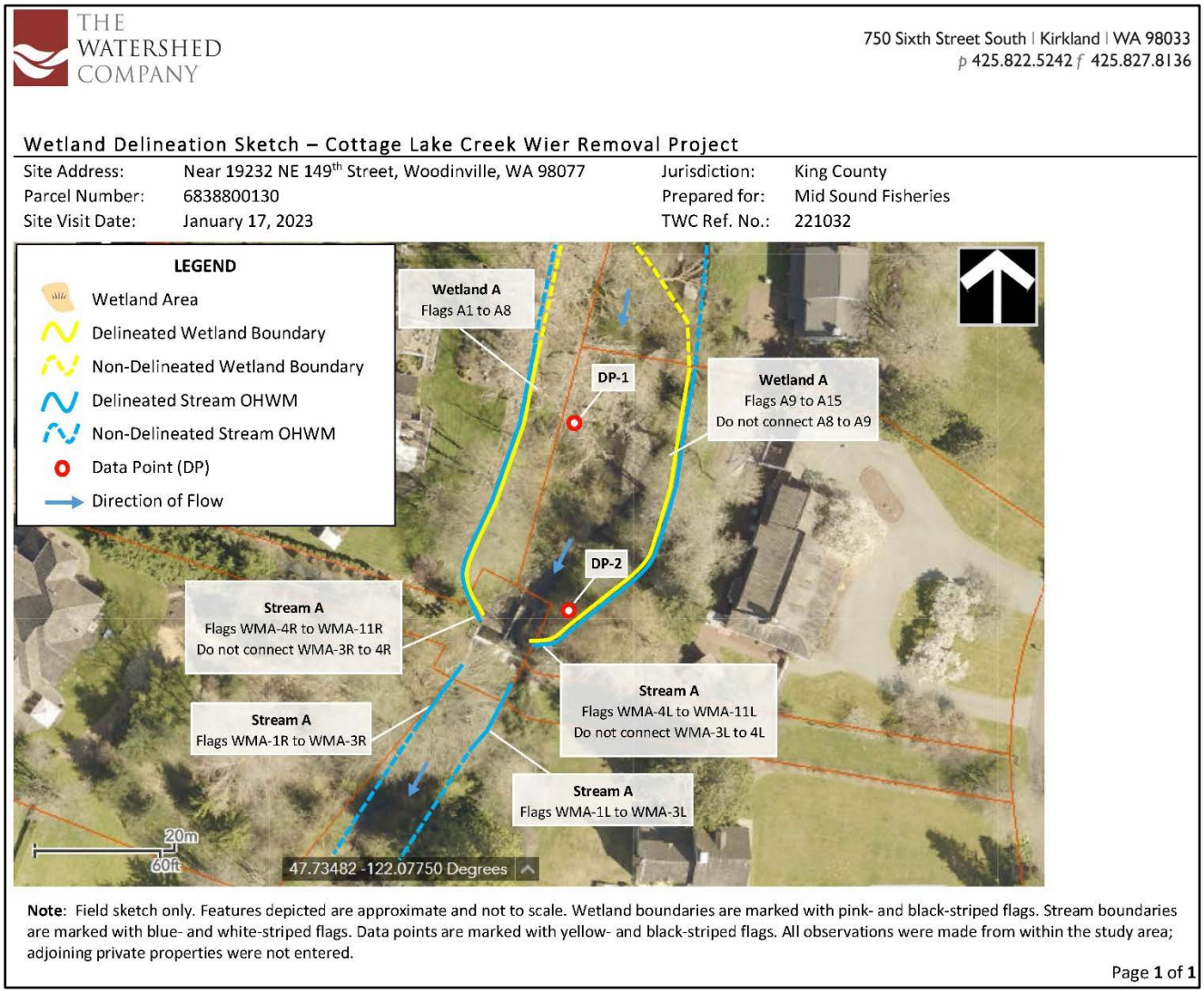


Figure 4. Stream and wetland delineation sketch.

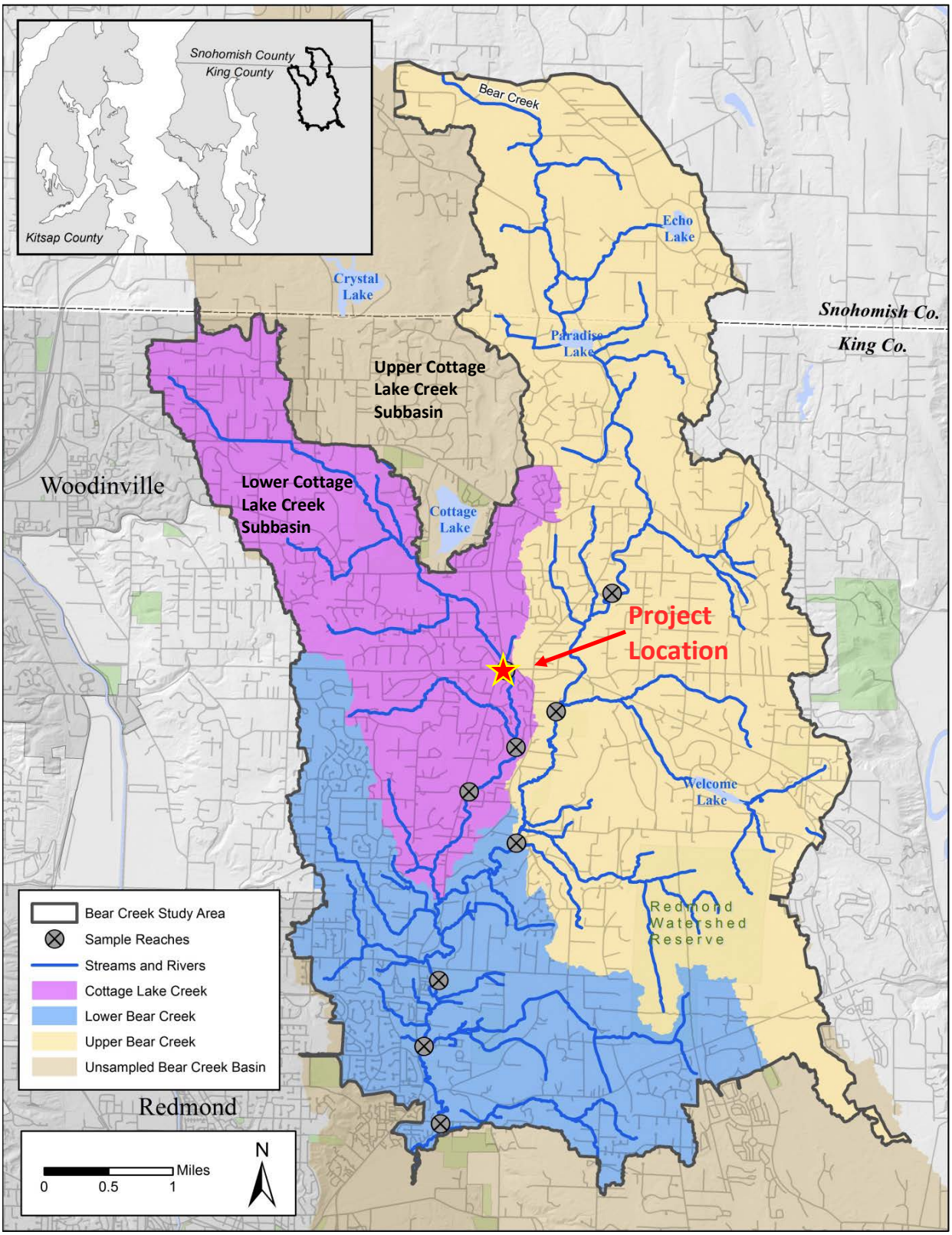


Figure 5. Bear Creek Basin. Figure from King County, 2017. Note that "Unsampled Bear Creek Basin" in the figure is also part of the Cottage Lake Creek subbasin, but was not addressed in the parent study.

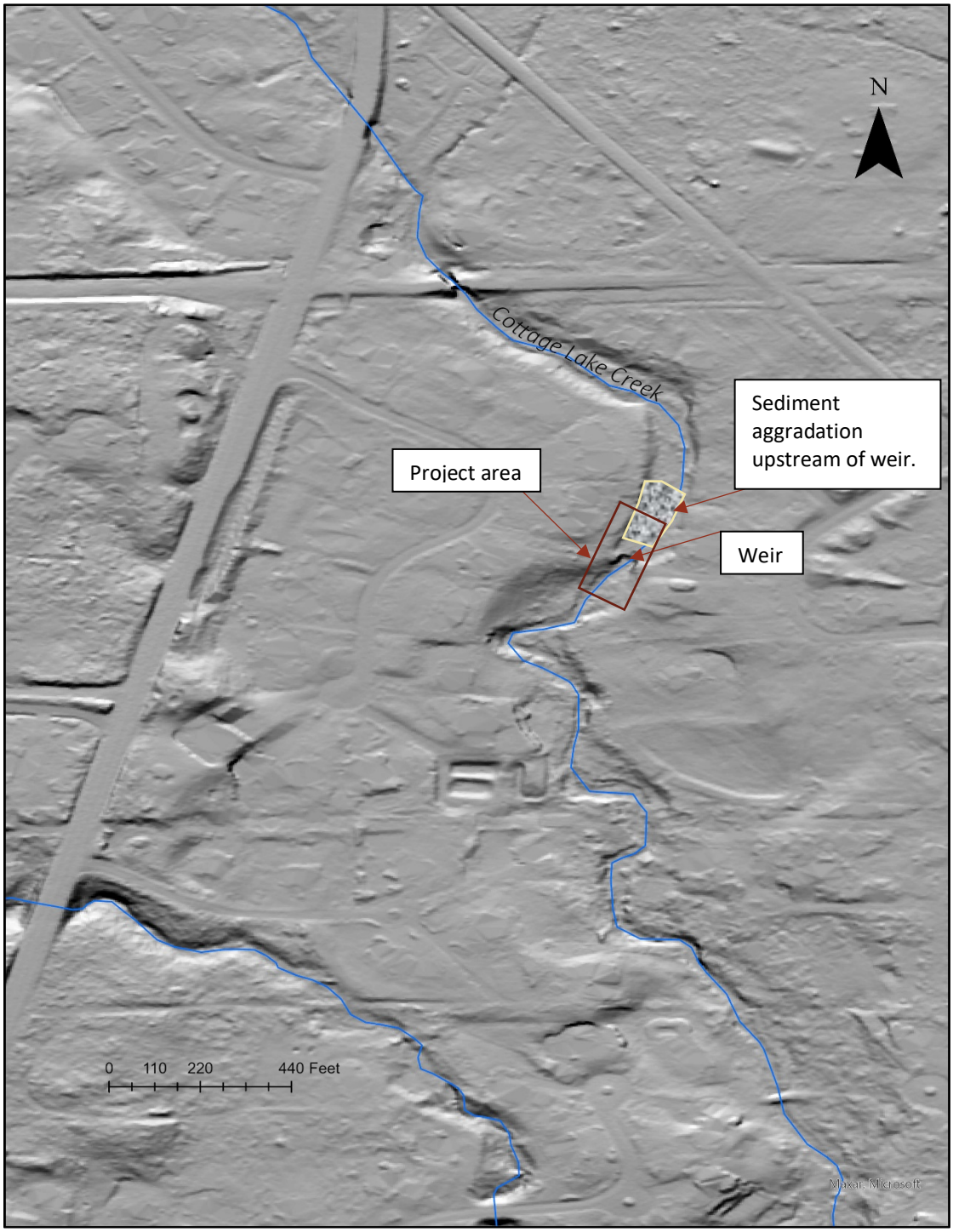


Figure 6. LiDAR imagery showing location and landscape of channel in vicinity of weir.

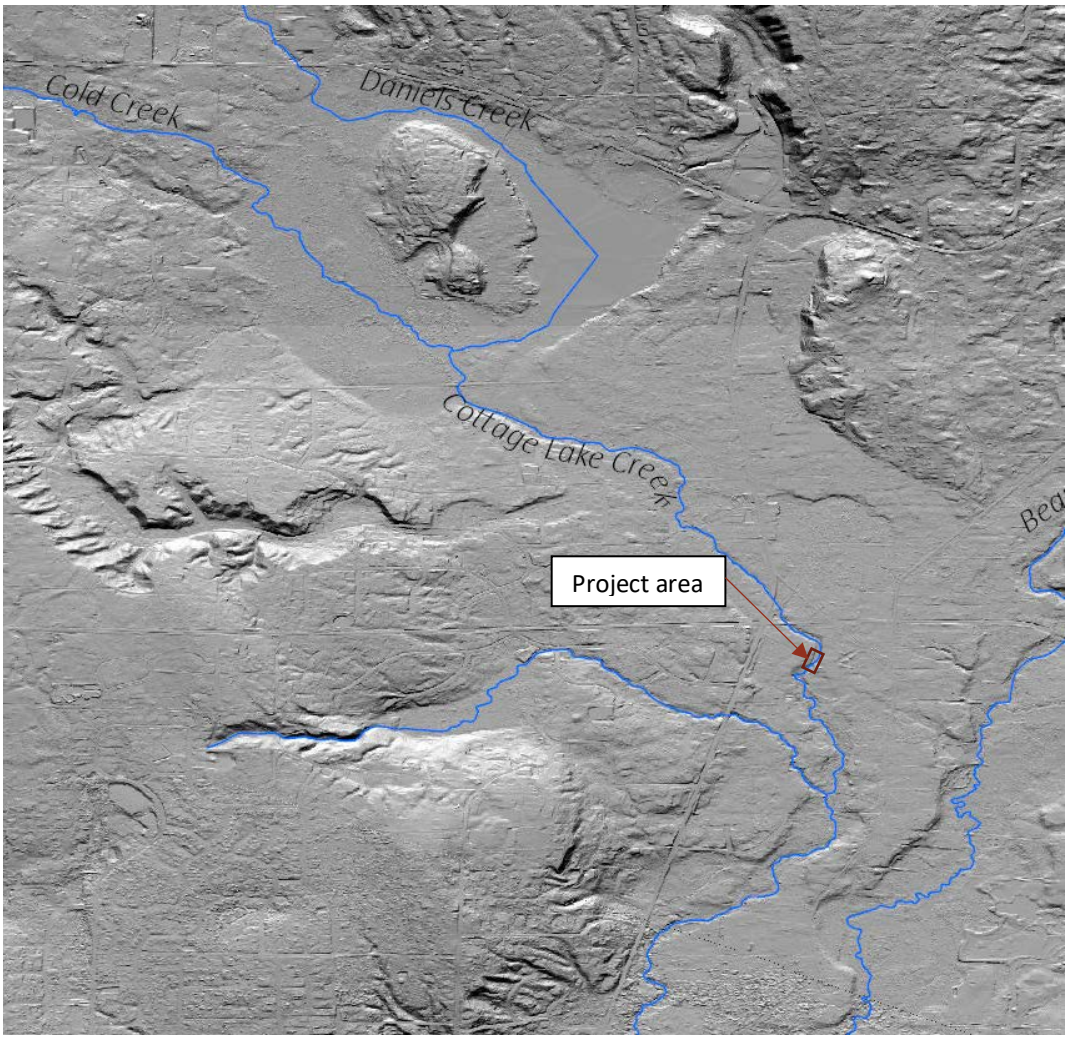


Figure 7. LiDAR imagery showing vicinity of project in the context of the surrounding landscape and terrain.

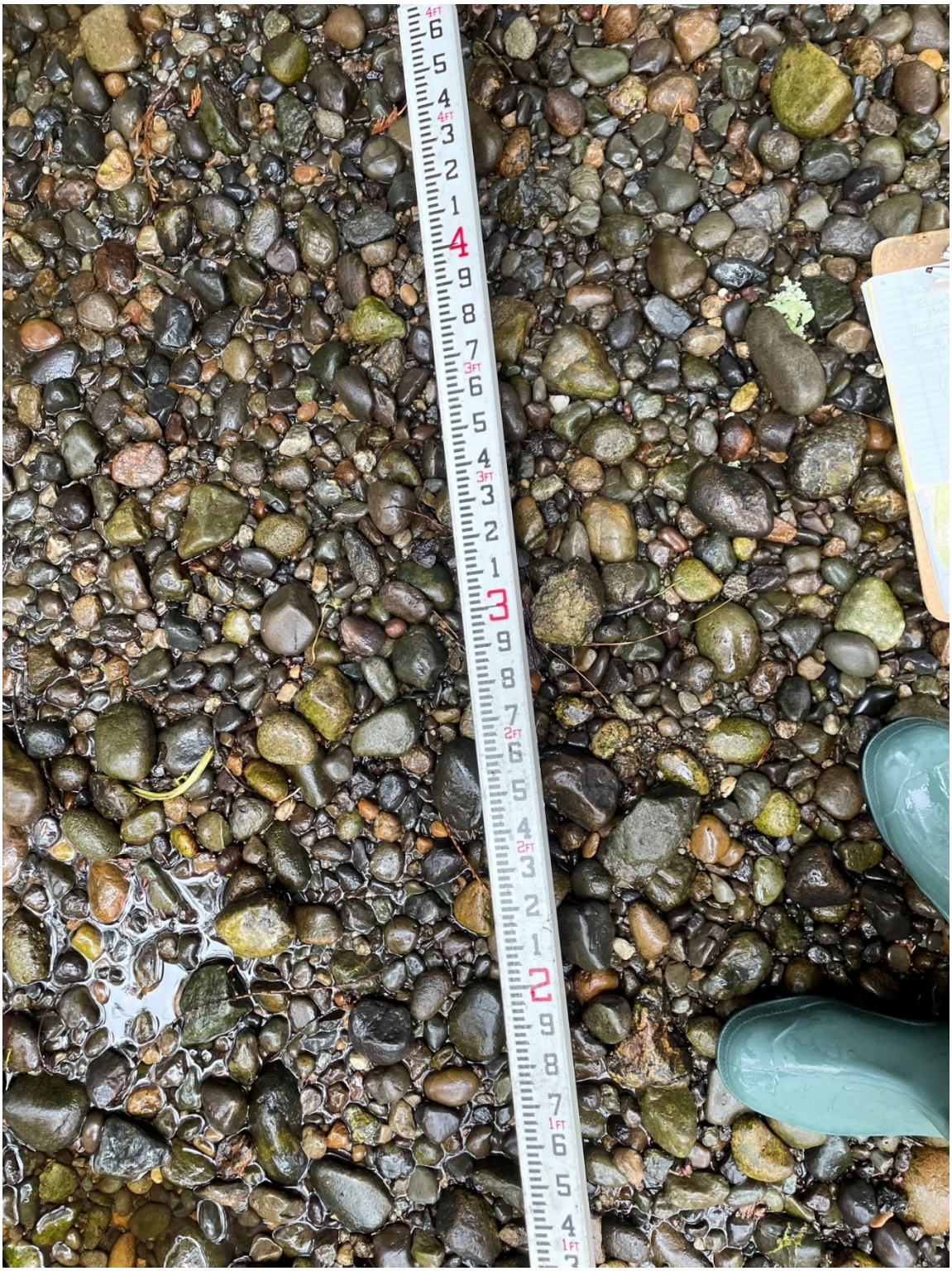


Figure 8. Gravel bar upstream of fine sediment depositional area upstream of weir (2/4/23).

Figure 9. Existing weir and fish ladder (12/15/22).

Figure 10. Close-up of fish ladder (12/15/22).

Figure 11. View from farther downstream, showing first downstream riffle (12/15/22).

Figure 12. Facing southeast downstream from above the weir. Riverine wetland in foreground, fish ladder walls and weir in the center, a home in Homestead neighborhood is in the background, upper left. (1/17/23).

Figure 13. Similar view of riverine wetland, fish ladder, and weir from upstream, facing south (12/15/22).

Figure 14. Facing east, community access from the Polo Club neighborhood (12/15/22).

Figure 15. Facing west, community access from the Homestead neighborhood (12/15/22).

Figure 16. Facing downstream (south) from just above the weir. Note failing concrete wall which was a former footbridge abutment (12/15/22).

Figure 17. A view of the channel facing south, downstream. The concrete in the channel on the left side is a toppled center support for the former footbridge (12/15/22).

Figure 18. Facing east, vertical streambank just below the weir, beyond which is the Homestead community (12/15/22). Note undercut, failing support wall.

Figure 19. The channel is resuming more natural characteristics with distance upstream of the weir (1/17/23).

Figure 20. Fish ladder and area upstream in October of 1990 showing backwatered condition and emergent vegetation.

Figure 21. Fish ladder in October of 1990.

Figure 22. Fish ladder in October of 1990.

Figure 23. Water overflowing the dam and backwatering the channel upstream, October 1990.

Figure 24. Facing southeast (downstream) along the Cottage Lake Creek channel from below the weir near the Homestead common parcel in 1990.

3 Stakeholder Review and Input

3.1 Process of Gaining Stakeholder Input

A number of on-site and on-line meetings were held during late February through May of 2023 to gain input for the project, possibly to be reflected by and incorporated into the design. The Mid-Sound Fisheries Enhancement Group coordinated these meetings which were also attended by members of the design team. Input was solicited from the following stakeholder categories:

- Residents of the Homestead and Polo Club Communities on the east and west sides of Cottage Lake Creek, respectively, at and near the project location.
- Regulatory agencies including the Washington State Department of Fish and Wildlife (WDFW), the Washington State Department of Ecology, the U. S. Army Corps of Engineers, and King County. (It is anticipated that the project will qualify for state permitting under a streamlined Fish Habitat Enhancement Process (FHEP) which eliminates or greatly reduces local permitting requirements. However, King County is expected to play a key review and advisory role in the project design and plan preparation, and may administer flood hazard permitting on behalf of the Federal Emergency Management Agency (FEMA).)
- The Muckleshoot and Snoqualmie Tribes.
- Grant Funding Agencies; King County Flood Control District.

3.1.1 Meetings with Adjoining and Other Nearby Property Owners and Neighborhood Community Meetings

- Thursday, February 16, 2023 7:00 PM-8:00 PM. Zoom meeting. Polo Club and Homestead Weir Introduction. Introduce Mid Sound Fisheries and the project team, discuss where we're at in the design phase for the removal of the Cottage Lake Creek weir and subsequent habitat restoration, and hear any questions from the community.
- Tuesday, February 28, 2023 10:15 AM-11:00 AM. Zoom meeting. Cottage Lake Creek Grading Conversation. Discuss grading approach and constraints for the Cottage Lake Creek Weir Removal Project.
- Wednesday, April 5, 2023 4:00 PM-5:00 PM. Zoom meeting. Conceptual Design Feedback Meeting for near neighbors – review of conceptual design draft plans.

3.1.2 Agency and Tribal Meetings

- Tuesday, April 11, 2023 10:00 AM-11:00 AM. Zoom meeting. Mid Sound Fisheries & USACE | Cottage Lake Creek Weir Removal Project Conceptual Design Review. Trevor Williams and Colleen Anderson with the Corps.
- Thursday, April 20, 2023 11:00 AM-11:45 AM. Zoom meeting. Cottage Lake Creek Weir Removal Project - initial feedback on the conceptual design draft. Kelsey Payne and Ezekiel Rohloff of the Snoqualmie Tribe
- Thursday, April 27, 2023 2:00 PM-3:15 PM. Cottage Lake Creek Site Visit to answer questions and collect feedback from agencies and tribes. Represented: Muckleshoot Tribe, King County, Ecology, Mid-Sound, Design Team.
- Friday, April 28, 2023 11:00 AM - 12:00 PM. Zoom meeting. Cottage Lake Creek conceptual design review with Washington Department of Fish and Wildlife and Washington Department of Ecology. Bethany Scoggins with WDFW and Cleo Neculae with Ecology.

3.1.3 Meetings with Potential Grant Funders: King County Flood Control District

- Monday, April 3, 2023 12:45 PM-1:45 PM. Cottage Lake Creek Weir Site Visit - WRIA 8 Grant Reviewers. On-site: 19232 NE 149th St, Woodinville, WA 98077

3.2 Summary of Stakeholder Comments and Design Recommendations

Topics discussed with stakeholders relevant to the design included:

3.2.1 Utilities – Water Main

A water main owned by the Woodinville Water District crosses under the creek just downstream of the weir. Parties wanted to make sure that its location is accurately known and that it is avoided.

3.2.2 Large Wood Placement

It was suggested to load the channel with a high wood density to maintain floodplain engagement upstream. Since we are lowering the water surface by removing the weir, we have more leeway to add wood without exceeding the zero-rise flood level requirement.

Ways of specifying and placing logs were also discussed as a means or reducing anchoring requirements. Longer and larger diameter logs are considered less mobile, as are logs keyed into a bank.

3.2.3 Sediment Transport

Effects of weir removal on sediment transport were discussed at several of the meetings. It was generally agreed that it was acceptable to allow the moderate amount of sediment that has accumulated upstream of the weir to mobilize and re-distribute naturally following weir removal. The channel would not be disturbed in order to adjust the channel profile farther upstream or downstream that equipment was able to reach readily from the weir demolition area.

3.2.4 Aesthetics

There has been limited discussion about aesthetics directly. So far, stakeholder participants in the discussion seem generally pleased to have the creek channel and adjoining riparian areas restored to a more naturally-functioning and -appearing condition. Restoring native vegetation within the stream corridor is generally seen as an improvement in aesthetics. Some discussion has occurred as to whether or not some large in-stream boulders should be considered for or included in the design. Such boulders would be fairly neutral in terms of habitat benefit or function, given the proposed placement of large logs to provide channel roughness, scour to form pools, and cover within those pools.

3.2.5 Extension onto Adjoining Parcels

Grading to accommodate an access trail from the west may occur on private property on the south side of the trail to avoid disturbing existing landscape features. The trail itself and a connected viewpoint will remain on the Polo Club community-owned access parcel. Likewise, a similar trail and viewpoint on the east side of the creek will remain within the Homestead community's access parcel, but some grading will occur on private property on the north side to accommodate the trail. See the Conceptual Project Plans in Appendix B for a depiction of grading, viewpoints, foot trail segments, and their relation to private and community-owned parcel boundaries.

3.2.6 Educational, Interpretive, Historic, and Commemorative Elements

A fair amount of discussion has taken place during the stakeholder meetings surrounding the extent, types, and locations of educational/interpretive or historic/commemorative elements that should be included in the project design. There has not been full agreement on these issues. See Section 4.1.7, below, for suggested treatment of these elements.

4 Presentation of the Concept Design

As discussed prior, the intent and purpose of this Cottage Lake Creek Weir Removal Project is to remove an obsolete and failing irrigation diversion weir in a way that restores upstream fish

passage and otherwise restores fish and wildlife habitat functions along the affected creek section. In addition, the restored site is intended to provide interpretive and passive recreational opportunities for nearby residents of the adjoining communities. A place to pause, sit along and enjoy the creek, and perhaps observe salmon, birds, and other wildlife. The concept-level plans for this project are included for reference in Appendix B following the report text. Included project design elements are described below:

4.1 Design Elements

4.1.1 Site Preparation: Temporary Erosion and Sedimentation Control

The site will be prepared with temporary erosion and sedimentation control (TESC) and other measures prior to demolition and subsequent restoration in an effort to minimize construction-related habitat impacts during project implementation. Note that work will take place only during a permitted "fish window" during the summer (see Section 4.1.9, below) when soils are drier, flows are lowest, and the fewest fish in species and number are present.

Site preparation plan notes:

1. Stabilize temporary access routes with hog fuel as necessary to maintain route in passable condition or as directed by inspector or engineer.
2. Minimize temporary access route width as necessary to minimize clearing of and damage to existing trees or vegetation.
3. Flag trees or vegetation requiring removal or pruning for access. Consult restoration ecologist prior to work.
4. Protect trees adjacent to work with planking as necessary to prevent damage to trees or as directed by the restoration ecologist.
5. Install high visibility fence where directed by engineer at project limits/clearing limits.
6 See flow diversion and fish exclusion plan. Creek section shall have fish removed and be de-watered prior to demolition work.
7. Indicated plan is a minimum. Amend as necessary to meet applicable water quality standards.

4.1.2 Flow Bypass During Construction

The plans call for construction of a sandbag and plastic coffer dam (or approved alternate) across the stream channel at or upstream of the limit of the affected in-stream work area, to create a pool. A flexible diversion pipe of sufficient size will then be placed to carry flow and any fish from the upstream pool to a point downstream of the downstream limit of the work area. The bypass pipe will be sized such that it will carry stream flows in excess of those expected during the permitted construction period, or as specified by project permitting. Initially, the diversion pipe is anticipated to be placed along the existing fish ladder through the weir, with the ladder's steps removed. As demolition work of the weir

progresses, this diversion pipe will moved from side to side as needed to stay out of the way during in-stream work activities, while still functioning to bypass stream flows. The bypass discharge is to be positioned to minimize erosion or turbidity resulting from the discharge velocity of the water.

A second sandbag and plastic dam or approved alternate is to be constructed a across the channel at the downstream limit of the affected work area to retain any silt-laden water that may collect as a result of implementation activities. A temporary shallow sump is to be dug in the streambed just upstream of the dam. Collected likely silty seepage water is to be pumped from the sump to upland areas for discharge and biofiltration and/or infiltration.

Although a gravity-flow bypass is envisioned and recommended, a contractor may also request that flow be allowed to be pumped around the work area. If pumps are used, the pump intakes are to be screened by a fine-meshed inner screen to keep fish from entering the pump and usually a coarser outer screen to retain debris. The inner screen is to be maximum 1/8-inch mesh and with an area large enough to ensure velocities through the screen of less than 0.4 feet per second under maximum expected flows during the project construction period. These screening requirements are according to National Marine Fisheries Service (NMFS) and WDFW standards. If pumps are used, they must remain operational continuously once pumping begins until instream work is completed and the channel re-watered. If the pumps fail and the channel within the work area is unintentionally re-watered before in-water work is complete, fish relocation and exclusion efforts would need to be repeated (see below).

4.1.3 Fish Relocation and Exclusion

Any fish present within the isolated in-stream work area between the coffer dams will be removed by the Stream Restoration Consultant in coordination with setting up and activating the streamflow bypass and de-watering of the work area. The isolated work area will not be fully de-watered until all fish have been removed from it. Given the size and characteristics of Cottage Lake Creek, it is expected that potentially-stranded fish can be located and captured using primarily dipnets and small seines nets, followed by electrofishing. Efforts to capture and relocate fish by netting methods will precede electrofishing. Captured fish will be released in unaffected stream reaches upstream and downstream of the project area.

Fish removal from the isolated work area and their safe relocation to free-flowing stream sections upstream or downstream will be conducted by and under the supervision of qualified and experienced biologists. Such fish removal and relocation will be done in accordance with the requirements of the forthcoming Hydraulic Project Approval (HPA) issued for the project by the Washington Department of Fish and Wildlife (WDFW) as well as any requirements specified in the special provisions of the project's specifications. These could include the Washington State Department of Transportation (WSDOT) Fish Exclusion Protocols and Standards. It is anticipated that a combination of seining, dipnetting, and electrofishing in that order of preference will be used to remove fish from the isolated in-stream

construction areas. The fish removal subcontractor will be on-call to return as needed should the work area be re-watered or the presence of any additional fish is otherwise noted within isolated work area as work progresses.

The sequencing of fish removal and relocation for the isolated work area along Cottage Lake Creek will be as follows:

1. The work area will be isolated using a combination of isolation (coffer) damming, block netting, and cross-channel screen fencing consistent with the project's Stream Diversion and Dewatering Plan (SDDP), which may be included in the project final plans and specifications or may be a submittal requirement of the contractor. Stream flows will be diverted around the work area by gravity flow (preferred) or pumping.
2. Initial fish removal will occur once isolation features have been placed, but prior to beginning to dewater the isolated work area. Depending on feasibility due to the presence of vegetation and debris, several initial passes will be made using seines and dipnets. Captured fish will be held for short durations in buckets equipped with aerators and filled with fresh, ambient water, and then released to unaffected stream reaches. Fish release will typically occur downstream of the project area though may occur upstream depending on suitability of stream conditions. During fish exclusion, captured fish will be tallied, identified by species, and noted for condition according to permit requirements. Data will be stored in a field notebook and reported in-person or via email to the project sponsor (Mid-Sound) and the prime contractor for multi-agency communication.
3. Once fish capture rates using netting techniques fall to zero or very low levels, electrofishing techniques will be used to conduct additional passes and remove remaining fish, continuing until no more fish are captured with successive passes. A crew of 2-3 will generally be used, with the member(s) not operating the electrofisher specifically responsible for monitoring fish condition and transferring fish for release to unaffected stream reaches in a timely manner.
4. Following initial fish removal efforts done prior to dewatering, the work area will be incrementally dewatered as successive fishing passes are made. In the final dewatering stages, any remaining fish stranded in residual pools or depressions will be captured using dipnets, including small "aquarium" nets. As for the previous efforts, these fish will be placed in buckets equipped with aerators and filled with fresh, ambient creek water and transported for release in unaffected stream sections.
5. Should any portion of the isolated work area become re-watered before work is completed for any reason (such as pump failure and/or breaching of isolation damming due to high flows) the isolated area(s) will be checked for fish presence by repeating the fish removal and relocation process as listed in steps 2-4, above, as it is again de-watered so that work can resume.

4.1.4 Demolition and Rough Grading

Concrete weir demolition and rough grading activities will be conducted to shape project area topography to sub-grade elevations within the de-watered stream section and adjoining streambank areas as depicted on the project plans. Over-excavation will occur to the extent needed to allow the placement of streambed gravels, topsoil, mulch, trail surfacing, and other materials to bring topography back up to finish grade elevations. It is anticipated that heavy equipment including a medium-sized track hoe will gain access to the site along the construction access route(s) as depicted on the plans, expected to be from the east. The channel cross section and profile will be shaped within the project area to sub-grade elevations as depicted on the plans. Excavation to form or adjust the channel profile extending upstream of the existing weir location will only occur as far as track hoe equipment can reach without additional channel disturbance beyond that needed for weir demolition. A restored streamflow regime after weir removal will be allowed to further fine tune and restore the channel profile.

4.1.5 In-Stream Grading and Log Cluster Placement as Habitat Features

Pool depressions within the disturbed channel section will be excavated as needed to accommodate the placement of proposed log structures, making certain to avoid the water supply line which is known to cross the creek within the project area. Such excavation will need to be sufficiently deep to result in pools at least 2 feet deep associated with log structures *after* final grading and substrate placement and to accommodate rootwads (which may otherwise tend to prop some logs up too high along the channel profile). Any non-gravel or non-rock spoils generated may be exported from the site or used to re-grade stream banks above ordinary high water (only), if and where consistent with the revegetation plans.

Log structures will then be placed and the pools associated with them will be formed and refined, again taking care to avoid damaging or otherwise disturbing the water supply pipeline known to cross the creek within the project area. The need for log anchoring and type(s) will be determined during final design. If earth anchors are used, care will again need to be taken to avoid damage to or disturbance of utilities. Woody materials specified for this project may include upright cedar or fir rootwads and cedar or fir trunks with root wads. All or nearly all of these woody materials and their anchors should placed prior to placing the specified spawning gravel substrate and streambank gravel/cobble/boulder mix. Short sections of filter fabric fencing or other TESC features, where present, may need to be modified or removed to allow log structure placement.

Once the log clusters are positioned and anchored, a to-be-specified spawning gravel mix will be placed along the channel bottom and a to-be-specified gravel/cobble/boulder mix will be placed along the lower stream banks, including between and amongst the placed logs and root wads. Placed gravel depths in pool bottoms should be shallow, more for looks. Downward scour in pools due to turbulence generated by logs and their rootwads under high streamflow conditions is generally beneficial for maintaining or deepening pools. During construction, care should be taken not to fill in pool depressions too much with substrate such that their areas and depths are reduced.

Once all in-stream work is complete, and at latest by the end of the permit-specified "fish window" for in-water work, stream flows will be re-introduced to the project stream channel section and the flow bypass will be de-activated and dismantled. See timing restriction below. Any silt-laden seepage water present in the in-stream work area at the cessation of in-water work activities will be allowed to settle or dissipate prior to reconnecting the de-watered work area to the flowing stream. Stream flow will be diverted back into the channel by removal of first the downstream then the upstream coffer dams and associated bypass piping.

4.1.6 Access and Viewpoints

The concept project plans depict a short trail section and a small viewing area on each side of the creek, accessible by HOA-owned parcels - the Polo Club from the west and the Homestead Community from the east. The viewpoints will provide a look at the restored stream channel section and passive recreational opportunities such as wildlife viewing, including several species of salmon passing upstream in season.

4.1.7 Interpretive, Educational, Historic, and Commemorative Signage and Displays

Stakeholder discussions did not meet with full consensus on the issues of presenting interpretive, educational, historic, or commemorative aspects of the project. The concept plans simply state that community amenities such as a bench at each of the two viewpoints and/or interpretive signage should be provided consistent with input from the neighborhood Homeowner Associations. Since the current effort depicts the conceptual design stage, there is time to refine these project elements at later permit-level and final design stages. A generalized approach is suggested here:

- Provide a bench at each of the viewpoint areas, one on each side of the creek.
- Historic and commemorative materials would not be placed right at the creek, but rather farther upslope near the beginning of each of the new short trail sections leading down to the viewpoints. If feasible and economical, some sections of concrete from the original weir could be placed near those trail entrances and identified. Attached or nearby signage could describe the weir that formerly existed, its purpose, and its historic significance with respect to century-old agricultural development in the area. Graphic or photographic depictions of the weir could be included as available. Reasons for removing the weir would be given, including 1) its obsolescence (no longer needed for irrigation), 2) its deterioration (resulting in hazards with no justification for repair), and 3) its detrimental effects on fish and wildlife habitat, most notably as a partial barrier to the upstream movements of several species of salmon.

- Likewise, educational and interpretive signage could be placed describing the habitat benefits to fish and wildlife resulting from removal of the weir. Explanations of the now well-functioning habitat could be provided – such as the functions of native streamside vegetation and how woody materials in streams help to scour pools for fish habitat and provide protective cover in those pools. If placed at or near the viewpoint areas, it is envisioned that such signage would be placed in ways to avoid interfering with views of the stream.

4.1.8 Native Revegetation

A native revegetation plan will be implemented in specified planting areas affected by the construction during the first dormant season (October through March) following in-stream work, allowing for the use of bare root plantings and live stakes in addition to container plants.

Prior to planting, all planting areas shall be clear of invasive or undesirable species. Himalayan blackberry and other invasive weeds will be grubbed out by the roots, by hand where necessary, from areas within the planting areas. Soils will be decompacted and amended as needed, and then protected with mulch and/or geotextile fabric. Fabric may be specified for steeper-sloped areas. Efforts will be made to preserve and make use of native topsoils as available. All overt traces of non-native vegetation will be removed, such as and including blackberry rhizomes and vines, in the process of topsoil placement, amendment, and finish grading.

A system for consistently delivering water to the revegetated areas during the first two consecutive summers shall be in place prior to the first summer after plant installation. An above-ground temporary irrigation system or pre-scheduled watering truck service could be considered so long as all areas can receive 1-2" of water each week during the summer drought period. Any temporary system components shall be removed after the first two summers.

4.1.9 Timing Restriction

Construction involving in-water work (this excludes revegetation) is estimated to take approximately six weeks to complete. In-water work is tentatively proposed to occur during the period extending from July 16 through September 30 as listed generally by WDFW for King County streams.

Table 1. Applicable work window.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Federal & State fish protection	No In-Water Work							In-water work		No In-Water Work		

4.1.10 Monitoring and Maintenance

The project designer or other designated representative will conduct construction monitoring. Revegetation plans will be subject to verification, and performance monitoring may required as indicated on the plans and permits. However, as a restoration project, this project is anticipated to have net positive benefits to habitat and so mitigation with accompanying performance standards may not be required or may be less stringent. It is *recommended* that planted vegetation be inspected annually during the late summer or fall for at least five years following the initial planting to determine if supplemental planting during the following dormant season, weeding, or other maintenance should be done. It is also recommended that vegetation be maintained at least twice each year for the first five years after project completion.

4.2 Estimated Costs and Timeline

4.2.1 Estimated Design, Permitting, and Construction Costs

Estimated project design, permitting, and construction costs based on the conceptual design are provided in the first table below, with construction costs (only) itemized in the second table following. Note that a contingency allowance of 50% has been applied to the construction costs based on the level of uncertainty at the conceptual design stage. Significant project design changes could occur at the draft and final design stages, which would affect costs. The percentage of contingency allowance will likely be reduced in subsequent project cost estimates as the level of uncertainty is correspondingly reduced.

Cottage Lake Creek Weir Removal Conceptual Design Engineers Cost Estimate		Weir Removal, Channel Grading, and Planting Restoration
Estimated Construction Cost		$519,643
Sales Tax	10.10%	$52,484
Contingency	50%	$286,064
Total Construction Cost		**$858,191**
Soft Costs		
Estimated Permit Fees		$46,600
Estimated Survey, Studies/Modeling, & Design (Less Permit Fees)		$195,000
Construction Monitoring	**7.5%**	$64,364
Estimated Project Grand Total		**$1,164,155**

Itemized Construction Costs

Item no.	Item Description	Unit	Unit Price	Quantity	Item Cost
	General Requirements				**$190,722**
1	Mobilization/demobilization (% of total)	%	$0.20		$78,437
2	Erosion and sediment control & SPCC plan (% of total)	%	$0.05		$19,609
3	Surveying (construction only) (% of total)	%	$0.03		$9,805
4	Protect ex utilities/shoring (% of total)	%	$0.05		$19,609
5	Unexpected site changes	LS	$7,500.00	1	$7,500
6	Perimeter Protection (silt fence, coir log, etc.)	LF	$9.00	876	$7,884
7	High visibility fencing	LF	$6.00	438	$2,628
8	Clearing and grubbing	AC	$25,000.00	0.15	$3,750
9	Remove tree (incl. trunk removal)	EA	$1,500.00	3	$4,500
10	Fish exclusion	LS	$8,000.00	1	$8,000
11	Cofferdam with gravity bypass	LS	$20,000.00	1	$20,000
12	Temporary traffic control	Day	$2,000.00	2	$4,000
13	Salvage and stack brick walkway	LS	$5,000.00	1	$5,000
	Channel Improvements & Restoration				**$264,005**
14	Removal/demo of structure incl. haul	LS	$20,000.00	1	$20,000
15	Channel excavation incl. haul	CY	$200.00	259	$51,800
16	Furnish and install streambed cobble mix	TON	$150.00	260	$39,000
17	Furnish streambed sediment	TON	$100.00	110	$11,000
18	Furnish and install 18" - 24" log with rootwad and anchor system	EA	$2,860.00	13	$37,180
19	Furnish and install rootwad and anchor system	EA	$2,145.00	7	$15,015
20	Trees	EA	$250.00	35	$8,750
21	Wetland/riparian plantings and restoration	SF	$6.00	5,210	$31,260
22	Water main relocation/accommodation	LS	$50,000.00	1	$50,000
	Tract Area				**$64,917**
23	Tract - amended soil/hydroseed lawn establishment	SF	$0.50	4,500	$2,250
24	Historical/informational interpretive sign	EA	$25,000.00	2	$50,000
25	Trail	CF	$20.00	273	$5,467
26	Landscape wall	LF	$180.00	40	$7,200
	Subtotal Construction Cost				**$519,643**
	Sales Tax		$0.10		**$52,484**
	Construction Contingency		$0.50		**$286,064**
	Total Construction Cost				**$858,191**

4.2.2 Tentative Project Schedule

Anticipated project scheduling calls for draft design and permitting to begin in the fall of 2023 with permitting applications accompanied by a draft, 60% level design submitted by the spring of 2024. Final design would be underway concurrent with agency permit application review. With final design complete and necessary permits secured, the project would go out to bid in the late winter 2025 with construction slated for the "fish window" of 2025, typically during the months of July through September as specified by project permits.

5 Summary and Next Steps

This Cottage Lake Creek weir removal project has been undertaken by the Mid Puget Sound Fisheries Enhancement Group primarily as a means to improve upstream passage conditions for Chinook, coho, and sockeye salmon, and steelhead and cutthroat trout. Habitat for other fish an wildlife species will be improved as well. In the absence of the weir, the stream section at the project site will be returned to a more natural condition where natural stream and riparian processes can prevail as habitat continues to improve over time with maturing riparian forest conditions.

The weir is thought to have been built about 100 years ago primarily as an irrigation diversion structure, but has not been used for that purpose for several decades. It includes a fish ladder structure, and so has not been *entirely* impassable, but improvements to passability are needed. The Chinook salmon and steelhead which use Cottage Lake Creek have been listed as threatened under the Federal Endangered Species Act, and Chinook are a preferred and crucial food source for listed *Endangered* Southern Resident Killer Whales. Furthermore, the formidable concrete structure is in disrepair and repairs are not feasible or warranted, especially since the weir no longer appears to serve a useful purpose. Its original irrigation diversion function is no longer operational or needed. Some concrete vertical channel wall portions of the structure are cracking and failing, and may pose risks to safety. Further habitat degradation and aesthetics are also considerations as the structure continues to break up.

This project phase completes a conceptual design process for the project, during which it has been vetted to a certain degree by local Polo Club and Homestead Community residents and representatives of the Snoqualmie and Muckleshoot Tribes, regulatory agencies, and grant funding entities. The feasibility and anticipated benefits of the project have been largely confirmed through this process. Moving forward, the next project phases will be draft or permit level design, final design, and implementation. Funding for these next phases has yet to be confirmed. Project implementation is tentatively planned for the summer of 2025.

6 References

Environmental Laboratory. 1987. "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Hruby, T. 2014. Washington State Wetland Rating System for Western Washington: 2014 Update. (Publication #14-06-029). Olympia, WA: Washington Department of Ecology.

King County. 2017. Bear Creek Watershed Juvenile Salmon Habitat Use. Prepared by Josh Kubo, Water and Land Resources Division. Seattle, Washington.

Minard, J. P and Booth, D. B. 1988. Geologic Map of the Redmond Quadrangle, King County, Washington, 1:24,000. U.S. Geological Survey. Miscellaneous Field Studies Map MF-2016.

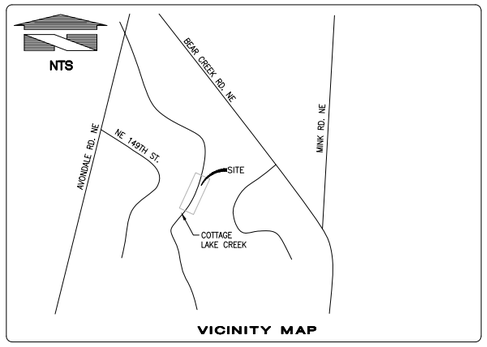
U.S. Army Corps of Engineers. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0). ed. J. S. Wakely, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-10-3. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Appendix A

EXISTING CONDITIONS SITE SURVEY

LIMITED TOPOGRAPHIC SURVEY

SEE MATCH LINE SHEET 2 OF 2



VICINITY MAP

N
W E
S

0 5 10 20
SCALE: 1"=10'

LEGEND

(NOTE: NOT ALL SYMBOLS MAY APPEAR ON THE MAP)

- SURVEY MONUMENT (AS NOTED)
- SECTION CORNER (AS NOTED)
- SET REBAR/CAP (LS#45789 OR #41282)
- FOUND REBAR/CAP (AS NOTED)
- SET 2"X2" HUB/TACK LINE STAKE
- MAG/WASHER OR LEAD/TACK (AS NOTED)
- WATER VALVE (WV)
- CHAIN LINK FENCE
- WOOD FENCE
- WATER LINE
- DECIDUOUS TREE
- CONIFEROUS TREE
- TREE DRIPLINE
- CONCRETE
- GRAVEL/SAND (AS NOTED)
- CREEK FLOW DIRECTION
- MATCH LINE

ABBREVIATIONS

(R#)	REFERENCE SURVEYS
(OH)	OVERHEAD
(UG)	UNDERGROUND
(TYP)	TYPICAL
(C)	CALCULATED
(M)	MEASURED
(GIS)	GEOGRAPHICAL INFORMATION SYSTEMS
(REF)	PER REFERENCE INFORMATION
(H)	HIGH

PURPOSE OF THIS SURVEY
THE PURPOSE OF THIS SURVEY IS TO SHOW EXISTING CONDITIONS FOR DEVELOPMENT AND/OR DESIGN

BASIS NAD83(2011) DATUM PER WASHINGTON STATE REFERENCE NETWORK(WSRN)
BASIS NAD83(2011) DATUM WAS ESTABLISHED BY HOLDING WSRN OBSERVATIONS ON MONUMENTS, SAID DIMENSIONS
AS SHOWN HEREON.

PROJECT BASE POINT
LATITUDE: N47.734689341
LONGITUDE: W122.078360926
HEIGHT: 120.000000
PROJECT COMBINED SCALE: 1.0000412361

VERTICAL DATUM IS NAVD88 PER WSRN TIED TO GEOID18

LOCAL SITE/PROJECT BENCHMARKS
AS SHOWN ON THIS SURVEY

SITE ADDRESS
TRACT "B"
PLAT OF THE POLO CLUB
REC. NO. 199003070629
RECORDS OF KING COUNTY, WA

FLOOD INFORMATION
PARCEL IS LOCATED IN ZONE "AE" – SPECIAL FLOOD HAZARD WITH
BASE FLOOD ELEVATION (BFE) OR DEPTH.
PER FEMA PANEL NUMBER 53033C0377G, DATED 8/19/2020.

REFERENCE SURVEYS
R1) PLAT OF THE POLO CLUB
REC. NO. 199003070629, RECORDS OF KING COUNTY, WA
R2) PLAT OF THE HOMESTEAD DIV. 1,
REC. NO. 197811080717, RECORDS OF KING COUNTY, WA
R3) BOUNDARY LINE ADJUSTMENT, REC. NO. 20060216900004,
RECORDS OF KING COUNTY, WA

REFERENCE GIS DATA
G1) GIS MAP PROVIDED OR DOWNLOADED ON 01/27/2023 FROM PUGET SOUND ENERGY.

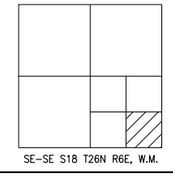
NOTES
1. ALL DISTANCES SHOWN ON THIS SURVEY ARE IN US SURVEY FOOT.

2. UTILITIES ARE SHOWN PER SURFACE OBSERVATIONS, UTILITY PAINT MARKINGS PER PRIVATE UTILITY LOCATOR ENLISTED AS PART OF THIS SURVEY AND PERFORMED BY APPLIED PROFESSIONAL SERVICES INC. AND OTHER REFERENCE INFORMATION. QUOTED ACCURACY OF UTILITIES SHOWN PER UTILITY LOCATE PAINT MARKINGS ARE 1.5'± HORIZONTALLY. VERTICAL UTILITY INFORMATION IS SHOWN TO THE SIGNIFICANT FIGURE AT WHICH THEY WERE MEASURED, BUT INHERENT ERROR EXISTS IN RESTRICTION OF ACCESS TO UNDERGROUND UTILITIES. UTILITIES SHOWN PER REFERENCE INFORMATION ARE PER BEST FIT AND INTERPOLATION AND SHOULD BE VERIFIED PRIOR TO CONSTRUCTION. FOR EXACT UTILITY DEPTH AND LOCATION INFORMATION, IT IS RECOMMENDED THAT POTHOLING BE PERFORMED.

3. FIELD SURVEY WAS COMPLETED IN FEBRUARY 2023 AND ALL MONUMENTS SHOWN AS FOUND WERE VISITED AT THIS TIME OR AS NOTED.

4. WETLAND FLAGS & DATA WERE PROVIDED BY THE WATERSHED COMPANY (TWC), SITE VISIT 1/17/23, TWC REF NO. 221032.

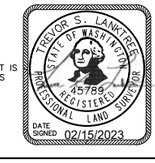
PROCEDURE / NARRATIVE:
A FIELD TRAVERSE USING A TRIMBLE S7 & SX10 ROBOTIC TOTAL STATION AND DATA COLLECTOR SUPPLEMENTED WITH FIELD NOTES AND SPECTRA PRECISION SPBO NETWORK RTK GPS ROVER, WAS PERFORMED, ESTABLISHING THE ANGULAR, DISTANCE, AND VERTICAL RELATIONSHIPS BETWEEN THE MONUMENTS, PROPERTY LINES AND IMPROVEMENTS. THE RESULTING DATA MEETS OR EXCEEDS THE STANDARDS FOR LAND BOUNDARY SURVEYS AS SET FORTH IN WAC 332-130-090.


SE-SE S18 T26N R6E, W.M.

SURVEYOR'S CERTIFICATE:
THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY UPON WHICH IT IS BASED WERE MADE BY ME OR UNDER MY DIRECTION AND CORRECTLY REFLECTS THE CONDITIONS OF THIS SITE AS OF THE DATE OF THE FIELD SURVEY.

02/15/2023
DATE

TREVOR S. LANKTREE P.L.S.
WASHINGTON REGISTRATION NO. 45789



No.	Date	By	Chkd.	Appr.	Revision

Title: LIMITED TOPOGRAPHIC SURVEY
PTN OF THE SE1/4, OF THE SE1/4 OF SEC. 18, TWP. 26 N., RGE 6 EAST, W. M.
WOODINVILLE
KING COUNTY STATE OF WASHINGTON

For: THE WATERSHED COMPANY
750 6TH STREET
KIRKLAND WA, 98033

Scale: Horizontal 1"=10' Vertical

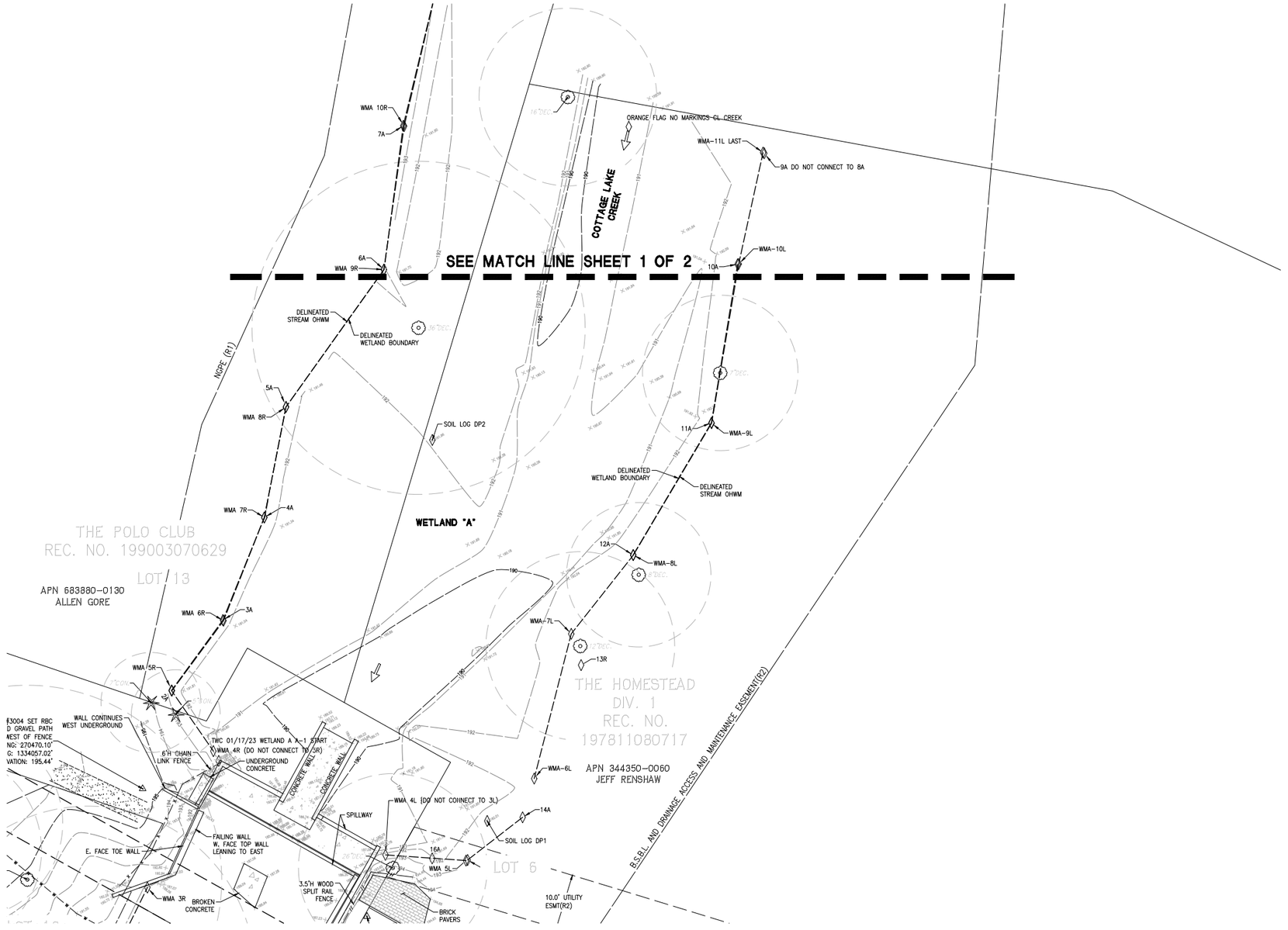
Designed XXX Drawn RDM Checked GSK Approved TSL Date 2/15/23

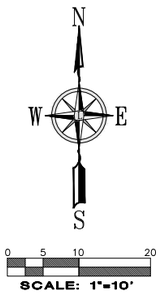
LANKTREE LAND SURVEYING, INC.
25510 74TH AVENUE SOUTH KENT, WA 98032
PHONE: (253) 653-6423
FAX: (253) 793-1616
WWW.LANKTREELANDSURVEYING.COM

Job Number 7028 | Sheet 1 of 2

File: P:\7028\Survey\DWGs\7028T001.dwg Date/Time: Feb 15, 2023 - 8:05am Scale: 1"=1' brian.mason Xrefs:

LIMITED TOPOGRAPHIC SURVEY





No.	Date	By	Chkd.	Appr.	Revision

Title: LIMITED TOPOGRAPHIC SURVEY
PTN OF THE SE1/4, OF THE SE1/4 OF SEC. 18, TWP. 26 N., RGE 6 EAST, W. M.
WOODINVILLE
KING COUNTY STATE OF WASHINGTON

For: THE WATERSHED COMPANY
750 6TH STREET
KIRKLAND WA, 98033

Scale: Horizontal 1"=10'
Vertical

Designed XXX
Drawn BGM
Checked JSK
Approved TSL
Date 2/15/23

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TREVOR S. LANKTREE
STATE OF WASHINGTON
45789
REGISTERED PROFESSIONAL LAND SURVEYOR
DATE SIGNED 02/15/2023

Job Number 7028

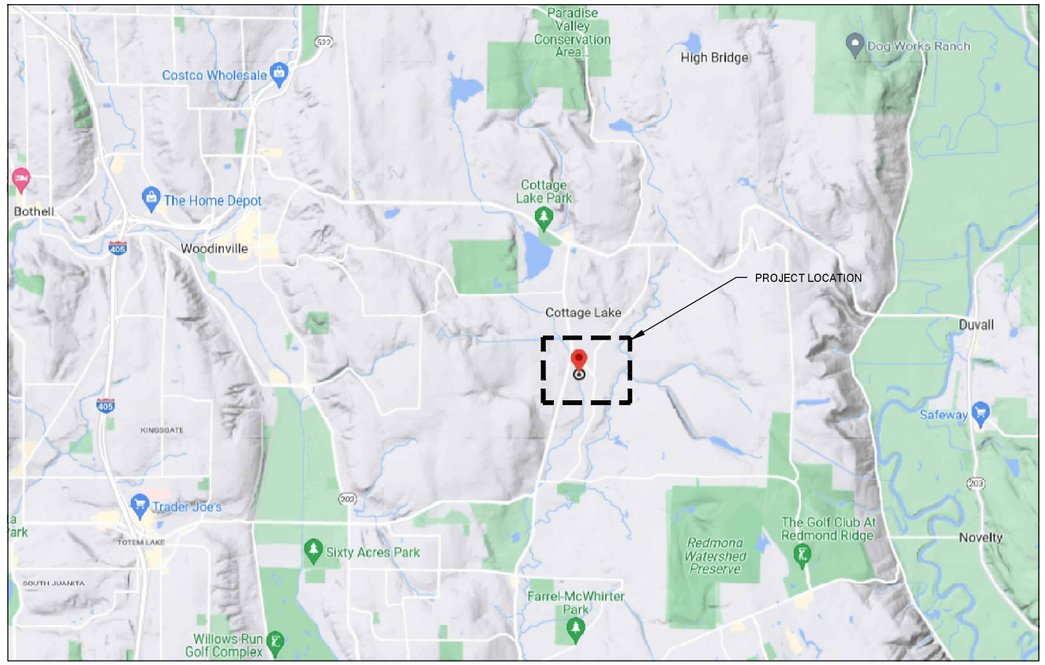
Sheet 2 of 2

File: P:\7028\Survey\DWGs\7028T001.dwg Date/Time: Feb 15, 2023 - 8:05am Scale: 1"=1' brion.mason Xrefs:

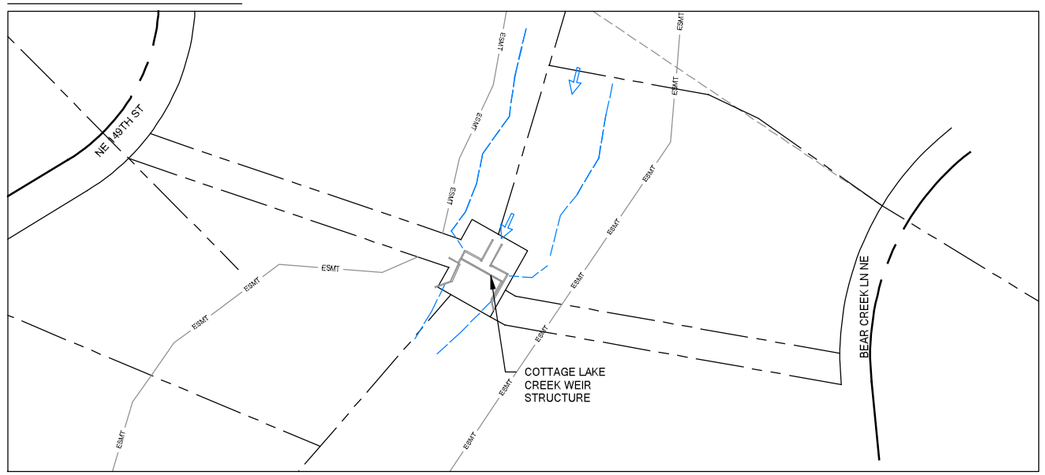
Appendix B

CONCEPT WEIR REMOVAL AND RESTORATION DESIGN

VICINITY MAP



PROJECT LOCATION



SHEET INDEX

PROJECT MANAGER: ED, GJ DESIGNED BY: MMD, MSF DRAWN BY: JL, GJ CHECKED BY:

COTTAGE LAKE CREEK
WEIR REMOVAL PROJECT
CONCEPTUAL PLAN SET

PROJECT TEAM

MID SOUND FISHERIES ENHANCEMENT GROUP
7400 SAND POINT WAY NE #202N
Seattle, WA 98115
CONTACT: AMANI MOYER-ALI
PH: (206) 529-9467

DCG|WATERSHED
750 6TH ST S
KIRKLAND, WA 98083
CONTACT: GREG JOHNSTON
PH: (425) 822-5242

GEOMORPHOLOGY:
ALTATERRA CONSULTING LLC
10333 40TH AVE NE
SEATTLE, WA 98125
PH: (206) 418-8084

SURVEY:
LANKTREE LAND SURVEYING, INC.
25510 74TH AVENUE SOUTH
KENT, WA 98032
OFFICE: (253) 653-6423, EXT. 101
DIRECT: (253) 285-4232

GEOTECHNICAL:
HWA GEOSCIENCES, INC.
21312 30TH DRIVE SE, SUITE 110
BOTHELL, WA 98021
OFFICE: (425) 774-0106 EXT. 242
DIRECT: (425) 499-6909

NO.	DATE	BY	REVISION

BASE MAP/TOPOGRAPHY PROVIDED BY OTHERS. DCG/WATERSHED CANNOT BE HELD LIABLE FOR ACCURACY. CONTRACTOR SHALL FIELD VERIFY GRADES, UTILITIES, AND ALL OTHER EXISTING FEATURES AND CONDITIONS. IF CONDITIONS ARE NOT AS SHOWN AND/OR PLANS CANNOT BE CONSTRUCTED AS SHOWN, CONTACT DCG/WATERSHED PRIOR TO CONSTRUCTION.

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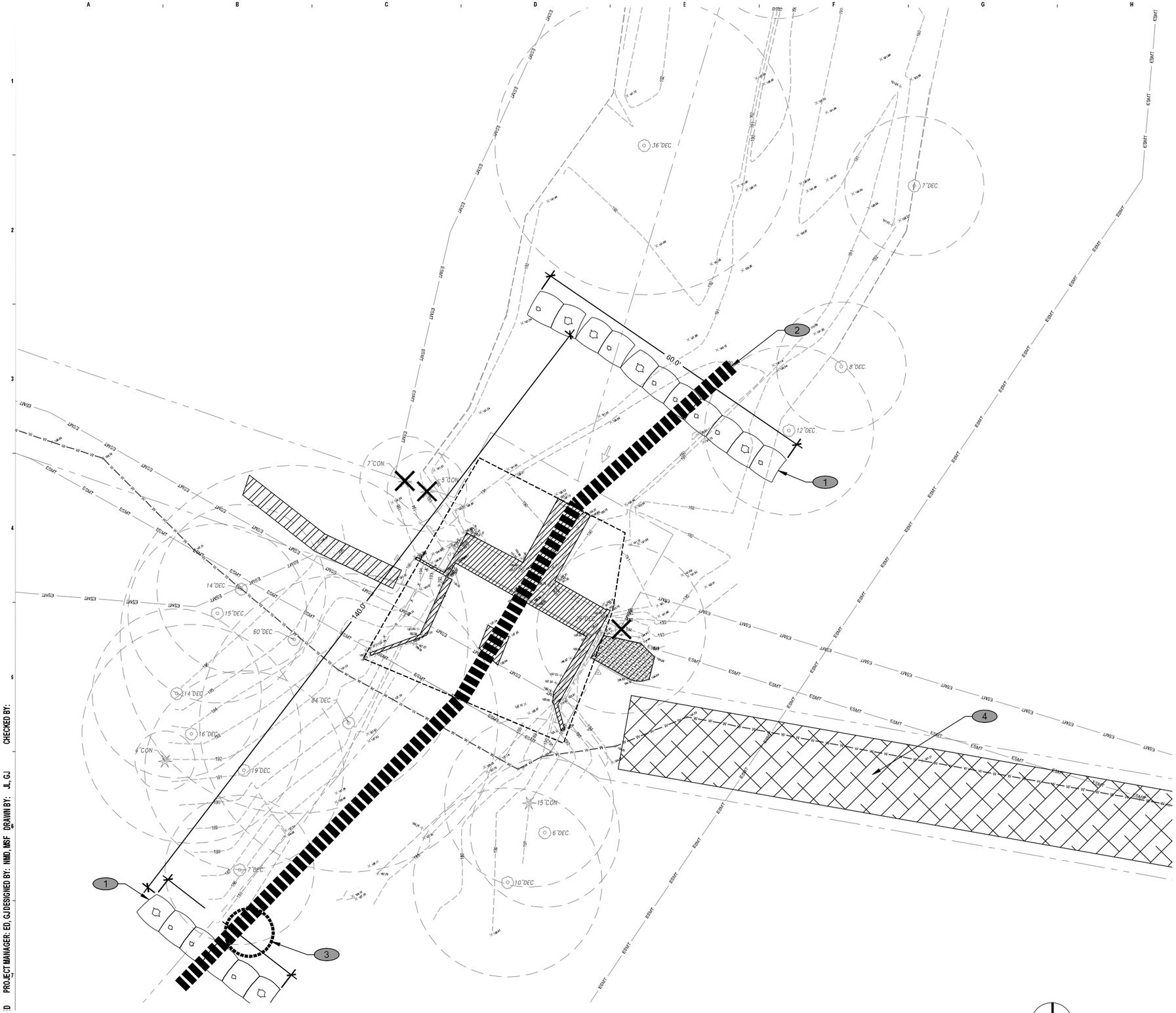
COTTAGE LAKE CREEK WEIR REMOVAL

PREPARED FOR: MID SOUND FISHERIES
PROJECT LOCATION: WOODINVILLE WA, 98077
TWC 221032

COVER

DATE: 7/17/2023
PLAN NUMBER:
G01
SHEET 1 OF 5



FLOW DIVERSION AND FISH EXCLUSION NOTES

1. ISOLATE CREEK REACH WORK AREA, INSTALL BYPASS PIPE, AND EXECUTE FISH REMOVAL AND EXCLUSION PLAN PER THE WATERSHED COMPANY, MARCH 20, 2023 MEMORANDUM.
2. WATER PUMPED FROM EXCAVATION AREAS SHALL BE DISCHARGED TO A COIR LOG OR SILT FENCE SEDIMENT TRAP LOCATED IN A VEGETATED UPLAND AREA. CONTROL DISCHARGE RATE AND PROVIDE EROSION CONTROL MATTING TO AVOID EROSION AT POINT OF PUMP DISCHARGE.
3. CONDUCT WEIR DEMOLITION AND ROUGH GRADING WITHIN DE-WATERED CREEK SECTION.
4. INDICATED PLAN IS A MINIMUM. RELOCATE, ADJUST AND AMEND AS NECESSARY TO MEET APPLICABLE CONSTRUCTION AND WATER QUALITY STANDARDS.

KEY NOTES

1. COFFERDAM SUPPLEMENTED WITH TURBIDITY CURTAIN SYSTEM AS NEEDED, TYP.
2. MOVABLE CONSTRUCTION FLOW BYPASS PIPE.
3. APPROXIMATE SUMP PUMP AREA, SEE ABOVE TESC NOTE 2.
4. SEE C02 FOR CONSTRUCTION ACCESS

10' 5' 0 10' 20'

PROJECT MANAGER: ED, GJ DESIGNED BY: HMD, MSF DRAWN BY: JL, GJ CHECKED BY:

NO.	DATE	BY	REVISION

BASE MAP/TOPOGRAPHY PROVIDED BY OTHERS. DCGWATERSHED CANNOT BE HELD LIABLE FOR ACCURACY. CONTRACTOR SHALL FIELD VERIFY GRADES, UTILITIES, AND ALL OTHER EXISTING FEATURES AND CONDITIONS. IF CONDITIONS ARE NOT AS SHOWN AND/OR PLANS CANNOT BE CONSTRUCTED AS SHOWN, CONTACT DCGWATERSHED PRIOR TO CONSTRUCTION.

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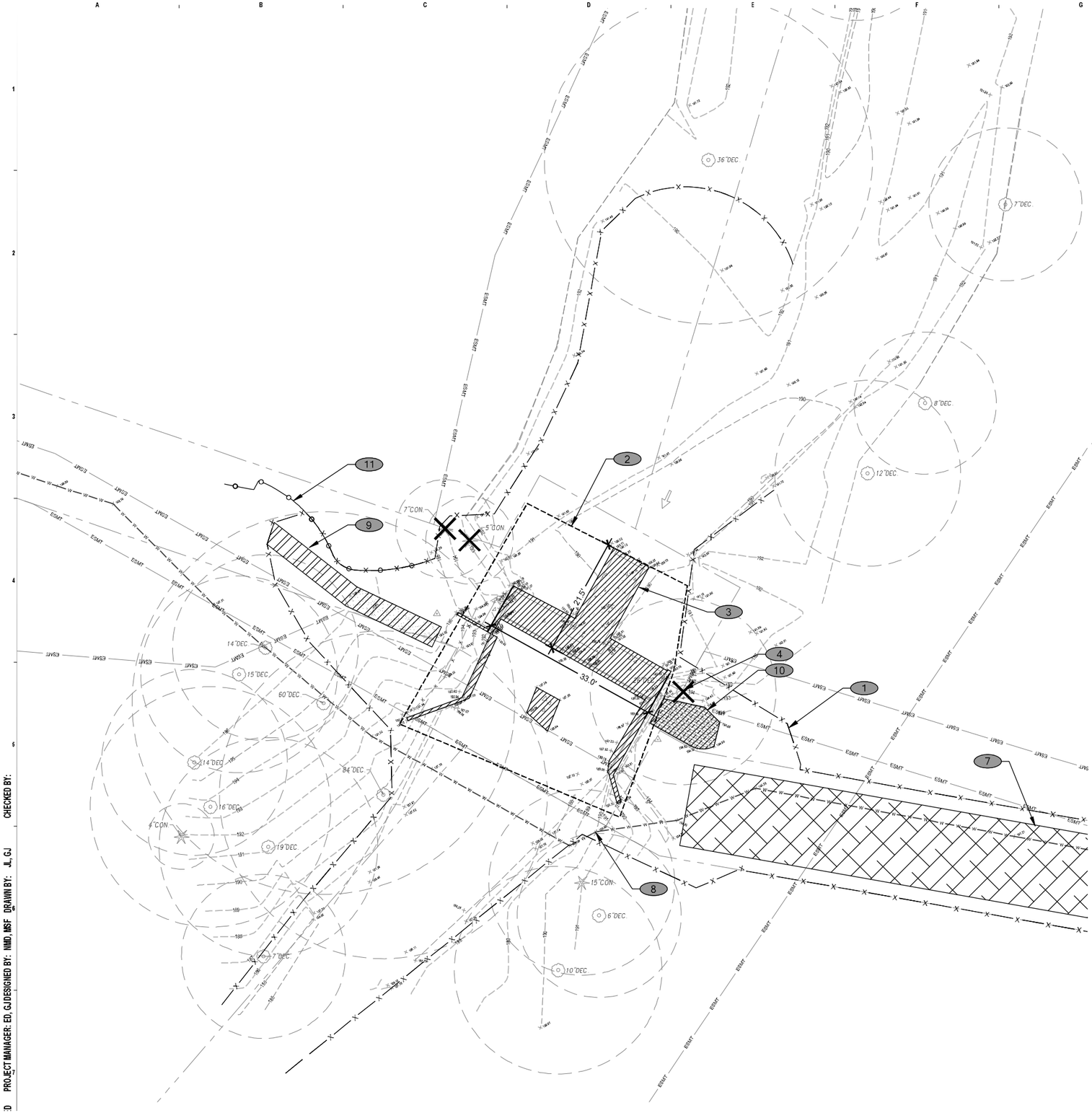
COTTAGE LAKE CREEK WEIR REMOVAL

PREPARED FOR: MID SOUND FISHERIES
PROJECT LOCATION: WOODINVILLE WA, 98077
TWC 221032

FLOW DIVERSION AND FISH EXCLUSION PLAN

DATE: 7/17/2023
PLAN NUMBER:
C01
SHEET 2 OF 5



CONSTRUCTION ACCESS MAP

DEMOLITION NOTES

1. STABILIZE TEMPORARY ACCESS ROUTES WITH HOG FUEL AS NECESSARY TO MAINTAIN ROUTE IN PASSABLE CONDITION OR AS DIRECTED BY INSPECTOR OR ENGINEER.
2. MINIMIZE TEMPORARY ACCESS ROUTE WIDTH AS NECESSARY TO MINIMIZE CLEARING OF AND DAMAGE TO EXISTING TREES OR VEGETATION.
3. FLAG TREES OR VEGETATION REQUIRING REMOVAL OR PRUNING FOR ACCESS. CONSULT RESTORATION ECOLOGIST PRIOR TO WORK.
4. PROTECT TREES ADJACENT TO WORK WITH PLANKING AS NECESSARY TO PREVENT DAMAGE TO TREES OR AS DIRECTED BY THE RESTORATION ECOLOGIST.
5. INSTALL HIGH VISIBILITY FENCE WHERE DIRECTED BY ENGINEER AT PROJECT LIMITS/CLEARING LIMITS.
6. SEE FLOW DIVERSION AND FISH EXCLUSION PLAN. CREEK SECTION SHALL BE DE-WATERED PRIOR TO DEMOLITION WORK.
7. INDICATED PLAN IS A MINIMUM. RELOCATE, ADJUST AND AMEND AS NECESSARY TO MEET APPLICABLE CONSTRUCTION AND WATER QUALITY STANDARDS.

KEY NOTES

1. APPROXIMATE CLEARING AND GRUBBING EXTENTS. INSTALL PERIMETER PROTECTION (I.E. COIR LOGS OR APPROVED EQUAL). RELOCATE THROUGHOUT CONSTRUCTION TO ACCOMMODATE WORKABLE AREA OR AS DIRECTED BY ENGINEER (TYP).
2. APPROXIMATE CHANNEL EXCAVATION LIMITS.
3. CONCRETE WEIR, WALLS, AND BRIDGE ABUTMENTS TO BE REMOVED.
4. TREE TO BE REMOVED (TYP).
5. INSTALL TEMPORARY CONSTRUCTION ENTRANCE AND PARKING ACCESS FROM EXISTING PULLOUT ON BEAR CREEK LN NE.
6. CONTRACTOR SHALL NOT TRACK MUD OR DEBRIS INTO BEAR CREEK LN NE, IF MUD OR DEBRIS IS TRACKED ONTO BEAR CREEK LN NE, STREET SWEEPING SHALL BE CONDUCTED IMMEDIATELY.
7. INSTALL TEMPORARY CONSTRUCTION ROAD USING MULCH OR ROCK.
8. PROTECT WATERMAIN DURING CONSTRUCTION (DEPTH IS APPROXIMATELY 4' BELOW CHANNEL PER AS-BUILT INFORMATION). PROJECT SEEKS TO MINIMIZE GROUND DISTURBANCE ABOVE PIPE AND AVOID FUTURE SCOUR. WATERMAIN RELOCATION MAY BE REQUIRED FOR FINISHED CONDITION (TBD).
9. GRAVEL TRAIL SECTION TO BE REMOVED WITHIN PROJECT LIMITS. WESTERN END REMOVAL APPROXIMATED, TO BE VERIFIED IN FIELD.
10. BRICKS FROM EXISTING BRICK-PAVED TRAIL TO BE SALVAGED AND STACKED AT A LOCATION TO BE INDICATED BY THE PROPERTY OWNER.
11. APPROXIMATE LOCATION OF EXISTING RESIDENTIAL BRICK WALL AND VEGETATION. ADDITIONAL SURVEY AND INVESTIGATION TO BE CONDUCTED TO DETERMINE LOCATION AND PROTECTION MEASURES.

PROJECT MANAGER: ED, GJ DESIGNED BY: HMD, MSF DRAWN BY: JL, GJ CHECKED BY:

NO.	DATE	BY	REVISION

BASE MAP/TOPOGRAPHY PROVIDED BY OTHERS. DOGWATERSHED CANNOT BE HELD LIABLE FOR ACCURACY. CONTRACTOR SHALL FIELD VERIFY GRADES, UTILITIES, AND ALL OTHER EXISTING FEATURES AND CONDITIONS. IF CONDITIONS ARE NOT AS SHOWN AND/OR PLANS CANNOT BE CONSTRUCTED AS SHOWN, CONTACT DOGWATERSHED PRIOR TO CONSTRUCTION.

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COTTAGE LAKE CREEK WEIR REMOVAL

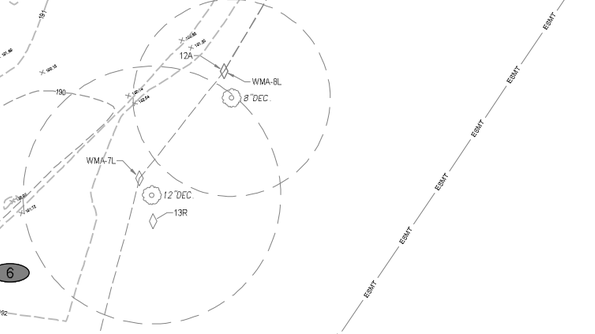
PREPARED FOR: MID SOUND FISHERIES
PROJECT LOCATION: WOODINVILLE WA, 98077
TWC 221032

DEMOLITION PLAN

DATE: 7/17/2023
PLAN NUMBER: C02
SHEET 3 OF 5

KEY NOTES

1. PROTECT WATERMAIN DURING CONSTRUCTION (DEPTH IS APPROXIMATELY 4' BELOW CHANNEL PER AS-BUILT INFORMATION). PROJECT SEEKS TO MINIMIZE GROUND DISTURBANCE ABOVE PIPE AND AVOID FUTURE SCOUR. WATERMAIN RELOCATION MAY BE REQUIRED FOR FINISHED CONDITION (TBD).
2. APPROXIMATE LOCATION OF EXISTING RESIDENTIAL BRICK WALL AND VEGETATION. ADDITIONAL SURVEY AND INVESTIGATION TO BE CONDUCTED TO DETERMINE LOCATION AND PROTECTION MEASURES.
3. TOPOGRAPHY IN THIS AREA IS APPROXIMATE, ADDITIONAL SURVEY & INVESTIGATION AT PERMIT-LEVEL OR FINAL DESIGN.
4. LANDSCAPE WALL, ADDITIONAL SURVEY AND INVESTIGATION TO BE CONDUCTED.
5. PROPOSED TRAIL AND OVERLOOK, TYP. SEE PROPOSED SITE & RESTORATION PLAN.
6. PRELIMINARY LARGE WOODY MATERIAL PLACEMENT (TYP).



RECORD DRAWING - WATER MAIN BELOW CHANNEL (A / --)

DETAIL IS NOT TO SCALE AND IS FOR REFERNECE ONLY. DETAIL IS FROM WOODINVILLE WATER DISTRICT RECORD DRAWINGS FOR 8" WATER MAIN INSTALLATION BELOW CHANNEL (RECORD DRAWING DATED MARCH 1, 1991). FURTHER INVESTIGATION ON WATER MAIN DEPTH AND PROTECTION MEASURES TO BE CONDUCTED.

10' 5' 0 10' 20'

NO.	DATE	BY	REVISION

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PROJECT MANAGER: ED, GJ DESIGNED BY: NMD, MSF DRAWN BY: JL, GJ CHECKED BY:

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COTTAGE LAKE CREEK WEIR REMOVAL

PREPARED FOR: MID SOUND FISHERIES

PROJECT LOCATION: WOODINVILLE WA, 98077

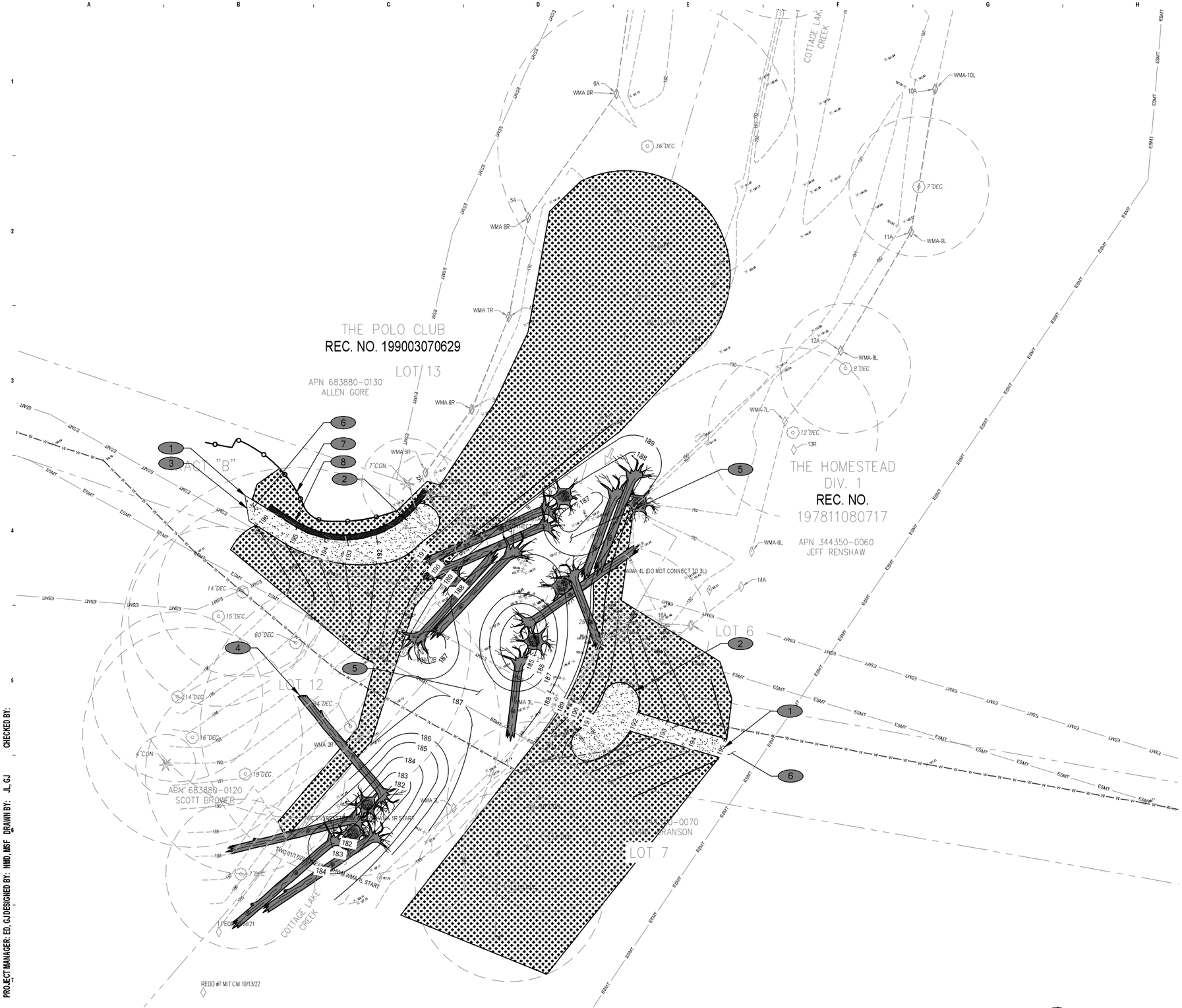
TWC 221032

GRADING PLAN

DATE: 7/17/2023

PLAN NUMBER: C03

SHEET 4 OF 5



PROJECT MANAGER: ED, GJ DESIGNED BY: NMD, MSF DRAWN BY: JL, GJ CHECKED BY:

SITE PLAN AND RESTORATION NOTES

1. INSTALL PATH AND OVERLOOK AREA FOLLOWING CREEK RESTORATION, AND PRIOR TO SITE RESTORATION.
2. WEST SIDE PATH ALIGNMENT IS APPROXIMATE AND SHALL BE FIELD ADJUSTED TO MEET UP WITH EXISTING PATH (CURRENTLY OUTSIDE SURVEY AREA).
3. CLEAR AND GRUB ALL INVASIVE OR UNDESIRED PLANT SPECIES IN THE RESTORATION AREA.
4. DECOMPACT AND AMEND SOILS IN DISTURBED AREAS. DO NOT USE MACHINERY IN ROOT ZONES OF TREES TO REMAIN.
5. STABILIZE CLEARED AREAS WITH THE PLACEMENT OF A LAYER OF WOOD CHIP MULCH. AREAS ADJACENT TO THE CREEK MAY ALSO REQUIRE THE INSTALLATION OF BIODEGRADABLE GEOTEXTILE FABRIC.
6. REVEGETATE THE SITE WITH NATIVE PLANTS PER THE BELOW CANDIDATE LIST OR OTHER NATIVE PLANTS AS DIRECTED. PLANTS SHALL BE INSTALLED DURING THE FIRST DORMANT SEASON (OCT THROUGH MARCH) FOR BEST SURVIVAL.
7. FOR THE FIRST TWO CONSECUTIVE SUMMERS, PLANTS WILL REQUIRE SUPPLEMENTAL WATER DELIVERY. A TEMPORARY, ABOVE GROUND IRRIGATION SYSTEM WITH A TIMER IS RECOMMENDED.

KEY NOTES

1. FOUR (4) FT WIDE PATH, DECOMPOSED GRANITE OR OTHER OWNER SELECTED MATERIAL PATH.
2. DECOMPOSED GRANITE OR OTHER OWNER SELECTED MATERIAL OVERLOOK AREA.
3. CONNECT TO EXISTING PATH, OUTSIDE OF SURVEYED AREA. PATH ALIGNMENT SHALL BE FIELD ADJUSTED AS NEEDED.
4. PRELIMINARY LARGE WOODY MATERIAL PLACEMENT (TYP).
5. PLACE STREAMBED BOULDERS, COBBLES, AND SEDIMENT IN DISTURBED CHANNEL AREAS.
6. INSTALL HISTORICAL / INFORMATIONAL INTERPRETIVE SIGN, PER INPUT FROM THE NEIGHBORHOOD HOMEOWNER ASSOCIATIONS.
7. APPROXIMATE LOCATION OF EXISTING RESIDENTIAL BRICK WALL AND VEGETATION. ADDITIONAL SURVEY AND INVESTIGATION TO BE CONDUCTED TO DETERMINE LOCATION AND PROTECTION MEASURES.
8. PROPOSED LANDSCAPE WALL, 4'-0" MAX HEIGHT, ADDITIONAL SURVEY AND INVESTIGATION TO BE CONDUCTED.

PLANT CANDIDATE LIST

APPROXIMATE PLANTING AREA (5,210 SF)

TREES (2 GALLON / 12 FT O.C. SPACING)	QTY
FRAXINUS LATIFOLIA / OREGON ASH	7
PICEA SITCHENSIS / SITKA SPRUCE	7
RHAMNUS PURSHIANA / CASCARA	7
SALIX LASIANDRA / PACIFIC WILLOW	7
THUJA PLICATA / WESTERN REDCEDAR	7
TOTAL	35

SHRUBS (1 GALLON / 4 FT O.C. SPACING)	
ACER CIRCINATUM / VINE MAPLE	28
AMELANCHIER ALNIFOLIA / SERVICEBERRY	28
CORNUS SERICEA / RED-OSIER DOGWOOD	28
MYRICA CALIFORNICA / PACIFIC WAX MYRTLE	28
PHYSOCARPUS CAPITATUS / PACIFIC NINEBARK	28
RIBES SANGUINEUM / RED-FLOWERING CURRANT	28
ROSA NUTKANA / NOOTKA ROSE	28
ROSA PISOCARPA / SWAMP ROSE	28
RUBUS SPECTABILIS / SALMONBERRY	28
SPIRAEA BETULIFOLIA / BIRCH-LEAF SPIREA	28
SYMPHORICARPOS ALBUS / SNOWBERRY	28
VACCINIUM OVATUM / EVERGREEN HUCKLEBERRY	28
TOTAL	336

GROUNDCOVERS (1 GALLON / 24 IN O.C. SPACING)	
CAMASSIA QUAMASH / CAMAS	112
CAREX OBNUPTA / SLOUGH SEDGE	112
DESCHAMPSIA CESPITOSA / TUFTED HAIRGRASS	112
DICENTRA FORMOSA / BLEEDING HEART	112
FESTUCA IDAHOENSIS / ROEMER'S FESCUE	112
MAHONIA NERVOSA / LOW OREGON-GRAPE	112
POLYSTICHUM MUNITUM / SWORD FERN	112
SCIRPUS MICROCARPUS / SMALL-FRUITED BULRUSH	112
SEDUM OREGANUM / OREGON STONECROP	112
VANCOUVERIA HEXANDRA / INSIDE-OUT FLOWER	112
TOTAL	1,120
TOTAL	1,491

10' 5' 0 10' 20'

NO.	DATE	BY	REVISION

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COTTAGE LAKE CREEK WEIR REMOVAL

PREPARED FOR: MID SOUND FISHERIES
PROJECT LOCATION: WOODINVILLE WA, 98077
TWC 221032

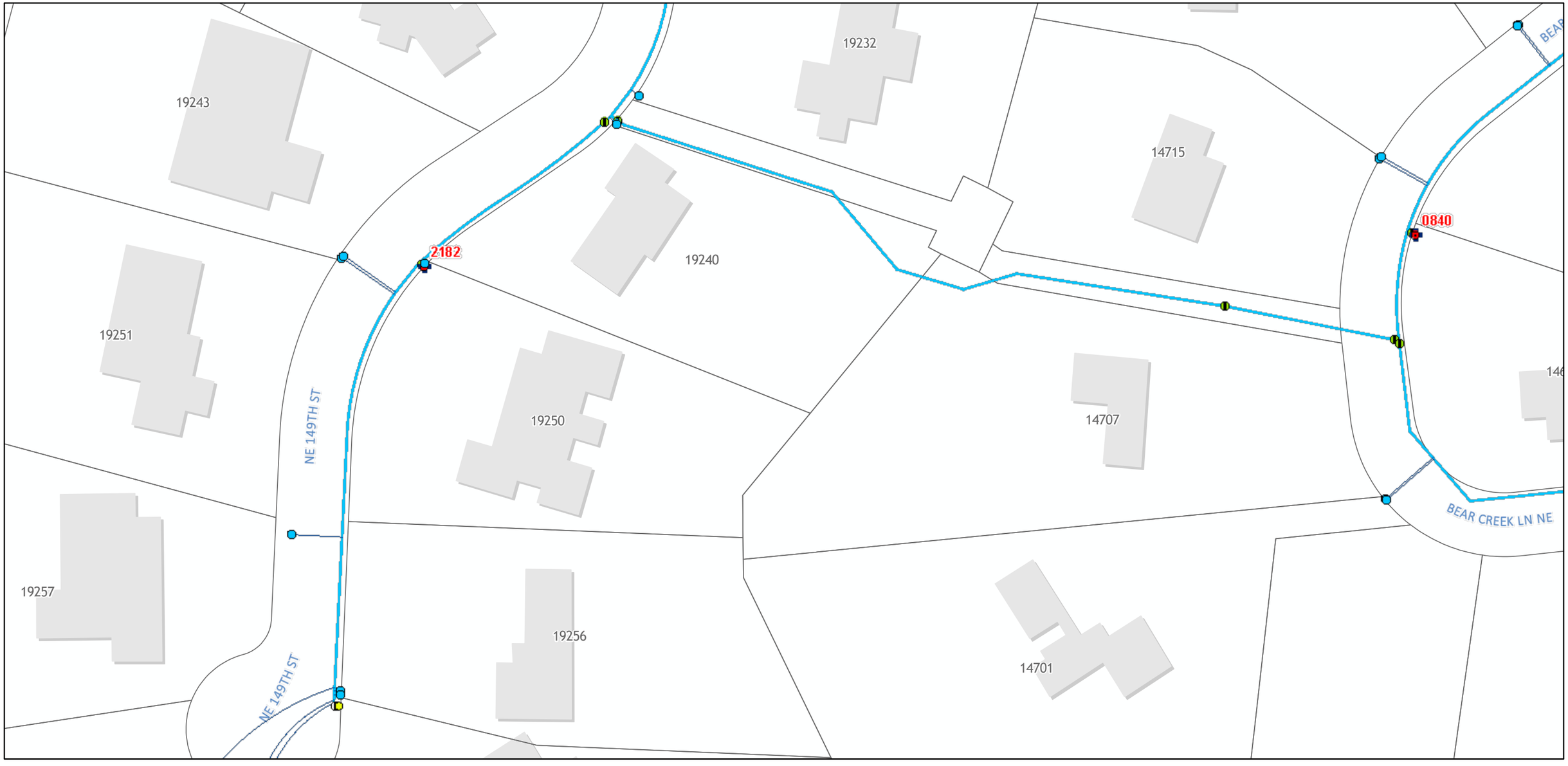
PROPOSED SITE & RESTORATION PLAN

DATE: 7/17/2023
PLAN NUMBER:
C04
SHEET 5 OF 5

Appendix C

WATER MAIN AS-BUILT DRAWINGS

Utility Map



12/19/2022, 12:13:02 PM

1:1,128

0 0.01 0.01 0.03 mi

0 0.01 0.03 0.05 km

Water Main
- Distribution Main

Water Service
- Water Service

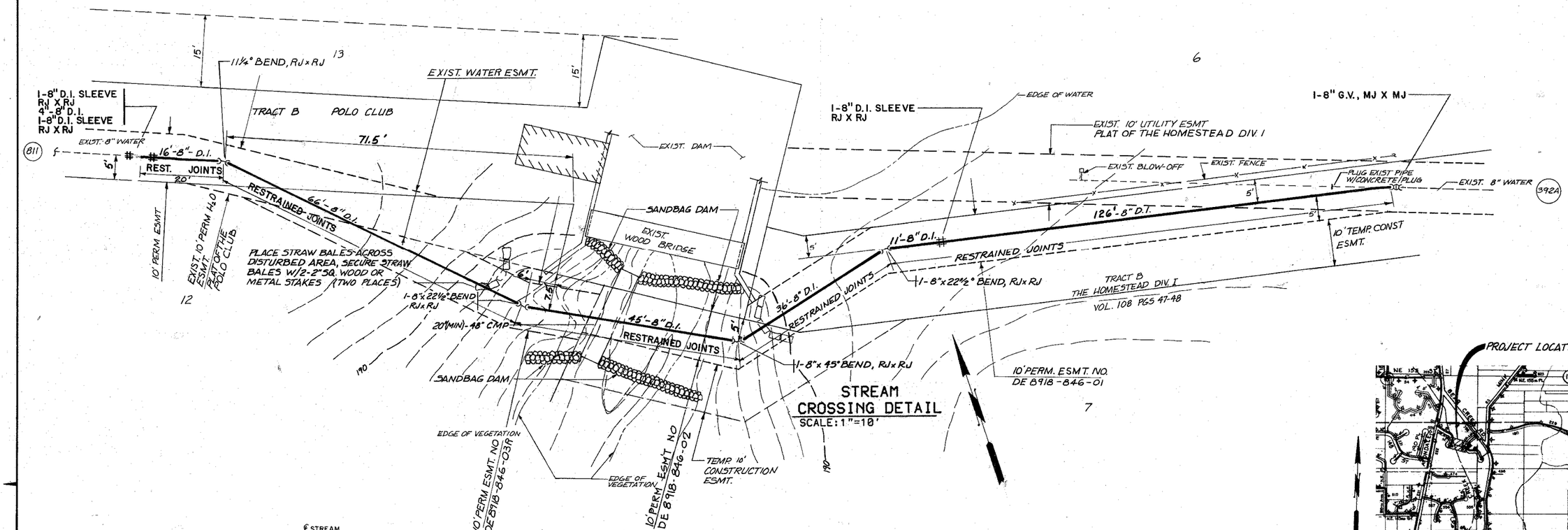
Water Valve
- Service Line Valve
- Open Valve

Control Valve
- Blowoff

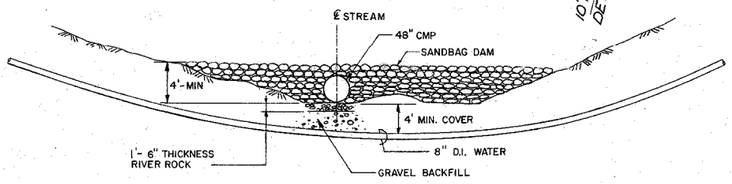
Hydrant
- Hydrant
- Water Meter

County Boundaries

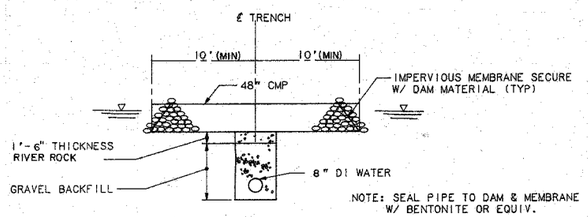
- District Boundary
- King County Parcels
- Addresses



STREAM CROSSING DETAIL
SCALE: 1"=10'



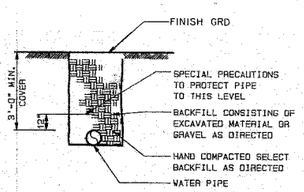
STREAM CROSSING PROFILE
NOT TO SCALE



STREAM CROSSING SECTION
NOT TO SCALE

NOTE

1. CONTRACTOR TO PLACE STRAW BALES IN AREAS ALONG PIPELINE REQUIRED TO PREVENT EXCAVATED MATERIAL FROM ENTERING THE STREAM.
2. ALL COSTS OF PREVENTING EROSION INTO THE STREAM DURING CONSTRUCTION SHALL BE INCLUDED IN THE COST OF THE PIPE.
3. ALL WATER FROM PUMPING OR DEWATERING BY THE CONTRACTOR SHALL BE PUMPED INTO A SEDIMENTATION POND FORMED BY STRAW BALES, BEFORE THE WATER ENTERS THE STREAM.
4. REMOVE 48"Ø CMP, SANDBAGS AND STRAW BALES AFTER INSTALLATION OF WATERMAIN, AND PRIOR TO HYDROSEEDING.
5. ALL DISTURBED AREAS SHALL BE HYDROSEEDED AFTER THE PIPELINE HAS BEEN INSTALLED AND TESTED.
6. CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS OF THE DEPARTMENT OF FISHERIES HYDRAULIC PERMIT.



TRENCH SECTION
NOT TO SCALE

VICINITY MAP
SCALE: 1"=1400'

GENERAL NOTES

1. STANDARD DETAILS AND MATERIALS SPECIFICATIONS ARE HEREBY MADE PART OF THESE PLANS AS IF ATTACHED HERETO BY THIS REFERENCE, EXCEPT AS NOTED.
2. THE DEVELOPER SHALL NOTIFY THE ENGINEER AT LEAST SEVEN DAYS IN ADVANCE AND MAKE THE NECESSARY ARRANGEMENT WITH THE WATER DISTRICT MANAGER FOR CONNECTION TO EXISTING WATER MAINS.
3. ALL MAINLINE GATE VALVES NOT LOCATED IN THE ASPHALT AREAS WILL REQUIRE VALVE MARKERS.
4. GUARD POSTS AND/OR ROCKERIES MAY BE REQUIRED FOR FIRE HYDRANTS. WOODINVILLE WATER DISTRICT OR THEIR REPRESENTATIVE WILL DETERMINE AT THE TIME OF INSTALLATION WHETHER OR NOT ANY OF THESE ITEMS ARE REQUIRED.
5. DELIVER ALL SALVAGED MATERIALS TO LOCATION DESIGNATED BY WOODINVILLE WATER DISTRICT.
6. ALL OPERATING NUTS ON GATE VALVES ARE TO BE EXTENDED TO WITHIN 18 TO 24 INCHES OF FINISHED GRADE.
7. NO CONSTRUCTION ON KING COUNTY RIGHT-OF-WAY WILL BE ALLOWED UNTIL THE PERMIT HAS BEEN ISSUED. CONTRACTOR TO CONTACT DISTRICT FOR STATUS OF PERMIT.
8. REFER TO WOODINVILLE WATER DISTRICT STANDARD SPECIFICATIONS FOR REQUIREMENTS ON CONNECTION TO EXISTING SYSTEM.
9. EXISTING UTILITIES SHOWN ON DRAWINGS ARE APPROXIMATE: CONTRACTOR TO VERIFY AND PRE-LOCATE OTHER UTILITIES. AT CROSSINGS OR CONFLICTS WITH OTHER UTILITIES THE CONTRACTOR SHALL ESTABLISH LOCATION AND DEPTH FAR ENOUGH IN ADVANCE OF PIPE LAYING SO THAT CONFLICT WILL BE AVOIDED BY USE OF NORMAL PIPE DEFLECTIONS. FITTINGS MAY ONLY BE USED WITH ADVANCE APPROVAL OF THE ENGINEER. MINIMUM SEPARATION BETWEEN UTILITIES SHALL BE 6" MINIMUM WITH A SAND CUSHION AND HAND COMPACTION. MINIMUM COVER OVER WATER MAIN SHALL BE 36" UNLESS ADVANCE APPROVAL IS GIVEN BY THE ENGINEER.
10. DUCTILE IRON PIPE SHALL BE CL. 52.

RECORD DRAWING
CENTRAC ASSOCIATES, INC.
DATE 3-1-91
BY Willy Herman
CHECKED William Cassen

Contractor: Universal Lead
Pipe: PACIFIC STATES SEATTLE /W
FIELD LOC. GASKETS
Fittings: U.S.A. Meg-a-lug @ Bends
G.V.'s: CLOW
F.H.'s:

BURIED UTILITIES IN AREA
CALL BEFORE YOU DIG
1-800-424-5555

(1234) Denotes number to be stenciled on fire hydrants. See specifications for placement.

NO.	REVISION	BY	DATE
1	PIPE RE-ALIGNMENT & EASMT DETAILS		5/23/90

WOODINVILLE WATER DISTRICT
Approved by Manager
23 Apr 90

ROGER L. COFFEL — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER — 4-18-90

GARETH A. CRUBE — STATE OF WASHINGTON — 14605 — REGISTERED PROFESSIONAL ENGINEER

DATE	3-12-90
DESIGNED	RLC
DRAWN	CPT
CHECKED	BMV
APPROVED	RLC

CENTRAC
CONSULTING ENGINEERS

WOODINVILLE WATER DISTRICT
LOCUST LANE
STREAM CROSSING
DE 89-18

9011-616

SHEET 1 OF 1 SHEETS

811

#846