Joint Permit Application

This is a joint application, and must be sent to all agencies (Corps, DSL, and DEQ). Alternative forms of permit applications may be acceptable; contact the Corps and DSL for more information.

RECEIVED
APR 11 2024
DEPARTMENT OF STATE LANDS
Date Stamp

U.S. Army Corps of Engineers Portland District		Oregon Department of State Lands		Oregon Department of Environmental Quality
Action ID Number	NWP2023-24	Number	63610-RF Revised	

(1) TYPE OF PERMIT(S) IF KNOWN (check all that apply)

Corps: ☒ Individual ☐ Nationwide No.: ________ ☐ Regional General Permit ________ ☐ Other (specify): ______

DSL: ☒ Individual ☐ GP Trans ☐ GP Min Wet ☐ GP Maint Dredge ☐ GP Ocean Energy ☐ No Permit ☐ Waiver

(2) APPLICANT AND LANDOWNER CONTACT INFORMATION

	Applicant	Property Owner (if different)	Authorized Agent (if applicable) ☐ Consultant ☐ Contractor
Name (Required)	Lonnie Lister	Same as Applicant	
Business Name	Portland Golf Club		
Mailing Address 1	5900 S.W. Scholls Ferry Rd.		
Mailing Address 2			
City, State, Zip	Portland, OR. 97225		
Business Phone	503-292-2651 (Lonnie Lister)	Same as Applicant	
Cell Phone	Same as above		
Fax	N/A		
Email	llister@portlandgolfclub.com		

(3) PROJECT INFORMATION

A. Provide the project location.

Project Name				Latitude & Longitude*
Irrigation Pond Sediment Removal-Placement				45.472900° N; -122.760619° W
Project Address / Location	City (nearest)			County
5900 S.W. Scholls Ferry Rd.	Portland			Washington
Township	Range	Section	Quarter / Quarter	Tax Lot
01S	01W	24	BC	1700 (south portion)
N/A	N/A	N/A	N/A	N/A

Brief Directions to the Site:
From I-5 North, exit to Beaverton on Hwy. 26. Proceed 2.5 miles then turn south on S.W. Skyline Blvd. (Exit 71B). Road name changes to S.W. Scholls Ferry Rd. Proceed 2.8 miles south and golf course is on left side. From I-5 South, exit to Beaverton on Hwy. 217 (Exit 292A). Drive on Hwy. 217 for 4.2 miles to Exit 3. Drive east on S.W. Denny Rd for 0.5-mile, the turn left on S.W. Scholls Ferry Rd. Proceed 1 mile north and golf course located on right side. Please contact wetland consultant at pscoles@terrascience.com for site access.

B. What types of waterbodies or wetlands are present in your project area? (Check all that apply.)

☐ River / Stream ☒ Non-Tidal Wetland ☐ Lake / Reservoir / Pond

☐ Estuary or Tidal Wetland ☐ Other ☐ Pacific Ocean

Waterbody or Wetland Name**	River Mile	6th Field HUC Name	6th Field HUC (12 digits)
Woods Creek	0	Fanno Creek	170900100502

* In decimal format (e.g., 44.9399, -123.0283)
** If there is no official name for the wetland or waterbody, create a unique name (such as "Wetland 1" or "Tributary A").

C. Indicate the project category. (Check all that apply.)		
☐ Commercial Development	☐ Industrial Development	☐ Residential Development
☐ Industrial Development	☐ Agricultural	☐ Recreational
☐ Transportation	☐ Restoration	☐ Bridge
☐ Dredging	☐ Utility Lines	☐ Survey or Sampling
☐ In- or Over-Water Structure	☒ Maintenance	☐ Other:

(4) PROJECT DESCRIPTION

A. Summarize the overall project including work in areas both in and outside of waters or wetlands.

Portland Golf Club (PGC) owns and operates a golf course on 147 acres of land in urban Washington County. The project consists of removing sediment from a 1.77-acre irrigation pond (locally called Junor Lake) situated within the playing area and placing it in sediment bags nearby. The sediment consists primarily of silt, with lesser amounts of sand, clay, as well as golf balls and organic debris (leaves and twigs). The sediment will be removed from the irrigation pond by floating dredge, then pumped 1300 feet to a sediment placement location immediately south of the playing area. The sediment placement location is 0.72-acre emergent wetland flanked by higher topography on all sides with a narrow outlet. The sediment removal volume is approximately 5300 cubic yards (CY) and will be considered permanent removal, and the wetland fill area is 0.72-acre permanent fill. Minor temporary wetland or waters impacts associated with construction measures. The project will not create any permanent impervious surfaces, but it will install a temporary gravel staging area near the sediment placement location. The project will not discharge water to Fanno Creek or Woods Creek. The dredging is expected to take 4 to 6 weeks to complete, with 2 to 4 weeks of preparation and decommissioning afterwards.

B. Describe work within waters and wetlands.

Irrigation Pond – The irrigation pond was created via excavation and creek impoundment about 100 years ago. For dredging, it will be isolated from Fanno Creek by closing existing control gates. The pond will be further isolated from Woods Creek by installing a temporary, stacked sandbag-type coffer dam and bypass pipe. The accumulated sediment will be removed using a floating dredge that is delivered by a pickup truck and flatbed trailer. The dredge will be launched from the west terminus of Fairway 7. Specifically, the floating dredge will use a suction pump system to capture sediment using an articulated cutting head that is draw across the submerged sediment surface. The cutting head slices the accumulated sediment and organic debris (but golf balls stay intact), then a suction pump conveys the slurry mixture through a 6-inch diameter pipe. This conveyance pipe is laid atop the ground surface, crossing three fairways and past a small grove of fir trees. These three fairways have subsurface drainage pipes to allow rainfall to infiltrate and percolate, so the delivery pipe cannot be installed underground. The irrigation pond will remain at about 3/4- capacity during the dredging process. When complete, the dredge and associated pipes will be removed, as well as the Woods Creek coffer dam and associated bypass pipe. The pond will naturally fill to full capacity via flow from Woods Creek.

Sediment Bag Placement Area (Wetland A) – Wetland A is fed by street runoff originating from the south and southeast. A 6-inch stormwater pipe under Fanno Creek bike and pedestrian trail conveys such stormwater. The stormwater pipe will be extended around Wetland A and discharged to golf course property downgradient of Wetland A. Topsoil from Wetland A will be excavated with a trackhoe and/or bulldozer, then stored on upland immediately to the west (no large trees removal necessary). The topsoil will be covered with plastic tarps to prevent erosion and provide dust abatement. The wetland naturally slopes gently to the northwest until it is intercepted by a former electric railroad berm. The wetland will be graded along contours to facilitate placement of sediment bags, each 20 feet wide and 50 feet long. These bags are constructed of heavy duty geofabric, similar to sediment fencing and construction fabric for road construction. The bags are machine-sewed and reinforced along all seams to allow water to seep through the fabric, while the sediment remains trapped within. Such grading will allow two or three sediment bags to be filled simultaneously or sequentially with the slurry mixture,

[continued on following page]

When a sediment bag is approximately 3/4-full, then a new bag is unrolled next to the previous one, then the slurry mixture is diverted to the new bag. When roughly 20 sediment bags have been filled, then a second layer of bags can be laid atop the filled bags. The second lift of bags will have the same dimensions, and raise the height of the sediment placement area approximately 3 feet. If needed, a third lift of bags can be added; however, topographic constraints will position the third lift further north (where the wetland is lower). Plastic tarps will be placed atop the sediment bags at the end of each work day. Three check dams will be installed below the sediment bags. The first check dam will allow dredge water to accumulate, then pumped back to the irrigation pond. This recaptured water will utilize a pipe parallel to the sediment delivery pipe where it cross three fairways. The two additional check dams will be installed downgradient, as safety features should the first check dam have overflow. When sediment placement is complete, the sediment bags will be allowed drain for several months, before the salvaged topsoil is placed atop them. The final topsoil grading will be seeded with native grasses and forbs, then allowed to naturally re-vegetate as an upland meadow.

C. Construction Methods. Describe how the removal and/or fill activities will be accomplished to minimize impacts to waters and wetlands.

During dredging, the project will isolate the irrigation pond by closing several gates that control water levels in the pond. These gates normally allow water to overflow to Fanno Creek (to the west and south), but they also serve to keep out Fanno Creek water when natural turbidity from rain events is high (to avoid more sediment accumulation in the pond). Water levels in the pond will be maintained by using captured dredge water that seeped from the sediment bags. If water levels in the pond increase due to rain, excess water can be removed by turning on the irrigation system to disperse the water across large areas of the golf course. Alternatively, the excess water can be infiltrated at two vegetated areas that flank the sediment bag placement area. The uplands have much greater capacity to infiltrate water than Wetland A or low lands in the vicinity of Fanno Creek.

The floating dredge will be launched from a tilt trailer, so it will be transported to the pond via the maintenance bridge over Fanno Creek. While the bridge is sufficiently strong for the floating dredge and tow truck, it is too old for multiple crossing of fully loaded, 12 cubic yard dump trucks (to be discussed in the alternatives analysis). The tilt trailer will launch the floating dredge from the east side of the irrigation pond (at fairway 7). The dredge machinery will include an engine mounted on a floating platform (barge), a pump and an articulated cutting head. The cutting head is lowered below the water level, then positioned atop of the sediment. By weight of the cutting head and rotation of the cutting blades, the sediment is loosened. The pump suction evacuates the sediment and pumps it in a 4- to 6-inch diameter pipe to the sediment bags located in the south part of the golf course property. Such pipe is laid across the ground surface and secured with tie-down stakes or straps to prevent movement. The pipe is sufficiently flexible to avoid trees and navigate the up and down slopes of the former railroad berm. Only brush and non-native trees will be removed for the placement of the dredge pipe. The dredge platform will progressively move north-south across the pond to remove the accumulated sediments. The dredge cutting head will move downward until the original pond depth is encountered. Such depth is evident by a change in soil density – the accumulated sediments are soft. In contrast, the native substrate is dense (firm) and may have some pebbles or rocks that compose the underlying stratigraphy (usually layers of silts and clays in the Tualatin Valley). The pond lacks any buried utilities, but it does have a submerged pump intake and conveyance pipe that will be avoided during the sediment dredging phase.

Wetland A is ideally suited for sediment bag placement, because it naturally has converging slopes from the east, west and south that surround a 40- to 80-foot wide swale. The north end of the swale is blocked by a former electric railroad berm, about 6 feet higher than the wetland terminus. The berm redirects water into a narrow passage to the west where such water overflows to a bottomland wetland on the east side of Fanno Creek (about 600 feet to west by northwest). The upgradient stormwater (from the south and southeast) will be rerouted into a 3- to 6-inch diameter pipe installed parallel to the wetland swale. Such pipe will divert the wetland water source around the work area, as well as preventing such stormwater from flowing on to the Fanno Creek bike and pedestrian trail. The outlet of the bypass pipe will be the overflow ditch along the south edge of the former railroad berm (where Wetland A currently is impounded). The work within the swale (aka Wetland A) will involve preparatory removal of the sod / topsoil layer – about 0.75-foot deep. This sod layer must be removed to create a gentle, smooth slope that the sediment bags can be laid atop. The dredge contractor will position the sediment bags along topographic contours, placing them side-by-side, and progressively positioning additional sediment bags down slope of filled sediment bags.

The slurry of sediment and dredge water will be pumped into approximately 90 sediment bags that are 20 feet wide and 50 feet long. As per regulatory protocols, the sediment will be collected and analyzed for hydrocarbons, metals and other chemical constituents specified by Corps of Engineers and Oregon Dept. of Environmental Quality. The sediment bags are composed of woven geofabric that is similar to common sediment fencing. It is extremely strong material that is sew by the manufacturer to the desired dimensions. The sediment bags are typically fitted with a valve situated on the top-middle part, so the sediment slurry fills evenly. As the sediment bag fills, dredge water soon begins to seep from the woven fabric. Such seepage continues for several hours, so the dredge contractor will rotate among 2 or 3 sediment bags to avoid overfilling. That is, 2 or 3 sediment bags will be actively filled sequentially – when one is filled, then the dredge pipe is connected to another bags, and so on. When sufficient water has seeped from a previously filled sediment bag, then it could be re-filled again. With the sediment slurry composed of 85 percent water, the sediment bags get refilled 5 to 6 times before there is no more sediment trapping capacity. When approximately 20 sediment bags have filled, then the dredge contractor will roll-out new sediment bags atop filled sediment bags. This will be similar to stacking sandbags, where the crease between two sandbags gets filled with a new bag position in that crease. It is anticipated that the sediment bags will be stacked with two lifts in the upper part of the swale, and 3 lifts in the middle and lower parts.

The dredge water that seeps from the filled sediment bags will flow northward across the swale bottom to the south edge of the former railroad berm. Such berm impounds Wetland A, then redirects runoff to a west-sloping ditch (about 10 feet wide and 2 feet deep). Three check dams will be constructed across this ditch as supplementary measures to prevent offsite runoff of any dredge water. Upgradient of the first check dam, the dredge contractor will excavate two sumps to capture the dredge water and pump it back to the irrigation pond. The dual sump system will provide redundancy in the event one pump becomes non-operational. This captured water will be conveyed in 3- to 4-inch diameter pipes and placed parallel to the 4- to 6-inch diameter dredge sediment delivery pipe. The re-use of the dredge water is necessary to keep the dredge barge afloat, as well as maintain water capacity for summer irrigation. Thus, the captured dredge water will be returned to its point of origin.

If necessary, a temporary filtering system would be utilized to remove clay from the captured dredge water. Such system would consist of 1-inch diameter PVC pipe laid atop the land surface and 2-foot risers utilized to sprinkler dredge water over these uplands. The upland soils have sufficient permeability to infiltrate about 0.5-inch per hour and the infiltration process would sequester clay-sized sediments (too small to be retained in the sediment bags). Once infiltrated, the water would naturally migrate subsurface toward the dual sump system (described in previous paragraph) and be returned to the irrigation pond. The filtration pipes and risers would be removed as part of the project closure and site restoration activity.

The dredging project will create two staging areas. One staging area will be inside the existing maintenance yard where PGC houses mowers and other service vehicles. A second staging area will be situated southeast of Wetland A, which has vehicle access to S.W. 82nd Avenue. This staging will be sufficiently large to park several pickup trucks, an excavator, a dozer, and dump truck (if needed). The staging area will include stockpiles of gravel, piping, other building materials, and equipment storage. As required by county code and DEQ regulations, any stockpiled soil will be covered to prevent erosion and downgradient side of the staging area demarcated by standard sediment fencing. This staging area will also have an ingress/egress for construction vehicles and equipment to safely cross the Fanno Creek bike and pedestrian trail. The S.W. 82nd Avenue portal is a deeded easement between the PGC property and municipal streets. It is the only way to bring heavy equipment and construction vehicle into the project area – the existing bridge over Fanno Creek was not built for large equipment/vehicles. It is anticipated that an access permit will be required from Tualatin Hills Parks and Recreation District to allow vehicle across the Fanno Creek bike and pedestrian trail. Given presence of underground sewer lines, steel or high density plastic panels will be placed across the asphalt trail to protect from compaction damage.

Dredging and sediment bag placement is expected to take six weeks (preferably in summer); however, pre-construction preparations will begin 2 to 4 weeks earlier and decommissioning will take 2 to 4 weeks after the dredging is complete. Pre-construction will commence when weather conditions are favorable to avoid construction erosion. All bare ground will be seeded prior to autumn rains for desirable germination.

Additional best management practices (BMPs) are described below:

1. Wetland A outfall: Use of geofabric and check dams will be regularly inspected and repaired (if needed). These check dams are intended to stop sediments from being transported offsite (particularly Fanno Creek to the west).

2. Gravel construction entrance at S.W. 82nd Avenue will be installed and properly maintained for the duration of the project. As necessary, gravel and dirt will be swept daily from the affected portion of Fanno Creek pedestrian and bike trail.

3. Sediment fencing installed near the sediment placement and staging areas will be inspected weekly. Any damaged or torn geofabric will be cleaned or replaced when sediment build up has exceeded manufacturer's recommendations.

4. Stockpile Covers: Surplus soil stored for future use will be covered with tarps or plastic sheeting, then surrounded with a mulch-type barrier to prevent sediment transport and/or tracking by equipment.

5. A 1200-C permit from DEQ will be acquired prior to construction beginning. Additional permits from Washington County will also be obtained for work within the floodplain and grading.

6. Additional agency authorizations for placement of sediment bags, such as cover soil and revegetation with naturalized grasses and forbs.

(4) PROJECT DESCRIPTION (continued)

D. Describe source of fill material and disposal locations if known.

Fill material consists of sediment dredged from golf course irrigation pond and pumped into sediment bags. The sediment bags will remain permanently at the proposed location. As part of the project decommissioning, the sediment bags will be capped with salvaged topsoil, then seeded with native grasses and forbs. The sediment originated as eroded creek bank soils and other sediment from the Woods Creek watershed (hence mostly silts and lesser amounts of sand and clay). Sediment also includes inert golf balls. Project will use imported crushed gravel from nearby quarry as base material for a temporary staging area. Such rock and temporary road will be removed and ground condition restored to open space.

E. Construction timeline.

What is the estimated project start date?	Summer 2024 (anticipated)
What is the estimated project completion date?	Early Fall. 2024 (anticipated)
Is any of the work underway or already complete? If yes, please describe.	☐ Yes ☒ No

F. Removal Volumes and Dimensions (if more than 7 impact sites, include a summary table as an attachment)							
Wetland / Waterbody Name *	Removal Dimensions					Time Removal is to remain**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq.ft. or ac.)	Volume (c.y.)		
Irrigation Pond	380	225	4	1.77-ac.	5300	Perm.	Sediment
Wetland A	330	60	0.5	0.72-ac.	400	Perm.	Topsoil
Woods Creek avoided							
Wetlands B+C avoided							

G. Total Removal Volumes and Dimensions			
Total Removal to Wetlands and Other Waters	**Length (ft.)**	**Area (sq. ft or ac.)**	**Volume (c.y.)**
Total Removal to Wetlands	330	0.72-ac.	400
Total Removal Below Ordinary High Water	380	1.77-ac.	5300
Total Removal Below Highest Measured Tide	N/A	N/A	N/A
Total Removal Below High Tide Line	N/A	N/A	N/A
Total Removal Below Mean High Water Tidal Elevation	N/A	N/A	N/A

H. Fill Volumes and Dimensions (if more than 7 impact sites, include a summary table as an attachment)							
Wetland / Waterbody Name*	Fill Dimensions					Time Fill is to remain**	Material***
	Length (ft.)	Width (ft.)	Depth (ft.)	Area (sq. ft. or ac.)	Volume (c.y.)		
Wetland C (dredge ramp)	20	10	4	200	10	Temp.	Gravel bags, Geofabric
Wetland C (check dam 1)	10	10	2	100 sf.	2.5	Temp.	Sand Bags, Geofabric
Wetland C (check dam 2)	10	14	3	140 sf ea.	4.5	Temp.	Sand Bags, Geofabric
Wetland C (coffer dam)	20	9	4	180 sf.	6.5	Temp	Sand Bags, Geofabric
Wetland C (bypass pipe)	440	1.5	1.5	660 sf.	37	Temp	PVC Pipe, Geofabric
Wetland A	450	70	5	0.72-ac.	6000	Perm.	Sediment, Geofabric, Soil
Wetland A (check dam 3)	5	10	2.5	50 sf.	2.5	Temp.	Sand Bags, Geofabric
Wetland A (check dam 4)	5	10	2.5	50 sf.	2.5	Temp.	Sand Bags, Geofabric
Wetland A (check dam 4)	5	10	2.5	50 sf.	2.5	Temp.	Sand Bags, Geofabric
Wetland A (access path)	47	8	1	3000 sf.	14	Temp.	Wood Chips, Geofabric

(4) PROJECT DESCRIPTION (CONTINUED)

I. Total Fill Volumes and Dimensions			
Total Fill to Wetlands and Other Waters	**Length (ft.)**	**Area (sq. ft or ac.)**	**Volume (c.y.)**
Total Fill to Wetlands	400	0.72-ac.	6000
Total Fill Below Ordinary High Water	None	None	None
Total Fill Below Highest Measured Tide	N/A	N/A	N/A
Total Fill Below High Tide Line	N/A	N/A	N/A
Total Fill Below Mean High Water Tidal Elevation	N/A	N/A	N/A

*If there is no official name for the wetland or waterbody, create a unique name (such as “Wetland 1” or “Tributary A”).
**Indicate whether the proposed area of removal or fill is permanent or, if you are proposing temporary impacts, specify the days, months or years the fill or removal is to remain.
*** Example: soil, gravel, wood, concrete, pilings, rock etc.

(5) PROJECT PURPOSE AND NEED

Provide a statement of the purpose and need for the overall project.

Portland Golf Club (PGC) was established in 1914 and has operated continuously since. PGC is situated in the West Hills where population growth has been particularly aggressive (converting remnant pockets of forest and small farms to residential subdivisions). The golf course has thousands of golf plays each year and they host local, regional and national tournaments. Such events bring 100 or more out-of-state amateur and professional golfers and stay locally for lodging, food services and entertainment. Population in the Portland area has been increasing for many decades, and is projected to continue doing so. The annual growth rate is about 1.8 percent (greater than statewide average). This growth increases development density in the urban area, thus increased desire for recreation opportunities. PGC is one of many organizations that serves local community recreation demand and stewardship of natural resources. Such service and stewardship require continual maintenance and vegetation management. Washington County has, in its comprehensive land use plan, recognized the recreational and natural resource values that PGC brings to the community. Indirectly, the golf course provides active open space within an urban environment and critical floodplain storage when Fanno Creek infrequently floods.

In addition to recreation, the golf course provides exercise, fresh air and relaxation to members. While PGC is a private course, it has experienced an increased golfing demand – same as municipal golf courses in the Metro-Portland vicinity. In particular, PGC has seen golf play nearly doubled over the past 10 years. Such demand is substantial in urban areas, especially when traffic congestion makes it increasingly difficult to travel across town. To accommodate new and existing players, PGC must maintain the operational systems (such as irrigation, drainage, etc.), as well as provide an excellent playing surface of mowed tees, fairways and greens. Along with the complexity of the course, the quality of the turf is the critical element to having a sustainable golf course. In fact, the turf quality – especially the putting greens – is one of the most revered component of this golf course.

The golf course requires perpetual maintenance, ranging from mowing to brush trimming to repairs. The golf course also has long-term projects to replace irrigation systems, refurbish greens and bunkers, replace drainage pipes, upgrade to newer technologies, or conduct maintenance of structures and features. One of the features is the irrigation pond, which accumulates sediment over several decades (hence infrequent maintenance). The sediment primarily originates offsite as alluvial terrace creek banks of Woods Creek, but secondarily it comes from dirt washed off roads and dust from roofs and other impervious surfaces in the watershed. That is, urban development in the upgradient watershed has significantly increased impervious cover that results in downcutting of creek channels. Such erosion is minimal within PGC since the golf course does not increase impervious cover and the creek gradient is low (compared to upgradient reaches). Furthermore, PGC lawfully impounds water from Woods Creek at the irrigation pond, hence sediment is sequestered in the pond, rather than conveyed downstream. While Fanno Creek water also has suspended sediments, PGC closes a gate value to prevent sediment-laden water from that waterway.

Adequate water supply, along with nutrient amendments and turf aeration, are essential to achieve a quality golfing surface. If irrigation water were to become scarce or too expensive (via purchase), then the playing surfaces will be watered less often and become hardened and develop patchy growth patterns. Such effects will result in fewer people wanting to golf at PGC (when other courses have greater water availability and/or higher quality turf conditions). Additionally, tournaments and other host events will not be scheduled at PGC when turf conditions are inferior, damaged or contain patch conditions. When a golf course fails to provide adequate playing experience, such lands are often turned into residential subdivisions and/or small warehouse districts due to their central locations, suitable topography, accessible utilities, and mature trees.

While golf play occurs year-round, there is more play, as well as tournaments, in the late spring to early fall in most years. Irrigation is needed during those peak periods and the water comes from a created pond located in the south-center portion of the golf course. As described in previous paragraphs, the project will remove approximately 5300 cubic yards of accumulated sediment from this irrigation pond (informally named Junor Lake by PGC). The pond location is centrally located but also where it can receive seasonal flow from Woods Creek and overflow to Fanno Creek. Fanno Creek bisects the golf course, with half of the fairways mostly to the north (front 9 holes) and other half to the south (mostly back 9 holes). Woods Creek bisects the back 9 holes, flowing from the east boundary to the irrigation pond. In turn, the pond overflows to Fanno Creek at two locations – one outlet to the northwest and one to the southwest. Most of the time, Woods Creek flows out the southwest control gate. Fanno Creek flows several miles to the southwest and terminates at Tualatin River.

Woods Creek watershed extends west and south (almost to Interstate 5 near Capitol Highway). The watershed continues to urbanize with in-fill lots converted to residences, streets widened, and higher density developments replacing lower density uses. The increased amount of stormwater from the watershed has incised Woods Creek several feet deep within the golf course. Within the golf course, the creek banks are now vertical, but very stable (no apparent erosion). High intensity rainfall events have a significant effect on upstream segments of Woods Creek, where the topography is much steeper. The creek in such areas have widened and deepened, as common in urban environments. Those eroded sediments wash down to the irrigation pond and settle in that 1.77-acre created waterbody. The influx of sediments from Woods Creek watershed is a never-ending process (occurring upgradient of the golf course), so future dredging of the irrigation pond is anticipated. Specifically, PGC would like to conduct future sediment removal potentially once every 20 years, where smaller volumes are removed (utilizing same area for sediment placement). Wetland A is naturally recessed below surrounding topography and the proposed sediment bag placement would raise the bottom of the swale several feet. Salvaged topsoil (about 6 inches thick) would cap the sediment bags and leave a resultant swale available for future sediment bag placement. It is estimated the resultant swale would have capacity for 2 future dredge projects over the next 40 years. Future dredge projects would need to construct a containment berm on the west side of the sediment bags to achieve the same objective where the old railroad berm impounds the water draining from the sediment bags. It is further anticipated that future creekbank restoration along Woods Creek and future upgradient sediment trapping (such as streetside rain gardens) would reduce the sediment influx when the resultant swale no longer has capacity for more sediment. The fixed costs of dredging and sediment bag placement are significant, so a 20-year interval is appropriate. Creek restoration and greater sediment trapping (BMPs) in the Woods Creek watershed are beyond the scope of removing and placing accumulated sediments. It typically takes several years of planning and permitting to undertake creek restoration projects. PGC anticipates future discussions and planning with Clean Water Services programs that can also improve creek functioning that is also compatible with course operations and golf play.

PGC has previously received authorization (circa 1994) to remove accumulated sediments from DSL and Corps of Engineers. The yard debris area was utilized to fill several sediment bags, with scuba divers operating a suction hose. The contractor was only a week into such work and it was obvious that approach was not sufficient to effectively remove the sediment. That is, the volume of sediment was likely 30 to 50 times greater than the capacity of the equipment and sediment bags. Additionally, the labor involved was no match for the task – formal excavation or dredging was acknowledged as the only means to remove the accumulated sediment. Recently, PGC became aware the sediment accumulation since 1994 was reducing the capacity of the irrigation intake pipe and cause damage to the irrigation system (in-line sediment results in accelerated pipe deterioration and lower water pressure). PGC seeks to have the sediments removed and commence repairs to their irrigation system (damaged by the sediment uptake).

Need For Sediment Removal: The sediment removal from the irrigation pond resolves a critical need for sufficient water storage for golf course watering of tees, fairways and greens. Without such removal, the golf course must construct another pond or reservoir to hold 3 to 5 acre-feet of water (due to ongoing accumulation of sediment). See alternatives analysis for detailed discussion. The sediment removal will also have a water quality benefit to Woods and Fanno Creeks, since deeper water in the pond (sans sediment) reduces water temperature prior to overflowing to the creek. Lower water temperatures provide better habitat for fish rearing and spawning. Such benefit is particularly pronounced in spring and autumn when Fanno Creek is sustained by rainfall and urban runoff (creek flow is minimal in summer due to naturally dry conditions in July, August and September). The sediment removal will also create more opportunity for sediment trapping in the irrigation pond. In contrast, an irrigation pond nearly full of accumulated sediment will eventually pass sediment through, then increase turbidity and sedimentation within Fanno Creek.

The sediment removal generates approximately 5300 CY of silt, with lesser amounts of sand, clay and golf balls. The cost of hauling away the sediment immediately doubles the project budget, so the PGC has explored many alternatives to place the sediment onsite. The sediment is unlike typical soil – it has a silty texture, which is easily eroded and difficult to incorporate with other fill material. In particular, the silty texture lacks sufficient clay content to stick together (hence it is easily erodible) and when mixed with other soils or fill it does not hold together and it compresses (compacts). Consequently, the sediment cannot be reused as a construction material. It also cannot be easily incorporated into the soil within the golf course – a simple application of 0.5-inch over a large area would destroy existing turf and also risk washing off during evening irrigation or unexpected rain event. As detailed in alternatives analysis (Appendix D), the placement of sediment bags within Wetland A is the preferred approach, rather than hauling the sediment offsite or other placement options. Specifically, the topographic setting of Wetland A is ideal for the sediment placement because it has higher elevations on 3.5 sides and a narrow outlet. Such configuration allows for drainage water from sediment bags to flow to a topographic low spot, filtered by grasses, then pumped back to the irrigation pond (it is necessary to keep the dredge afloat). To construct a containment system (rather than use the natural low setting of Wetland A) requires a larger disturbance footprint and has great risks due to more soil exposure to rain (hence offsite transport of eroded material). See alternatives analysis for extensive discussion of such options, including logistical, physical, economic and environmental considerations.

Local Benefit: The sediment removal will deepen the irrigation pond, which Woods Creek flow in and out. The deeper pond will improve water quality for Woods Creek and Fanno Creek. Wildlife and fish will have improved habitat for feeding, rearing and reproduction. Improved habitat conditions typically sustain wildlife presence longer and reinforce migration patterns that utilize the pond. The removal of the accumulated sediment creates greater capacity for sediment trapping and nutrient cycling within the irrigation pond, as well opportunity for seasonal stormwater desynchronization (during irrigation season). From an economic perspective, the PGC sediment removal and bag placement project will create about 4 to 6 part-time, temporary jobs for typical construction employees that operate an excavator, a bulldozer, and floating dredges. The project will also require about 400 CY of crushed rock for a staging area, submersible pumps, temporary sprinkler system, and associated erosion controls. The estimated project cost is $550,000 roughly translates into $110,000 additional payroll, which is used for local housing, food, utilities, education, recreation and savings. The project will generate approximately $350,000 in equipment rentals for the dredging contractor, which enables that contractor to provide employment for support and supervisory staff. Remaining project expenses for dredge operations include sediment bag construction, land grading, etc. Such purchases and services will support local businesses in the pipe supply, construction supply and geofabrics industries. Several alternatives explored in the alternatives analysis would use 550 or more roundtrip truck hauls to a quarry for sediment placement. Such trucking would benefit local hauling firms $350,000 to $400,000 for trucking and related construction services (approximately 4 trucks, operators hauling 7 loads per day for 5 weeks). Ultimately, the locally earned payroll, equipment rentals, and goods sold facilitates about $1,800,000 to $2,400,000 consumer spending and re-investment in the Metro-Portland vicinity. While these costs are approximate, they are based on discussions with contractors familiar with the project, as well as other natural resource and wetland mitigation matters implemented by the PGC project team.

(6) DESCRIPTION OF RESOURCES IN PROJECT AREA

A. Describe the existing physical, chemical, and biological characteristics of each wetland or waterbody. Reference the wetland and waters delineation report if one is available. Include the list of items provided in the instructions.

The project area includes two non-wetland waters and three wetlands. The non-wetland waters include a created irrigation pond that is encircled with a 4 to 6 feet tall retaining wall. It lacks a natural fringe, so it consists only of open water that is 3 to 7 feet deep. Except for a few submergent plants, it is unvegetated. Woods Creek is the other non-wetland waters, which terminates at the irrigation pond. In turn, the irrigation pond overflows to Fanno Creek. Woods Creek has mostly vertical side banks, barren channel bottom, and mowed turf beyond the top of bank. The wetlands within the project area include the sediment placement area (Wetland A); an area adjacent to Woods Creek (Wetland B); and a small patch of mowed turf adjacent to the irrigation pond (Wetland C). All of the non-wetland waters and wetlands are considered jurisdictional by DSL and Corps.

Wetland A was delineated in April 2018 by Terra Science, Inc. A technical report summarizing the wetland boundaries and related attributes was compiled shortly thereafter. Wetland A is a southeast to northwest sloping, emergent swale (0.72-acre). The wetland is sustained by primarily by rainfall, but also receives street runoff and drainage water pumped from several residences near the terminus of S.W. 82nd Avenue. Such water is piped under the Fanno Creek bike path and discharges about 10 feet north of the Fanno Creek trail bike and pedestrian path. The flow rate into Wetland A mostly occurs in the rainy season and late spring, but it can have a trickle flow in summer months. The lower end of the swale terminates at a former electric railroad berm. Consequently, the swale overflows to the west via narrow ditch on the south side of the former railroad berm. The narrow ditch eventually terminates at a bottomland wetland situated near Fanno Creek approximately 400 to the west. This complex is connected to Fanno Creek, which flows about 8 miles south to Tualatin River (near City of Durham). The west-center of Wetland A is dominated by meadow foxtail, colonial bentgrass and Himalayan blackberry. It contains lesser amounts of soft rush, velvetgrass, and supports a few red hawthorn and willow along the edges. This wetland is seasonally saturated (usually within 6 inches of surface), but lacks depressions with ponding in winter months. Soil conditions have redoximorphoric concentrations in the upper part (F6 hydric soil indicator) and depleted matrix deeper in the profile (A11 indicator). It qualifies a Palustrine Emergent, Seasonally Flooded/Saturated type wetland (PEME) and has a hydrogeomorphic class of Slope Headwater (HGM-SH). This wetland is proposed as the sediment placement area, because it is surrounded by higher ground that helps contain and recycle water draining from recently filled sediment bags.

Wetlands B and C were delineated in October 2021 by Terra Science, Inc. Wetland B is a 1.34-acre partially wooded, partially mowed seasonal wetland that flanks Woods Creek, but predominately occurs on the north side. It is dominated by creeping buttercup, bentgrass, common reed, and bluegrass with scattered Oregon ash trees. This wetland also has pockets of Himalayan blackberry. This wetland is also seasonally saturated and has a subtle depression with ponding in winter months. The hydrology source for this wetland is mostly rainfall; however, large rain event can cause Woods Creek to overbank flood this vicinity. The flashy flooding is infrequent and short duration – as expected from an urbanizing upgradient watershed. Soil conditions have dark surface with redoximorphoric concentrations in the upper part (F6 hydric soil indicator) and/or depleted matrix deeper in the profile (F3 and A11 indicators). This wetland qualifies a Palustrine Emergent and Palustrine Forested type wetland (PEM-PFO) and has a hydrogeomorphic class of Slope (HGM-SL).

Wetland C consists of narrow strips of wetland parallel to the irrigation pond. It is dominated by bluegrass and ryegrass (since it is mowed turf). One small patch has some ornamental rhododendrons planted in the wetland. Soil conditions have dark surface with redoximorphoric concentrations in the upper part (F6 hydric soil indicator) or sandy fill material that has redoximorphic concentrations (S5 indicator). It qualifies a Palustrine Emergent type wetland (PEM) and has a hydrogeomorphic class of Slope (HGM-SL). This wetland will be avoided for the sediment removal work; however, a temporary water line (plastic pipe or hose) will be laid atop the mowed turf to convey pumped dredge water and sediment to the filter sediment bags placed in Wetland A. The updated wetland report was submitted to Oregon Dept. of State Lands and U.S. Army Corps of Engineers in mid-November 2021 for their review and concurrence.

Upland Between Wetland A and Irrigation Pond/Woods Creek: The study area also included the proposed pipe alignment across three fairways and open space (land between the irrigation pond and Wetland A). The fairways are regularly mowed and have a network of subsurface drainage pipes (perforated pipe) that prevents formation of a seasonal high water table in the upper 2 to 3 feet of the surface. The importance of the drainage network is essential for year-round golf play, as well as facilitating regular mowing, trimming, pipe repair, and turf maintenance. As such, these fairways and upland forest (between fairways) were not suspect as wetland and do not show wetness patterns on current and historical aerial photographs. Additionally, the fairways and adjacent open space are several feet higher than irrigation pond, Wetland B and Wetland C.

Impacts are proposed only for the irrigation pond (sediment removal) and Wetland A (sediment placement). While no fish occupy or utilize any portion of Wetland A, amphibian use (such as salamanders) is likely but potentially only in winter and spring months (before the wetland dries out). The lack of open water, as well as trees, stems and woody debris greatly diminishes habitat opportunities for native frogs; however, downgradient wetlands connected to Fanno Creek may have suitable habitat for such amphibians. The irrigation pond supports small, warm-water fish that migrate up and down Woods Creek, but fish passage is limited by control gates that hold water in the irrigation pond (hence control connection to downgradient Fanno Creek). Warm summer and early fall temperatures in the irrigation pond, as well as lack of significant dry-season flow in Fanno

Creek, preclude cool water fish in the irrigation pond. The irrigation pond also supports non-native frogs and invertebrates.

Additionally, songbirds likely utilize Wetland A and its vicinity regularly for feeding, breeding, nesting, and rearing during spring and summer. Resident and incidental bird species use the wetland is probably minimal; however, adjacent upland areas support songbirds, hummingbirds, woodpeckers, jays, hawks, and owls. Waterbirds have been observed feeding in the irrigation pond, Fanno Creek and Woods Creek. Nearby wetlands and floodplain areas along Fanno Creek have shrub and forested wetland habitat, which results in greater wildlife usage for nesting, breeding and foraging. An ORWAP Wetland Functional Assessment was completed for Wetland A and included as Appendix D.

B. Describe the existing navigation, fishing and recreational use of the waterbody or wetland.

The project does not involve permanent impacts to Fanno Creek or Woods Creek, so there no navigation impact of those waterways. There will be a temporary impact to Woods Creek for sandbag placement for a coffer dam. Such temporary impact will be installed for 4 to 6 weeks and it will not affect public navigation (current none due to private ownership and lack of public access). Wetland A lacks open water; therefore, the proposed fill activity will not affect navigation. That is, winter rain events may temporarily create inundation 1 to 2 inches above the surface, but such inundation recedes to saturation at the surface – insufficient wetness for navigation.

Similarly, the project does not affect fishing in Fanno Creek and Woods Creek. During the dredging of the irrigation pond, the control gate connection to Fanno Creek will be closed, so no fish could enter the pond. Woods Creek will also be isolated from the pond by installation of a temporary bypass pipe. Such bypass will redirect Woods Creek flow into a large diameter pipe that circumvents the dredging zone. The bypass pipe will be secured next to the existing retaining wall on the south side of the irrigation pond. It is important to acknowledge that PGC does not allow fishing in the irrigation pond, nor allow any fishing along Fanno Creek or Woods Creek within the golf course. Wetland A lacks any open water, so the proposed fill activity will not affect fishing.

Recreational use of the irrigation pond is limited to birdwatching and open space enjoyment. The floating dredge will temporarily reduce such recreational use due to engine and pump noise, as well as human presence on the dredge barge that moves back and forth across the pond. While the engine and pump noise will be moderate, it will only occur during hours specified by Washington County code (presumably same noise restriction as other construction projects). When dredging is complete and floating dredge removed, pre-disturbance conditions will be restored at the irrigation pond. Wetland A has similar birdwatching and open space recreation attributes, except it has trees and shrubs on adjacent uplands. The proposed fill activity in Wetland A will permanently change the conditions from wetland habitat to upland habitat, so such area will be expected to provide more opportunity for terrestrial mammals, songbirds and raptors. In particular, the sediment bags will be capped with salvaged topsoil, then seeded with native grasses and forbs. Since the recreational uses occur on private land, there will be no loss of public recreation (within the wetland).

(7) PROJECT SPECIFIC CRITERIA AND ALTERNATIVES ANALYSIS

Describe project-specific criteria necessary to achieve the project purpose. Describe alternative sites and project designs that were considered to avoid or minimize impacts to the waterbody or wetland.*

A Least Environmentally Damaging Practical Alternatives (LEDPA) analysis was prepared for this application and included as Appendix D. This document follows the Alternatives Analysis Framework (guidance) provided by U. S. Army Corps of Engineers. Prior review by Corps of Engineers adjusted the evaluation criteria to narrow focus on variables of size, availability, logistics, environmental impact, and implementation cost. PGC added evaluation criteria for effect on golf course property, operations and user experience. While Appendix D includes substantial detail, the revised evaluation criteria consists of:

1. Size, namely water storage or supply capacity and sediment placement site.
2. Availability, particularly land area for water storage and sediment placement.
3. Logistics, such as compatibility with PGC irrigation system, construction ingress/egress, and avoiding damage to PGC and municipal utility infrastructure.
4. Environmental impact minimization to a) stream and riparian functions, b) wetlands and functional attributes, c) wildlife habitat and functions, forest habitat and functions.
5. Cost to conduct dredging (or excavation) or building new storage; to place sediment bags; to install or repair infrastructure; and to implement project (other project expenses).
6. Effect on a) golf course operations, b) maintaining golf course design (play experience), c) existing drainage network present under most fairways, and d) displacement of PGC activities at other accessory work areas.

The analysis evaluated the following alternative approaches to accomplishing the project objective (to restore irrigation capacity) and addressing placement and/or hauling of dredged sediment:

- Relocation of golf course to a new site
- No sediment removal—pond siltation (no-action alternative)
- Excavation of replacement irrigation pond elsewhere within golf course
- Construction of metal or concrete reservoirs (in lieu of in-ground pond)
- Use of on-demand well and/or domestic water (no physical water storage)
- Use of recycled water storage system (treated effluent not currently available)

The analysis also compares sediment excavation and hauling to sediment dredging and placement. Hauling sediment will involve trucking to a quarry or other construction site, presumably between Sherwood and Wilsonville (closest location). Sediment dredging is clearly environmentally preferrable and allows for ongoing golf course use, while sediment excavation results in extensive damage to golf course and loss of golf play (hence temporary closure of golf course during peak play season). Many onsite places were considered for sediment bag placement, namely:

- Placement between Fairways (multiple locations near irrigation pond)
- Placement in Wetland B (larger wetland impact)
- Placement west of Wetland A (larger disturbance area due to extensive grading necessary)
- Placement in yard debris area (too small, underlain by loose, old fill material)
- Placement in turf farm area (too small, sediment must be hauled away to restore turf farm)
- Placement in driving range area (extensive restoration required after sediment application)
- Placement in forested groves (requires large tree removal, loss of vertical habitat)

* Not required by the Corps for a complete application, but is necessary for individual permits before a permit decision can be rendered.

- Placement in Fairway 15 (requires closure, then reconstruction of fairway with inferior silt material)
- Temporary placement in Wetland A, then hauled to quarry or other construction site
- Placement in Wetland A (conducted 3 times over 15 years)
- Placement in Wetland A (preferred approach as per LEDPA criteria and analysis)

See Appendix D for complete LEDPA alternative analysis (October 2023).

Avoidance and minimization of sediment removal effects: No avoidance of impacts is possible, since the sediment removal project is absolutely necessary to continue golf course operations. The primary environmental impacts of dredging are temporary mobilization/demobilization, temporary water turbidity, loss of invertebrates in sediment, and operations noise (pumps).

1) Temporary impacts due to mobilization and demobilization. The dredging barge is relatively small and can be mobilized using a pickup and tilting trailer. There will be a small, temporary impact to the edge of the irrigation pond at the launch point, with placement of rock to allow the trailer to dip into the water. The resource impact is rock placement on silt substrate. This is the same silt substrate that will be removed by the dredging activity. Upon completion of the dredging, the rock ramp will be removed (leaving earthen pond bottom minus accumulated sediment). This is a very minor impact amounting to 10 cubic yards of gravel.

2) Temporary turbidity in irrigation pond. The inherent nature of the dredging cutting head involves rotating blades that slice into submerged sediment to loosen it, then draw it into a suction pump. Such activity does not stir-up sediment like a blender, but the motor vibrations will result in some turbidity near the cutting head. Given the fine particle size of silt, suspended solids will likely stay afloat during daily operations, but settle out at night. To avoid any turbid water entering Fanno Creek and Woods Creek, the irrigation pond will be temporarily isolated with closure of two lift gates that connect to the creeks. The gates will be further sealed with plastic sheeting and sand bags to prevent any leakage to the creeks. In addition, a temporary bypass for Woods Creek will be installed along the south edge of the pond, so clean water from the creek does not enter the irrigation pond during the dredging operation. The bypass will utilize a coffer dam at a pedestrian/golf cart bridge immediately upgradient of the pond. The coffer dam will be constructed with plastic sheeting and sand bags to prevent any turbid water from back-flowing (up) into Woods Creek. No gravel or soil material will be placed for the coffer dam or other temporary sediment barriers. This impact will amount to 50.5 cubic yards – all hand-placed plastic sheeting and sand bags.

3). Loss of invertebrates within accumulated sediment. The removal of sediment, either by excavation or dredging, will also removal invertebrates that inhabit such sediment. While not quantified, the loss of invertebrates, such as worms, snails, mollusks and insects, will not have an adverse impact on nearby aquatic habitats in Woods or Fanno Creeks, or nearby Wetland B. Such invertebrates are a food source for some birds, fish and other invertebrates, such loss is short-term and similar invertebrates will inhabit the pond bottom after the sediment removal. There are similar food sources in Woods and Fanno Creek, both upstream and downstream, so no measurable effect is anticipated.

4) Temporary noise impact from pumps and/or electrical generators. The dredge pump system requires a dedicated electrical source of sufficient voltages to operate the dredge and associated suction pumps. The noise levels are generally low, somewhat similar to an idling truck or tractor. Some wildlife, such as birds and small mammals, will acclimate (or habituate) to a temporary noise (that lacks significant percussion or irregular jarring sounds). Other wildlife, particular nocturnal mammals and birds, may be temporarily displaced during operational hours; however, such operation (approximately 8 hours per day) will not occur during evening, dusk or dawn conditions when those animals may be active. The surrounding golf course lands, to the north and south, provide sufficient refugia for birds and wildlife. There are also open space lands to the east and southwest where such animals can retreat during operation hours. Consequently, the noise impacts are anticipated to be minor and temporary.

Avoidance and minimization of sediment placement effects: The primary environmental impacts of sediment bag placement are temporary mobilization/demobilization, temporary water turbidity, loss of invertebrates in Wetland A, and loss of wildlife and bird habitat in Wetland A.

5). Temporary impacts due to mobilization and demobilization. The sediment placement approach requires ingress/egress from S.W. 82nd Avenue, which has a deeded access at such location. Vegetation will trimmed accordingly to open and close the existing gate, but approximately 10 feet swath of shrubs, trees and herbaceous vegetation will be preserved along the bike and pedestrian path (both sides of existing fence). Small, volunteer trees and shrubs will be trimmed to ground level, then wood chips imported to create a drivable surface for construction equipment and pickups. Cuttings will be chipped onsite to avoid additional hauling offsite. If necessary to reduce soil compaction, geotextile may be laid down prior to wood chip placement. Upon project completion, any geotextile will be removed and wood chips dispersed to allow for volunteer and seeded species to grow. Such impacts will occur on uplands only.

6) Temporary turbidity in contained drainage water. Via pipeline, the process of transporting sediment from the dredge to the sediment bag location will create a turbid mixture of approximately 15 percent solids and 85 percent water. This slurry is pumped into sediment bags, which removes the sand and silt particles; however, microscopic clay particles may stay suspended in the drainage water. Such water will be allowed to filter through grasses, then collected in a natural low area and pumped back to the irrigation pond. Since the pond is hydrologically separated from Woods and Fanno Creeks, such turbidity is temporary and occurs in a closed loop. In the event of unintentional overflow, the project will install three temporary check dams (one primary dam, two backup dams) designed to slow water flow and trap suspended solid (hence no offsite export of sediment). The sediment dams will be constructed of filter fabric and large gravel and sand bags. Upon project completion, the temporary sediment dams will be removed and ground restored to original contours, then seeded with native grasses and forbs. This impact will amount to 7.5 cubic yards.

7) Loss of invertebrates within Wetland A. The placement of sediment bags will also impacts invertebrates that inhabit the wetland soil. While not quantified, the loss of invertebrates (e.g. worms, snails, and insects), will have a minor adverse impact on nearby aquatic habitat in downgradient Fanno Creek. While the pond invertebrates are partial food source for some birds, fish and insects, the minor impact is short-term and similar invertebrates are abundant in Fanno Creek and Woods Creek watershed which have similar food sources. Thus, no measurable effect is anticipated.

8). Loss of bird and wildlife habitat within Wetland A. The preparation for sediment bag placement, and subsequent soil cover in Wetland A will remove habitat used by small mammals, birds, insects that reside in nearby uplands. The lowest portion of Wetland A may become filled with sediment associated with the drainage water, so such wetland is included in the permanent wetland impact (0.72-acre). While Wetland A has relatively low plant diversity (due to invasive and non-native grasses/forbs), some birds and wildlife are partly sustained by seeds and foliage, and/or utilize the grassy habitat for nesting, resting and seasonal water consumption. The sediment bag placement will permanent fill such habitat and place salvaged topsoil atop the sediment bags. The topsoil will be contoured to have a natural appearance and the new surface seeded with native grasses and forbs. Such grasses and forbs will provide a partial food source for some birds and wildlife. Regardless, some birds and small mammals may be displaced during the preparation phase and not return after the ground restoration occurs. Such animals have sufficient replacement habitat to the east, west and north, including portions of the golf course. Such animal displacement occurs regularly within urban areas as habitat is removed for home construction/remodeling, street improvements, hazard tree removal, and other disturbances. The loss of individual animals is difficult to assess, since they may have annual migrations or simply decide to inhabit another location (but not return after project completion). The sediment bag placement will preserve the large trees on upland east of Wetland A and shrub land west of Wetland A to encourage displaced animals to return.

(8) ADDITIONAL INFORMATION

Are there state or federally listed species on the project site?	☐ Yes	☒ No	☐ Unknown
Is the project site within designated or proposed critical habitat?	☐ Yes	☒ No	☐ Unknown
Is the project site within a national Wild and Scenic River?	☐ Yes	☒ No	☐ Unknown
Is the project site within a State Scenic Waterway?	☐ Yes	☒ No	☐ Unknown
Is the project site within the 100-year floodplain?	☒ Yes	☐ No	☐ Unknown

If yes to any above, explain in Block 6 and describe measures to minimize adverse effects to those resources in Block 7.

Is the project site within the Territorial Sea Plan (TSP) Area?	☐ Yes	☒ No	☐ Unknown

If yes, attach TSP review as a separate document for DSL.

Is the project site within a designated Marine Reserve?	☐ Yes	☒ No	☐ Unknown

If yes, certain additional DSL restrictions will apply.

Will the overall project involve ground disturbance of one acre or more?	☒ Yes	☐ No	☐ Unknown

If yes, you may need a 1200-C permit from the Oregon Department of Environmental Quality (DEQ).

Is the fill or dredged material a carrier of contaminants from on-site or off-site spills?	☐ Yes	☒ No	☐ Unknown
Has the fill or dredged material been physically and/or chemically tested?	☒ Yes	☐ No	☐ Unknown

If yes, explain in Block 6 and provide references to any physical/chemical testing report(s).

Has a cultural resource (archaeological and/or built environment) survey been performed on the project area?	☐ Yes	☒ No	☐ Unknown
Do you have any additional archaeological or built environment documentation, or correspondence from tribes or the State Historic Preservation Office?	☐ Yes	☒ No	☐ Unknown

If yes, provide a copy of the survey and/or documentation of correspondence with this application to the Corps only. Do not describe any resources in this document. Do not provide the survey or documentation to DSL.

Is the project part of a DEQ Cleanup Site? ☒ **No** ☐ **Yes** Permit number N/A.
DEQ contact: N/A.

Will the project result in new impervious surfaces or the redevelopment of existing surfaces? ☐ **Yes** ☒ **No**
If yes, the applicant must submit a post-construction stormwater management plan as part of this application to DEQ's 401 WQC program for review and approval, see https://www.oregon.gov/deq/FilterDocs/401wqcertPostCon.pdf
While the project will create a temporary, gravel staging area, such pad will be removed as part of project completion and ground seeded with native grasses and forbs.

Identify any other federal agency that is funding, authorizing or implementing the project.

Agency Name	Contact Name	Phone Number	Most Recent Date of Contact
N/A	N/A	N/A	N/A

List other certificates or approvals/denials required or received from other federal, state or local agencies for work described in this application.

Agency	Certificate / approval / denial description	Date Applied
Dept. of Envir. Quality	401 Water Quality Certification	Same as JPA
Washington County	Grading Permit; Flood Plain Permit; Service Provider Letter from Clean Water Services	To be determined

Other DSL and/or Corps Actions Associated with this Site (Check all that apply.)

☐ Work proposed on or over lands owned by or leased from the Corps (may require authorization pursuant to 33 USC 408). These could include the federal navigation channel, structures, levees, real estate, dikes, dams, and other Corps projects.

☐ State Owned Waterway	DSL Waterway Lease #: N/A	
☐ Other Corps or DSL Permits	Corps # N/A	DSL # N/A
☐ Violation for Unauthorized Activity	Corps # N/A	DSL # N/A
☒ Wetland or Waters Delineation	Corps #	DSL # 2021

Submit the entire delineation report to the Corps; submit only the concurrence letter (if complete) and approved maps to DSL. If not previously submitted to DSL, send under a separate cover letter.

(9) IMPACTS, RESTORATION/REHABILITATION, AND COMPENSATORY MITIGATION

A. Describe unavoidable environmental impacts that are likely to result from the proposed project. Include permanent, temporary, direct, and indirect impacts.

<u>Aquatic impacts – Irrigation Pond:</u> The irrigation pond excavation will have a direct, but temporary impact of 1.77-acre to pond bottom consisting of unvegetated, soft sediments (mostly silts). The sediment provides incidental habitat for invertebrates, while the open water is intermittently used by turtles (including non-native snapping turtles), nutria and wildfowl. The pond is encircled by retaining wall and water levels are maintained sufficiently high that it lacks submergent vegetation. The pond has existing control gates that isolate it from adjacent Fanno Creek, so no impacts will occur to that perennial creek. Woods Creek terminates at the irrigation pond; however, flow from Woods Creek will be temporary diverted around the irrigation pond during the short period of sediment removal. Preceding dredging, the pond water level will be lowered in a manner that allows fish to migrate to Fanno Creek and Woods Creek. Specifically, the pond will be lowered abruptly to alert fish and other wildlife that water depth is changing – this often signals fish to leave the pond. The rapid water lowering process can be repeated several times to remove other fish that did not previously leave. The repeated water lowering approach is necessary, since hand-salvaging of stray fish is unfeasible due to the soft and deep condition of the accumulated sediment in the pond. Next, temporary fish screens will be installed on the inlet and outlets of the pond. Simultaneously, a small coffer dam will be constructed at the inlet to the pond, which coincides with a small foot-golf cart bridge. A temporary fish screen will be used to keep any fish and invertebrates from entering the bypass pipe. Proper placement of the fish screen will be checked daily to assure the pipe does not shift as water levels change during the course of the excavation. As such, no permanent impacts to Woods Creek will occur, since the pond supports only warm water adapted fish, no effect is anticipated on sensitive fish species. Regardless, the applicant will obtain a fish salvage permit if required by Oregon Dept. of Fish and Wildlife and/or U.S. Fish and Wildlife Service.

<u>Aquatic impacts – Sediment Placement Site (Wetland A):</u> The dredged sediment will be pumped into sediment bags, placed in Wetland A. This southeast to northwest sloping wetland will be regraded to have a smooth, gently sloping surface – the sediment bags will be oriented along contours and placed side-by-side. The sediment bags will be filled 2 or 3 per day. The sloping surface will stop about 50 feet before the north edge of the wetland. Such area will be used as a dredge water recovery area and fine sediment accumulation area. The wetland lacks standing water and it is dominated by non-native grasses and forbs, so there will not be any loss of open water or aquatic invertebrate habitat. Instead, the primary impact will be terrestrial habitat for neighborhood deer, small mammals and songbirds that traverse the wetland and possibly some forage on new grass sprouts and forbs. The adjacent uplands appear to provide significantly more nesting, resting and fruit forage (wetland lacks trees/ bushes/ vines). Wetland A is situated in the upper end of the subwatershed, and receives contributing runoff from approximately 2 acres of urban lands to the south and east. The project will convey this urban runoff (via 6-inch pipe) to the northwest corner of the sediment placement area to assure that no loss of conveyance. The downgradient discharge of the urban runoff will flow through wetland and continue to provide incidental function for sediment trapping, nutrient uptake and floodwater desynchronization. No endangered or sensitive species are present within or adjacent to Wetland A.

<u>New impervious cover and storm water:</u> The gravel staging area near the sediment bag placement area will

be decommissioned as part of the completion activities. As such, no impervious cover or stormwater created; thus, the sediment removal and sediment bag placement will not degrade or harm downgradient wetlands or waters of the U.S./State of Oregon.

Construction sediment: Lacking permanent impervious roads, roof, paths or buildings, there will not be any Indirect impacts to fish species, via drainage water or natural seepage from Wetland A. Temporary erosion controls will be installed where dredge water could potentially overflow to offsite wetlands, and downgradient of the irrigation pond and Wetland A to assure no sediment export during the sediment removal phase. The project will be implemented when rain events have low intensity and short duration, as well as having ground conditions that can adsorb the rain. Additionally, the natural topography and low grades within the project area are favorable to minimizing sediment movement and sediment bag placement area. The excavation contractor will be required to acquire a 1200-C permit from DEQ and strictly adhere to all sediment and erosion control measures (aka Best Management Practices or BMPs). Further, the contractor will maintain all BMPs in good condition, repair damaged BMPs within 24 hours, and provide weekly photo documentation for project duration and upon removal of the temporary staging area.

Avoided wetlands and non-wetland waters: The project will avoid Woods Creek, Wetland B and Wetland C that occur in project area. Fanno Creek is adjacent, but outside of the project area.

B. For temporary removal or fill or disturbance of vegetation in waterbodies, wetlands or riparian (i.e., streamside) areas, discuss how the site will be restored after construction to include the timeline for restoration.

The sediment dredging and placement project will not have any temporary impacts to Fanno Creek or offsite emergent wetlands. The placement of a sandbag coffer dam will have an incidental impact where plastic sheeting is laid atop the creek bed and banks, then sand bags stacked in a pyramid configuration to redirect flow into a bypass pipe. No excavation or fill will occur, since the sand bags and plastic sheeting are removed when dredging is complete. The staging area in the southeast portion of the project area will have gravel imported for maneuvering of construction equipment and truck parking. When the dredging project is complete, the staging area gravel will be re-used by the golf course for various maintenance projects. The sediment bags will be capped using topsoil salvaged from Wetland A, Any bare ground associated with the projected will be hand-broadcast with native seed and forb mixture in late September or early October. After one growing season, areas of patchy seed growth will be in-filled with additional hand seeding. No indirect impacts to Woods Creek, Wetland B, or Wetland C anticipated. Appendix G includes a Best Professional Judgement determination using the Stream Function Assessment Method (SFAM) for the pond dredging and temporary placement of check dams, coffer dam, bypass pipe, and dredge launch ramp.

Compensatory Mitigation

C. Proposed mitigation approach. Check all that apply:

☐ Permittee-responsible Onsite Mitigation
☐ Permittee-responsible Offsite Mitigation
☒ Mitigation Bank or in-lieu fee program
☐ Payment to Provide (not approved for use with Corps permits)

D. Provide a brief description of proposed mitigation approach and the rationale for choosing that approach. If you believe mitigation should not be required, explain why.

Mitigation for permanent fill impacts to 0.72-acre of PEM wetland associated with Wetland A will be mitigated through purchase of compensatory wetland mitigation credit at an approved mitigation bank with a service area that encompasses project location. There are currently two mitigation banks having a service area extending to the site. A small portion of Wetland A (where it overflows to the west) may indirectly become filled with sediment (from sediment bag drainage water), so the project impact accounts for such indirect sedimentation. At this time, Butler Mitigation Bank will be the chosen provider; however, the applicant reserves the right to select a different or new mitigation bank (assuming available credits available). The 1.77-

acres impact to the bottom of the irrigation pond is considered self-mitigating, since the pond size (surface area) will remain unchanged and the deeper water (post-excavation) will have improved conditions for warm water fish; greater flood synchronization in winter/spring months; greater sediment trapping capacity; and continue to provide open water for wildfowl, songbirds, and aquatic invertebrates.

Permittee responsible mitigation onsite is not feasible for the proposed wetland impact, due to a lack of suitable space onsite with sufficient and permanent water source. Specifically, the golf course lands adjacent to Fanno Creek are mostly developed for tees, fairways, greens, or 8 to 10 feet higher than creek flow levels in summer/early fall. That is, Fanno Creek is deeply incised due to upgradient runoff from urban lands that create flashy flows. Portions of the creek are cement-lined to prevent further incision and subsequent bank failure. While there are some vacant lands adjacent to Fanno Creek (particularly at the lower end of the golf course), such areas already have riparian conditions that provide habitat and shade functions for the creek. Such lands do not have separate water source to sustain wetlands (rainfall mostly infiltrates permeable soils, rather than runoff to swales or creeks). Reliance on Fanno Creek flow will require a water right, which is problematic since the creek has significant water quality attributes, particularly in spring and summer.

Lands flanking Woods Creek are either golf course fairways, or a mixture of riparian and wetland conditions that provide shade to the creek, as well as flood water desynchronization. It will be difficult to achieve sufficient gain in functions and values (i.e., "functional lift" needed DSL's mitigation requirement). Replacing such lands with emergent wetland will be problematic, potentially unsuccessful, to justify to the regulatory agencies. The remaining portions of the golf course are situated on higher ground that have permeable soils (non-hydric), or extensive network of subsurface drainage pipes that allows for year-round golf play. Such drainage pipes lower the water table 24 to 36 inches below the surface – incompatible with wetland mitigation requirements of water table within 6 to 12 inches of the surface.

As per principal objectives for Compensatory Wetland Mitigation (CWM), the mitigation credit purchase will satisfy the following objectives:

A) As per principal objectives for CWM, the mitigation credit purchase satisfies these objectives:

B) Replacing wetland functions and values lost at the impact site – The mitigation bank site has wetland functions and values that are greater, namely: 1) moderate to high wildlife/bird habitat and hydraulic functioning and value (due to plant diversity, habitat maturation, proximity to Tualatin River); 2) preferrable mitigation bank location, which is located away from urban development and stressors; 3) the mitigation bank possess moderate to high terrestrial habitat value (particularly for mammals and birds, and 4) mitigation bank exhibits similar hydrologic characteristics (mostly precipitation-driven seasonal wetlands, HGM-Slope). There is no ORWAP score from Butler Mitigation Bank to compare to the ORWAP score for Wetland A.

C) Providing local replacement of said functions and values -- The impact to Wetland A is within the service area of the mitigation bank site, which provides local replacement of wetlands in the Tualatin Valley.

D) Providing self-sustaining wetland with minimal long-term maintenance – The mitigation bank site has achieved target functioning, which requires minimal maintenance. Long-term stewardship is a component of the mitigation bank obligations. Onsite or nearby mitigation (same vicinity as development) will be adversely affected by existing adjacent urban development and ongoing golfing activities/maintenance.

Providing an ecologically suitable location that is not adversely affected by adjacent land uses -- The bank site is situated where it provides functions for surrounding wetlands and uplands. It provides valuable wildfowl/wildlife habitat, storm event desynchronization, and nutrient cycling that have been historically altered by agriculture and urban development in the Tualatin Valley. Minimizing temporal loss of wetlands and their functions and values -- The mitigation bank began construction over 12 years old and following protocols for annual maintenance and monitoring. Given the mitigation wetlands have been maturing years in advance of the proposed wetland impacts, the temporal loss is minimized.

Mitigation Bank / In-Lieu Fee Information:	
Name of mitigation bank or in-lieu fee project:	Butler Mitigation Bank or another available bank
Type and amount of credits to be purchased:	Palustrine emergent wetland (PEM)

If you are proposing permittee-responsible mitigation, have you prepared a compensatory mitigation plan?

☐ Yes. Submit the plan with this application and complete the remainder of this section.

☐ No. A mitigation plan will need to be submitted (for DSL, this plan is required for a complete

Mitigation Location Information (Fill out only if permittee-responsible mitigation is proposed)

Mitigation Site Name/Legal Description	Mitigation Site Address	Tax Lot #
N/A	N/A	N/A
County	**City**	**Latitude & Longitude (in DD.DDDD format)**
N/A	N/A	N/A

Township	Range	Section	Quarter/Quarter
N/A	N/A	N/A	N/A

(10) ADJACENT PROPERTY OWNERS FOR PROJECT AND MITIGATION SITE

Project Site Adjacent Property Owners	**Project Site Adjacent Property Owners**	**Project Site Adjacent Property Owners**
1S1240001700, 1S1240001800, 1S123AD00100, 1S123AD00101, 1S123AD06400, 1S123AA00800 Portland Golf Club 5900 S.W. Scholls Ferry Rd. Portland, OR 97225	1S114DD03700 Matthew & Catherine Patton Trust 816 Timberland Dr. Lake Oswego, OR. 97034	1S113CA04850 Carl & Vicki Piersall 2927 SW Hamilton Portland, OR 97239
1S123AD00200,1S123AD00202 City of Portland 1120 S.W. Fifth St., ste. 800 Portland, OR. 97204	1S114DD03900 Smith Family Trust 5705 S.W. Scholls Ferry Rd. Portland, OR 97225	1S113CC00900 Robert M. Law Trust 2018 12655 SW N. Dakota St. Tigard, OR. 97223
1S1240001600, 1S113CD00100, 1S113CD00200 Oregon Episcopal Schools 6300 S.W. Nichol Rd. Portland, OR 97223	1S114DD04001 Drake & Lynn LLC 16252 Bluff Rd. Sandy, OR. 97055	1S113CC01000 Christopher & Kristine McGehee 8120 S.W. Westgate Way Portland, OR 97225

1S124CB04200
Jerem & Amy Mitchell
7034 S.W. 83rd Ave.
Portland, OR 97223

1S123AA00801
Kristin & Mark Rousseve
6370 S.W. 86th Ave.
Portland, OR. 97223

1S123AA00802
Harold Lyons Settlement Trust
Post Office Box 23176
Tigard, OR. 97223

1S123AA00700
Jon & Tiffani Bettendorf
11150 S.W. Allen Blvd.
Beaverton, OR. 97005

1S123AA00600
Thomas & Kelly Arenz
Post Office Box 25366
Portland, OR. 97298

1S123AA00100
Ann Humerston Trust
6050 S.W. Old Scholls Ferry Rd..
Portland, OR. 97223

1S1240001500
Prime Aloma LLC
600 Montgomery St., ste. 1700
San Francisco, CA. 94111

1S1240002200
Patricia & Lane Gossett
6945 S.W. 78th Ave.
Portland, OR 97223

1S124CB02300
Eugenia Parker Rev. Living Trust
7020 S.W. 82nd Ave.
Portland, OR 97223

1S113CB01000
Eric & Jennifer Croll
5575 S.W. Scholls Ferry Rd.
Portland, OR 97225

1S113CB01001
Ronald & Barbara Crawford
6075 S.W. Chestnut Ave.
Beaverton, OR. 97005

1S113CB03800
Thomas & Debra Mattson
5494 S.W. Champion Place
Portland, OR 97225

1S113CB03900
Patricia N. Eargle
5482 S.W. Champion Place
Portland, OR 97225

1S113CB04000
Brian & Nancy Leitgeb
5472 S.W. Champion Place
Portland, OR 97225

1S113CB00800
Mojgan Vazeen
267 Hickory Heights Ave.
Las Vegas, NV. 89148

1S1240002000
Jan V. Fredrickson
6995 S.W. 78th Ave.
Portland, OR 97223

1S1240002300
John & Julie Manning Liv. Trust
6705 Stichter Ave.
Dallas, TX 75230

1S124CB02400
Shelia M. Jameson
7025 S.W. 82nd Ave.
Portland, OR 97223

1S113CC01100
Courtney & Piyakorn Bird
5650 S.W. Nichol Rd.
Portland, OR 97225

1S113CC01200
Yamanaka Family Trust
8350 Joy Haven Ln. SE
Salem, OR. 97317

1S113CC01300
Candace Jurrens & Jacob Mashek
5760 S.W. Nichol Rd.
Portland, OR 97225

1S113CC04100
John Junkin & Nancy Stouder
8060 S.W. Willowmere Dr
Portland, OR 97225

1S124CB04300
Patrick & Pauline Barrett Trust
7035 S.W. 83rd Ave.
Portland, OR 97223

1S124CB05131
Russell & Ann Martin
7020 S.W. 84th Ave.
Portland, OR 97223

1S1240002100
Gerald & Eldona Rev. Trust
6975 S.W. 78th Ave.
Portland, OR 97223

1S1240002302
Christopher M. Pleasant
6980 S.W. 78th Ave.
Portland, OR 97223

(11) CITY/COUNTY PLANNING DEPARTMENT LAND USE AFFIDAVIT (TO BE COMPLETED BY LOCAL PLANNING OFFICIAL)

I have reviewed the project described in this application and have determined that:

- ☐ This project is not regulated by the comprehensive plan and land use regulations
- ☐ This project is consistent with the comprehensive plan and land use regulations
- ☒ This project is consistent with the comprehensive plan and land use regulations with the following:
  - ☒ Conditional Use Approval
  - ☐ Development Permit
  - ☐ Other Permit (explain in comment section below)
- ☐ This project is not currently consistent with the comprehensive plan and land use regulations. To be consistent requires:
  - ☐ Plan Amendment
  - ☐ Zone Change
  - ☐ Other Approval or Review (explain in comment section below)

An application or variance request has ☐ has not ☒ been filed for the approvals required above.

Local planning official name (print)	Title	City / County
SEAN D. HARRASSER, CFM	ASSOCIATE PLANNER	WASHINGTON COUNTY, OR

Signature	Date
[signature]	05/02/2022

Comments: Development review application required for floodplain alteration

(12) COASTAL ZONE CERTIFICATION

If the proposed activity described in your permit application is within the Oregon Coastal Zone, the following certification is required before your application can be processed. The signed statement will be forwarded to the Oregon Department of Land Conservation and Development (DLCD) for its concurrence or objection. For additional information on the Oregon Coastal Zone Management Program and consistency reviews of federally permitted projects, contact DLCD at 635 Capitol Street NE, Suite 150, Salem, Oregon 97301 or call 503-373-0050 or click here.

CERTIFICATION STATEMENT

I certify that, to the best of my knowledge and belief, the proposed activity described in this application complies with the approved Oregon Coastal Zone Management Program and will be completed in a manner consistent with the program.

Print /Type Applicant Name	Title
Applicant Signature	**Date**

(13) SIGNATURES

Application is hereby made for the activities described herein. I certify that I am familiar with the information contained in the application, and, to the best of my knowledge and belief, this information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities. By signing this application I consent to allow Corps or DSL staff to enter into the above-described property to inspect the project location and to determine compliance with an authorization, if granted. I hereby authorize the person identified in the authorized agent block below to act in my behalf as my agent in the processing of this application and to furnish supplemental information in support of this permit application. I understand that the granting of other permits by local, county, state or federal agencies does not release me from the requirement of obtaining the permits requested before commencing the project. I understand that payment of the required state processing fee does not guarantee permit issuance.

To be considered complete, the fee must accompany the application to DSL. The fee is not required for submittal of an application to the Corps.

Fee Amount Enclosed	**$1343.00** (Commercial operator, 3000 to 10,000 cubic yards)

Applicant Signature (required) must match the name in Block 2

Print Name Lonnie Lister	Title General Manager
Signature	Date 11/17/2021

Authorized Agent Signature

Print Name	Title
Signature	Date

Landowner Signature(s)*

Landowner of the Project Site (if different from applicant)

Print Name Same as Applicant	Title N/A
Signature N/A	Date N/A

Landowner of the Mitigation Site (if different from applicant)

Print Name N/A	Title N/A
Signature	Date

Department of State Lands, Property Manager (to be completed by DSL)

If the project is located on state-owned submerged and submersible lands, DSL staff will obtain a signature from the Land Management Division of DSL. A signature by DSL for activities proposed on state-owned submerged/submersible lands only grants the applicant consent to apply for a removal-fill permit. A signature for activities on state-owned submerged and submersible lands grants no other authority, express or implied and a separate proprietary authorization may be required.

Print Name N/A	Title N/A
Signature N/A	Date N/A

* Not required by the Corps.

(14) ATTACHMENTS

- ☒ Drawings – APPENDIX A
  - ☒ Location map with roads identified – FIGURE 1
  - ☒ U.S.G.S topographic map – FIGURE 2
  - ☒ Tax lot map – FIGURE 3, Local Zoning Map
  - ☒ Site plan(s) – FIGURE 6 (Existing conditions)
  - ☒ Plan view and cross section drawing(s) – FIGURES 6 & 7
  - ☒ Recent aerial photo – FIGURE 4
  - ☒ Project photos – INCLUDED IN WETLAND DELINEATION REPORT
  - ☒ Erosion and Pollution Control Plan(s), if applicable
  - ☒ DSL / Corps Wetland Concurrence letter and map, if approved and applicable – APPENDIX C
- ☒ Pre-printed labels for adjacent property owners (Required if more than 5) – LESS THAN 5
- ☒ Incumbency Certificate if applicant is a partnership or corporation – BEFORE APPENDIX A
- ☐ Restoration plan or rehabilitation plan for temporary impacts – N/A
- ☐ Mitigation plan – N/A
- ☒ Wetland functional assessments, if applicable – APPENDIX D
  - ☒ Cover Page
  - ☒ Score Sheets
  - ☒ ORWAP OR, F, T, & S forms
  - ☒ ORWAP Reports
  - ☒ Assessment Maps
  - ☒ ORWAP Reports: Soils, Topo, Assessment area, Contributing area
- ☐ Stream Functional Assessments, if applicable – N/A
  - ☐ Cover Page
  - ☐ Score Sheets
  - ☐ SFAM PA, PAA, & EAA forms
  - ☐ SFAM Report
  - ☐ Assessment Maps
    - ☐ Aerial Photo Site Map and Topo Site Map (Both maps should document the PA, PAA, & EAA)
- ☐ Compensatory Mitigation (CM) Eligibility & Accounting Worksheet
  - ☐ Matching Quickguide sheet(s)
  - ☒ CM Eligibility & Accounting sheet
- ☒ Alternatives analysis – INCLUDED IN JPA TEXT
- ☐ Biological assessment (if requested by the Corps project manager during pre-application coordination)
- ☒ Stormwater management plan (may be required by the Corps or DEQ) – APPENDIX B
- ☐ Other
  - ☐ Please describe:

For U.S. Army Corps of Engineers send application to:

USACE Portland District
ATTN: CENWP-ODG-P
PO Box 2946
Portland, OR 97208-2946
Phone: 503-808-4373
portlandpermits@usace.army.mil

Counties:
Baker, Benton, Clackamas, Clatsop, Columbia, Gilliam, Grant, Hood River, Jefferson, Lincoln, Linn, Malheur, Marion, Morrow, Multnomah, Polk, Sherman, Tillamook, Umatilla, Union, Wallowa, Wasco, Washington, Wheeler, Yamhill

U.S. Army Corps of Engineers
ATTN: CENWP-ODG-E
211 E. 7th AVE, Suite 105
Eugene, OR 97401-2722
Phone: 541-465-6868
portlandpermits@usace.army.mil

Counties:
Coos, Crook, Curry, Deschutes, Douglas, Jackson, Josephine, Harney, Klamath, Lake, Lane

For Department of State Lands send application to:

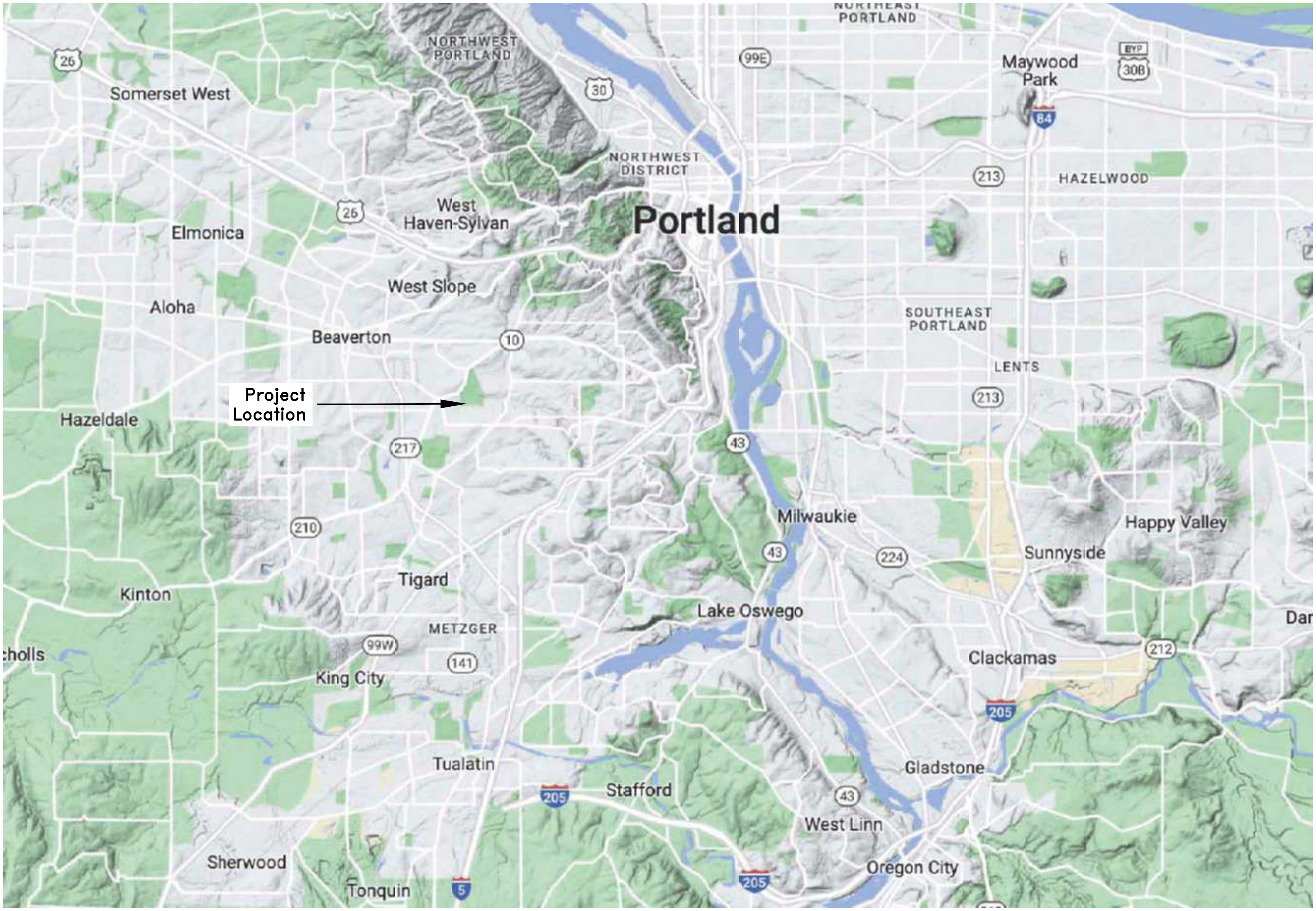
West of the Cascades:
Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
Phone: 503-986-5200

East of the Cascades:
Department of State Lands
1645 NE Forbes Road, Suite 112
Bend, Oregon 97701
Phone: 541-388-6112

For Department of Environmental Quality e-mail application to:

ATTN: DEQ 401 Certification Program
Water Quality
700 NE Multnomah St, Suite 600
Portland, OR 97232
401applications@deq.state.or.us

APPENDIX A – DRAWINGS



SOURCE: Google maps, downloaded December 2022.

Terra Science, Inc.
Soil, Water, & Wetland Consultants

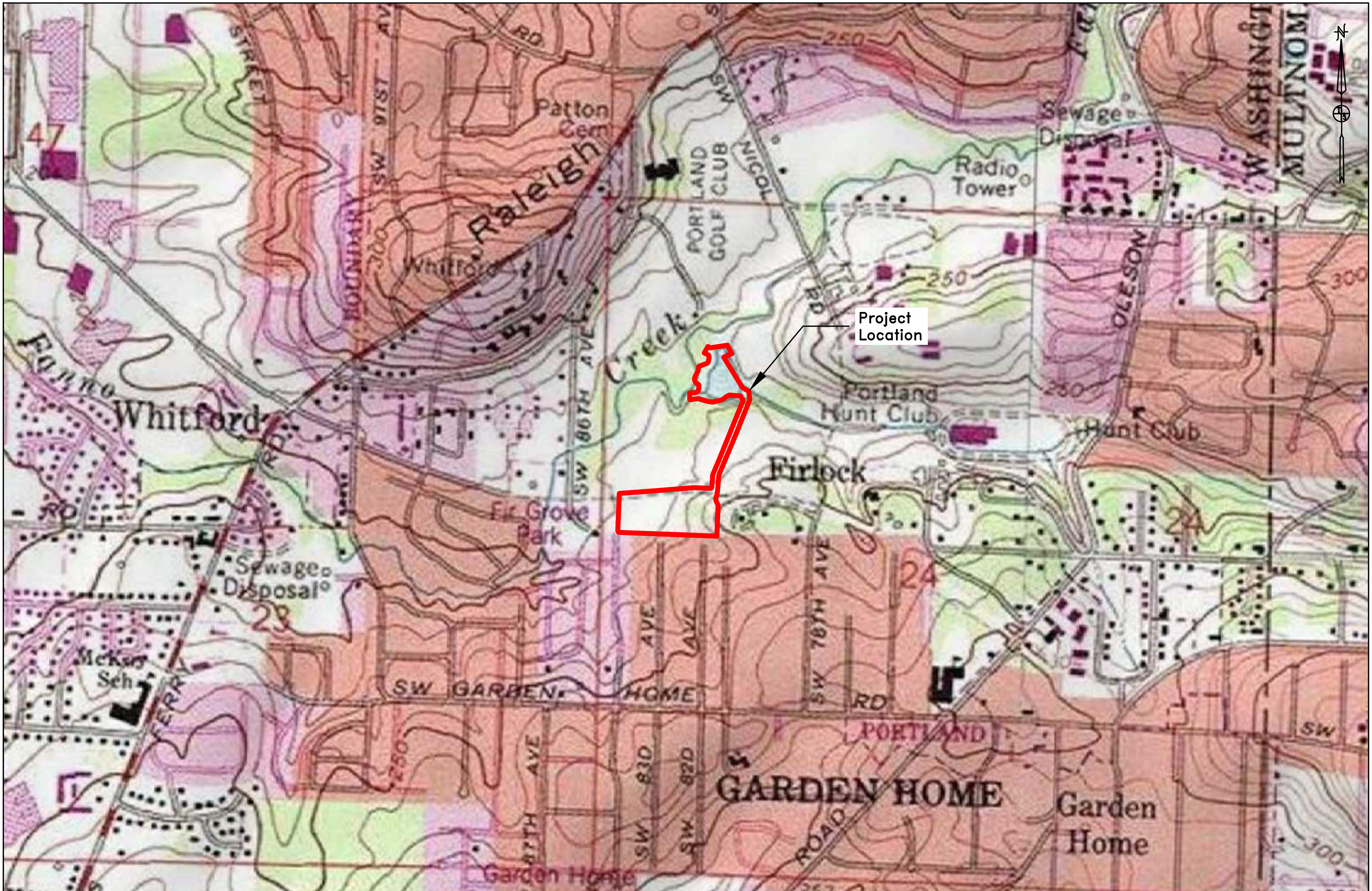
GRAPHIC SCALE
0 1.25 mile 2.5 mi. 5 mi.

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

December 2022

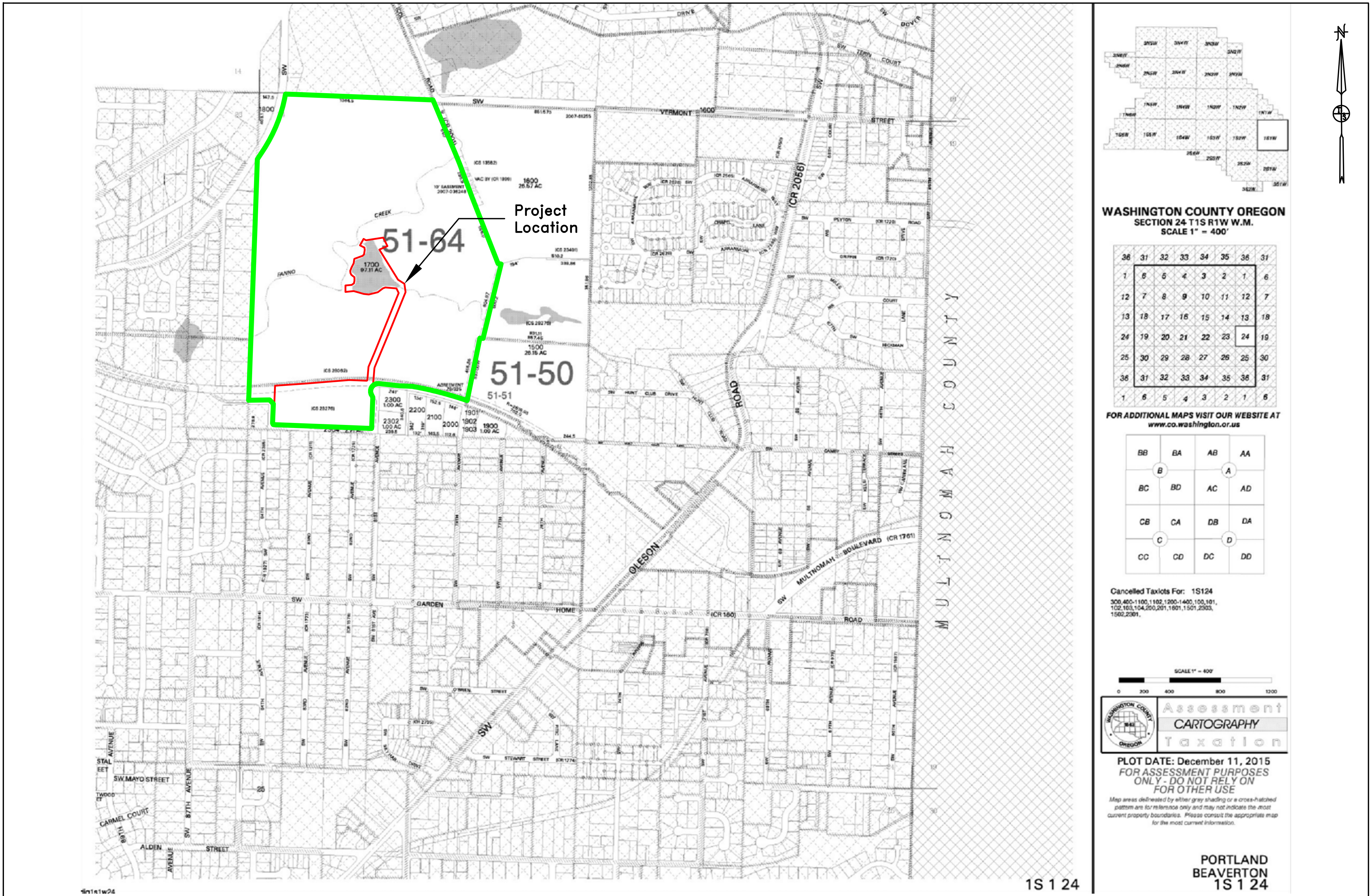
VICINITY MAP

FIGURE 1



SOURCE: U.S. Department of the Interior, U.S. Geological Survey, The National Map Viewer, 2021. Available at: <https://apps.nationalmap.gov/viewer/>

Terra Science, Inc. Soil, Water, & Wetland Consultants	JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon	U.S.G.S. Topography Map	FIGURE 2
GRAPHIC SCALE 500' 0' 500' 1000' 2000'	December 2022		



SOURCE: ORMAP website, Washington County Assessor's Map 1S 1 24, 2021. Available at: <https://ormap.net/gis/index.html>

Terra Science, Inc. Soil, Water, & Wetland Consultants GRAPHIC SCALE 500' 0' 500' 1000' 2000'	JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon December 2022	TAX LOT MAP 1S 1 24 FIGURE 3

SOURCE: Google Earth, 2021. Available at: <https://earth.google.com>

Terra Science, Inc.
Soil, Water, & Wetland Consultants

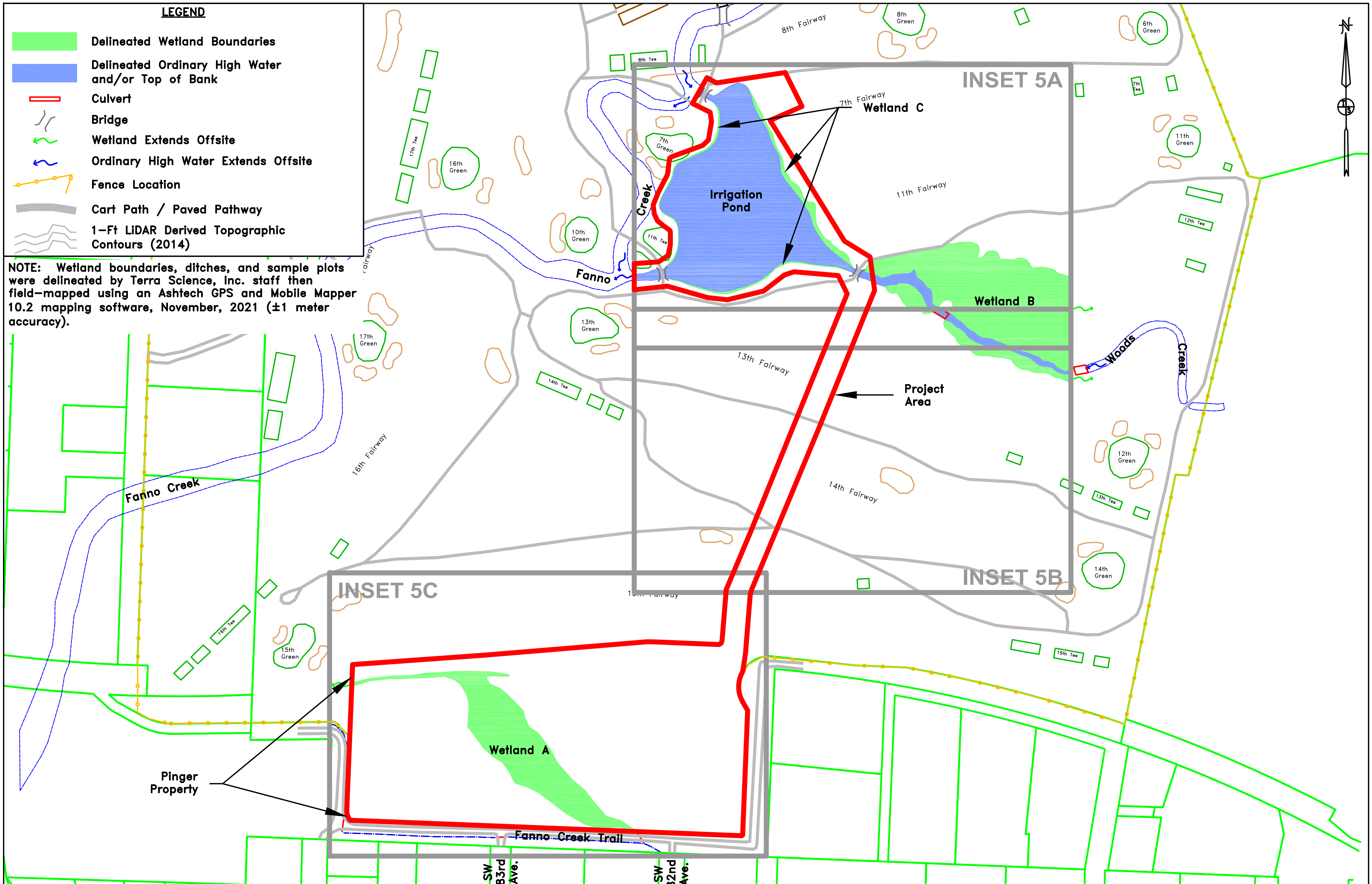
GRAPHIC SCALE
125' 0' 125' 250' 500'

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

December 2022

JUNE 21, 2021
AERIAL IMAGE

FIGURE 4



NOTE: Wetland boundaries, ditches, and sample plots were delineated by Terra Science, Inc. staff then field-mapped using an Ashtech GPS and Mobile Mapper 10.2 mapping software, November, 2021 (±1 meter accuracy).

SOURCES: LiDAR: Dept. of Geology and Mineral Industries. OLC Metro 2014: Final Delivery. Watershed Sciences, Inc.
Tax Lot Boundaries: Washington County GIS, 2021.

Terra Science, Inc.
Soil, Water, & Wetland Consultants

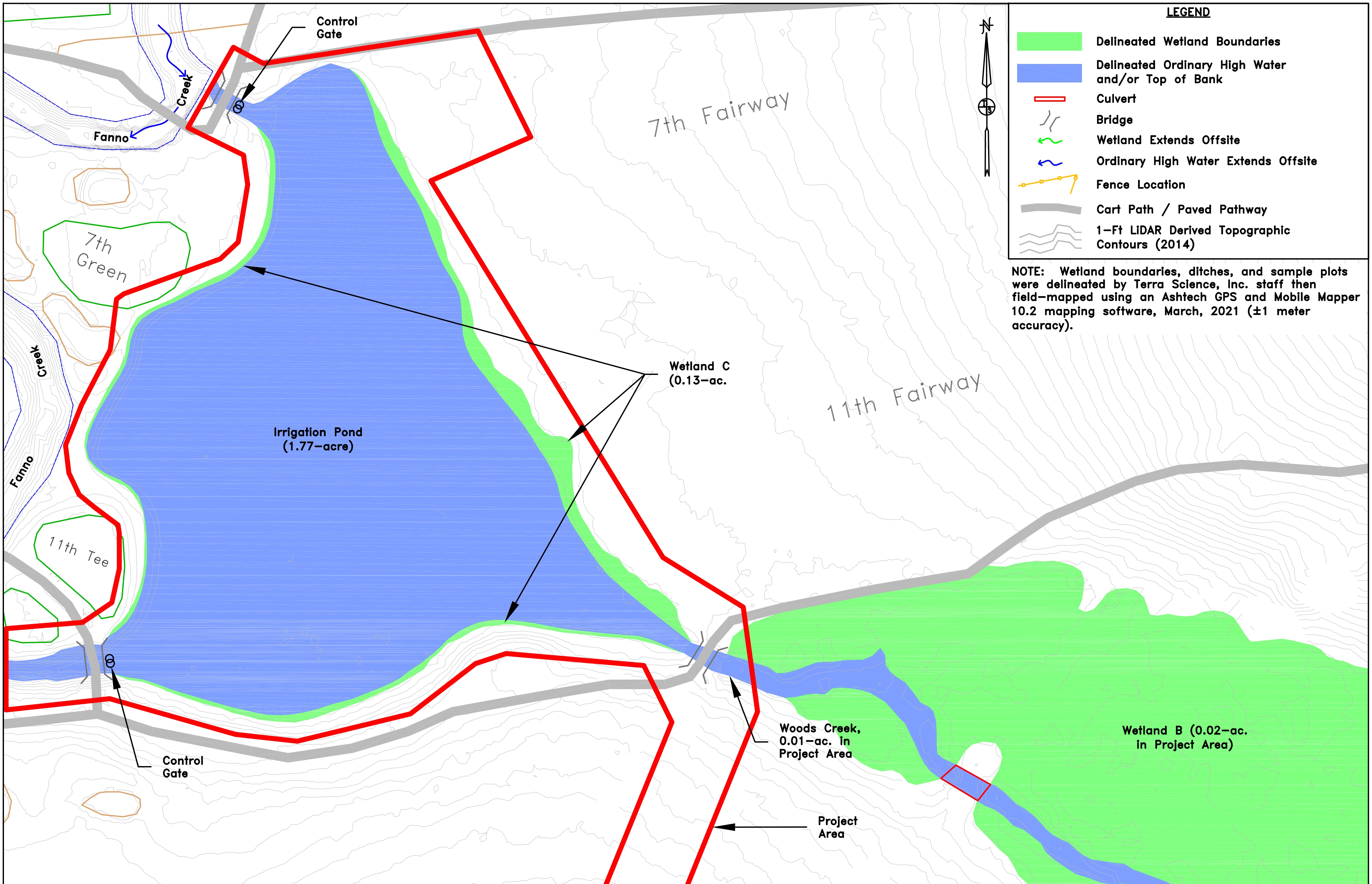
GRAPHIC SCALE
125' 0' 125' 250' 500'

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

December 2022 (Updated June 2023)

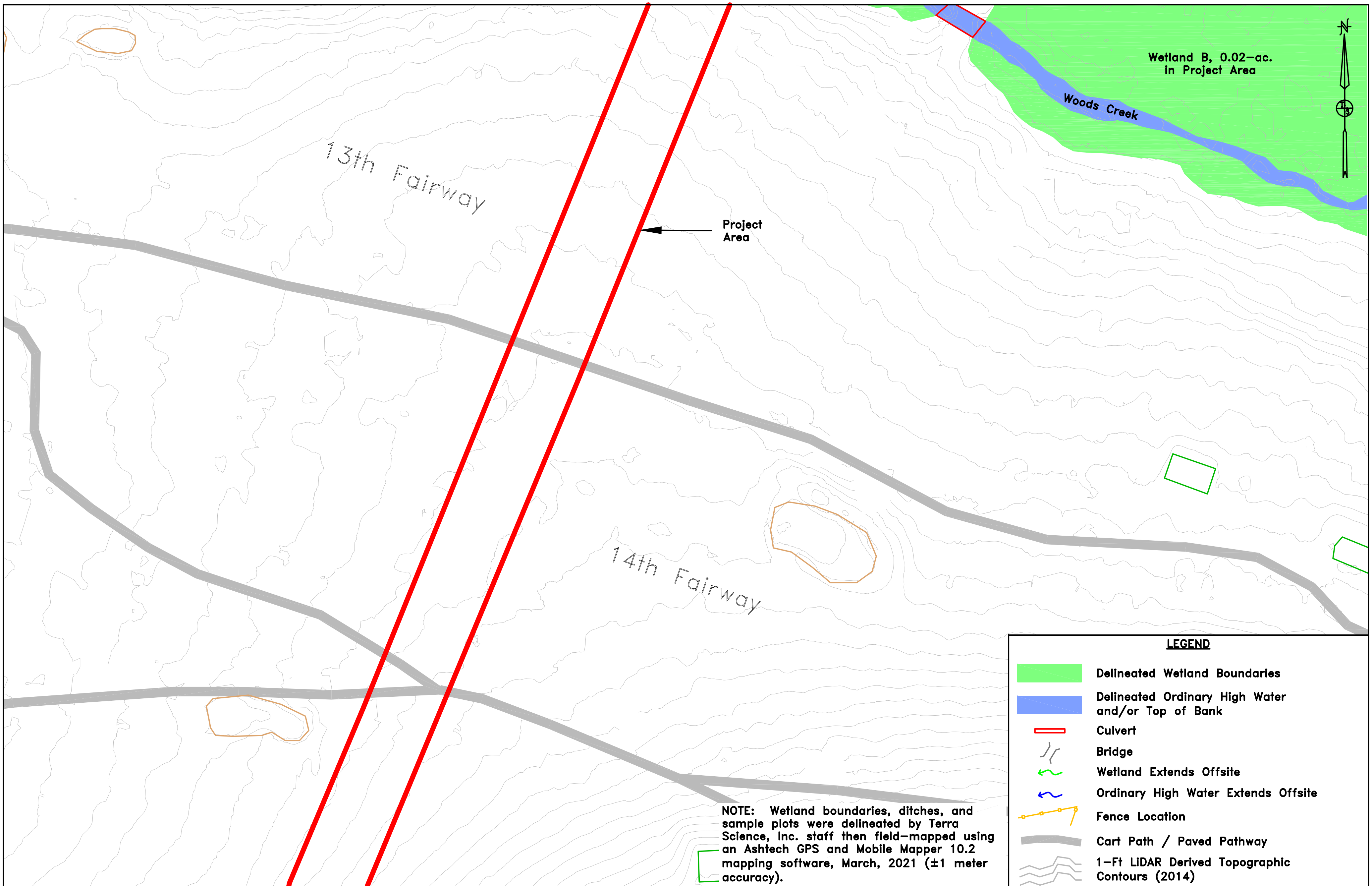
EXISTING CONDITIONS
INDEX MAP

FIGURE 5



SOURCES: LiDAR: Dept. of Geology and Mineral Industries. OLC Metro 2014: Final Delivery. Watershed Sciences, Inc.
Tax Lot Boundaries: Washington County GIS, 2021.

Terra Science, Inc. Soil, Water, & Wetland Consultants GRAPHIC SCALE 40' 0' 40' 80' 160'	JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon December 2022 (Updated June 2023)	EXISTING CONDITIONS (SEDIMENT REMOVAL AREA)	INSET 5A



SOURCES: LiDAR: Dept. of Geology and Mineral Industries. OLC Metro 2014: Final Delivery. Watershed Sciences, Inc.
Tax Lot Boundaries: Washington County GIS, 2021.

Terra Science, Inc.
Soil, Water, & Wetland Consultants

GRAPHIC SCALE
40' 0' 40' 80' 160'

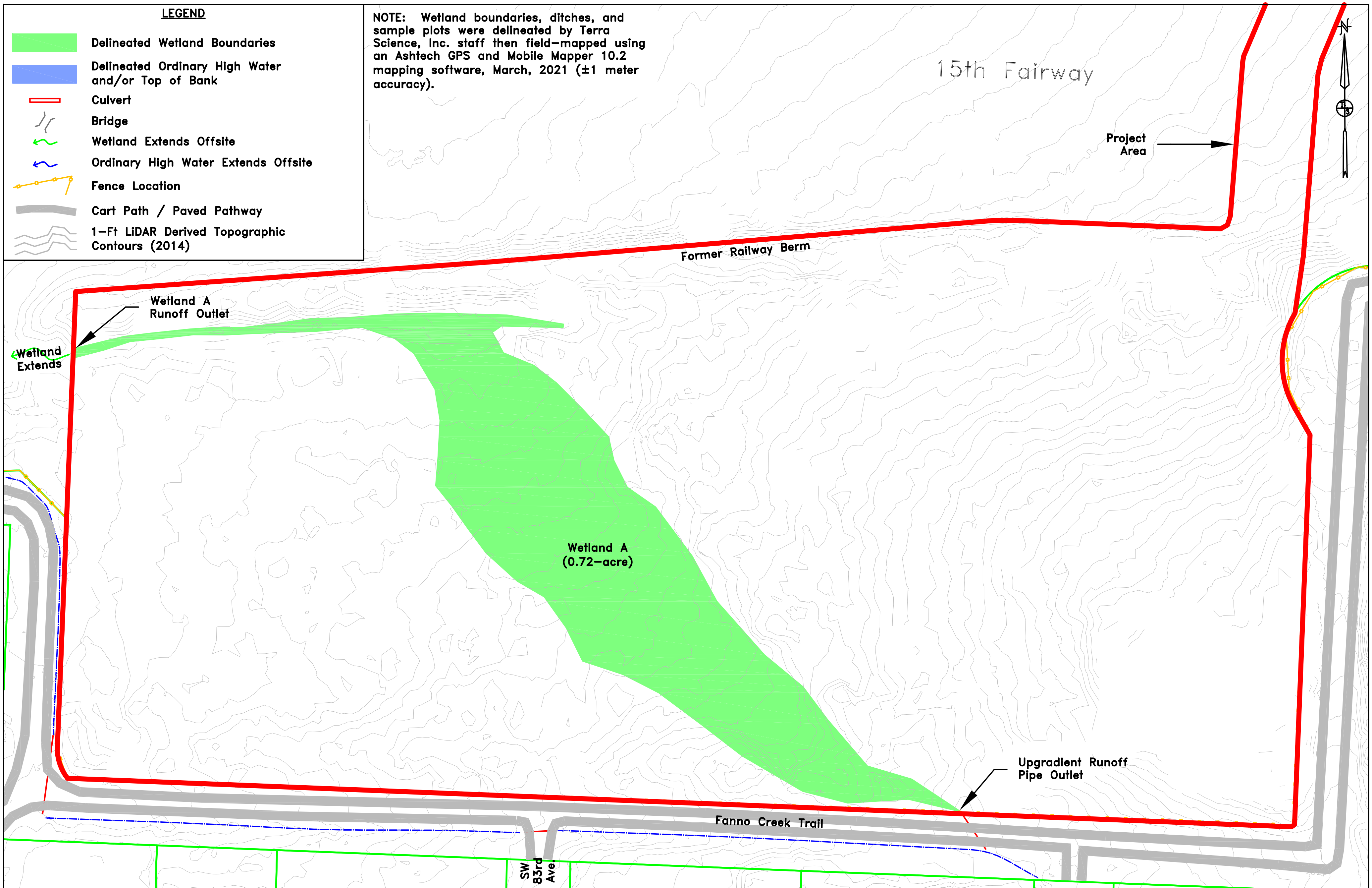
JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

December 2022 (Updated June 2023)

EXISTING CONDITIONS
(FAIRWAYS 13, 14 & 15)

INSET 5B

NOTE: Wetland boundaries, ditches, and sample plots were delineated by Terra Science, Inc. staff then field-mapped using an Ashtech GPS and Mobile Mapper 10.2 mapping software, March, 2021 (±1 meter accuracy).



SOURCES: LiDAR: Dept. of Geology and Mineral Industries. OLC Metro 2014: Final Delivery. Watershed Sciences, Inc.
Tax Lot Boundaries: Washington County GIS, 2021.

Terra Science, Inc.
Soil, Water, & Wetland Consultants

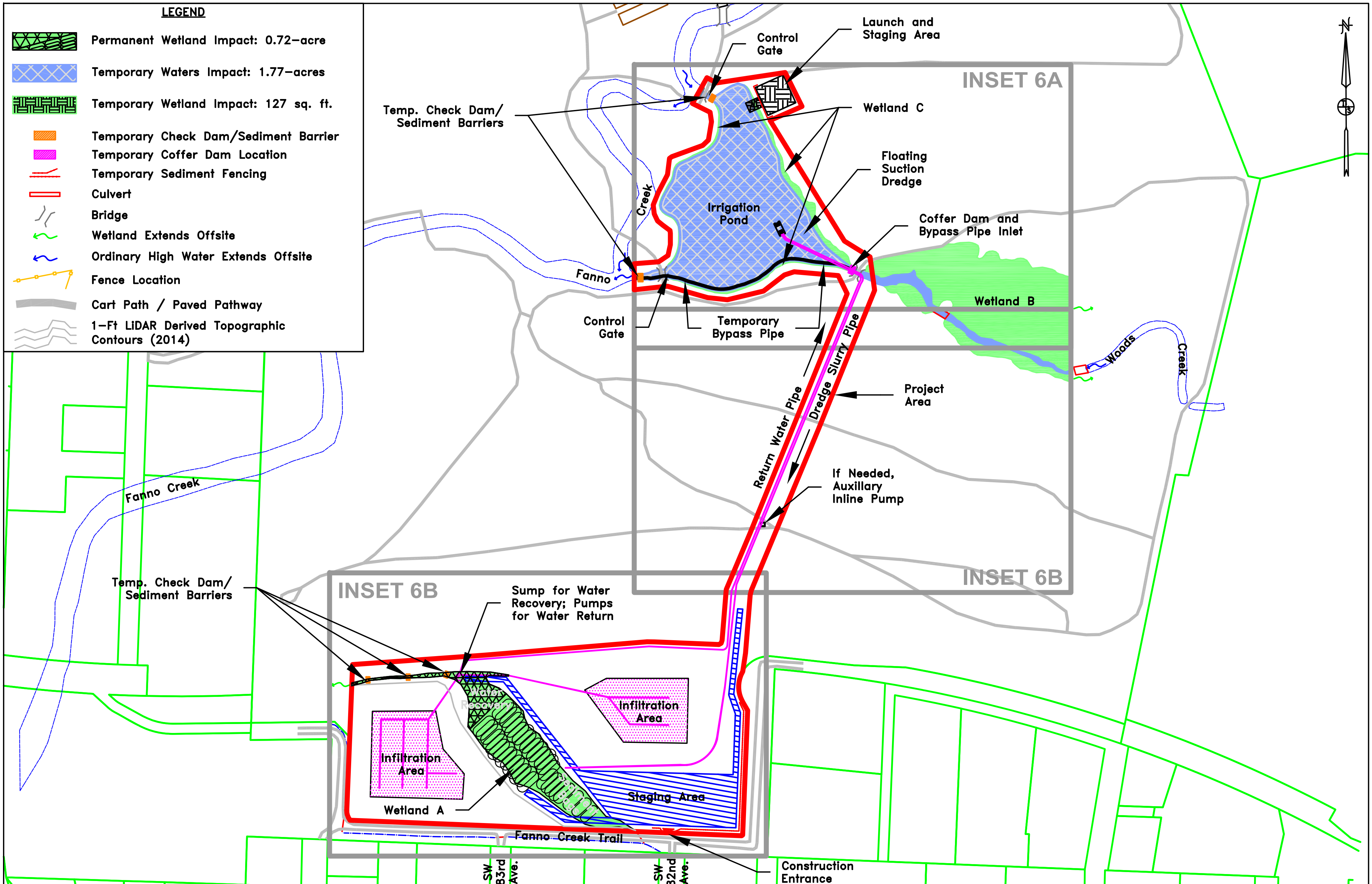
GRAPHIC SCALE
40' 0' 40' 80' 160'

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

December 2022 (Updated June 2023)

EXISTING CONDITIONS
(SEDIMENT PLACEMENT AREA)

INSET 5C



SOURCES: LiDAR: Dept. of Geology and Mineral Industries. OLC Metro 2014: Final Delivery. Watershed Sciences, Inc.
Tax Lot Boundaries: Washington County GIS, 2021.

Terra Science, Inc.
Soil, Water, & Wetland Consultants

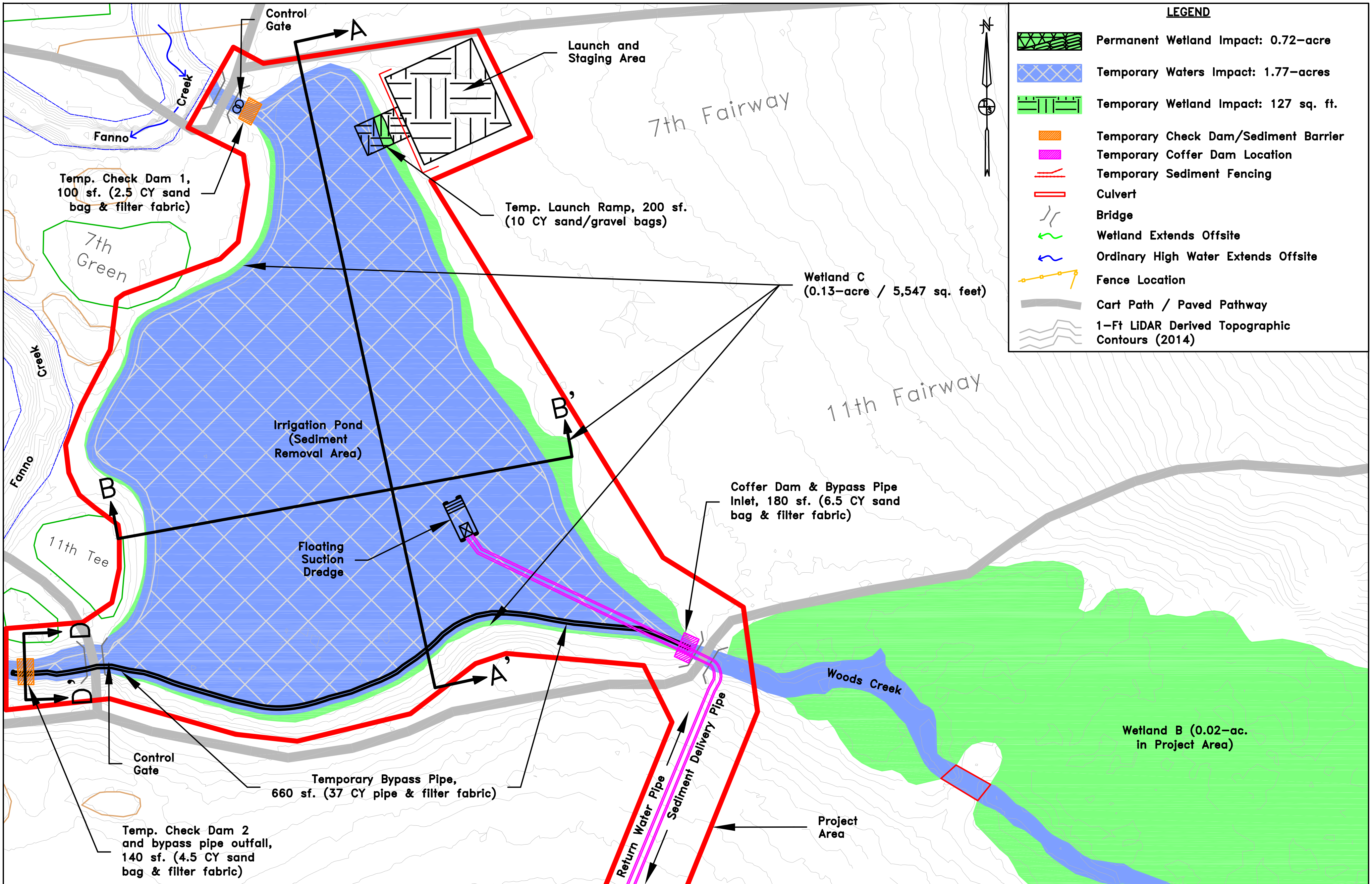
GRAPHIC SCALE
125' 0' 125' 250' 500'

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

December 2022 (Updated June 2023)

SITE PLAN
INDEX MAP

FIGURE 6



SOURCES: LiDAR: Dept. of Geology and Mineral Industries. OLC Metro 2014: Final Delivery. Watershed Sciences, Inc.
Tax Lot Boundaries: Washington County GIS, 2021.

Terra Science, Inc.
Soil, Water, & Wetland Consultants

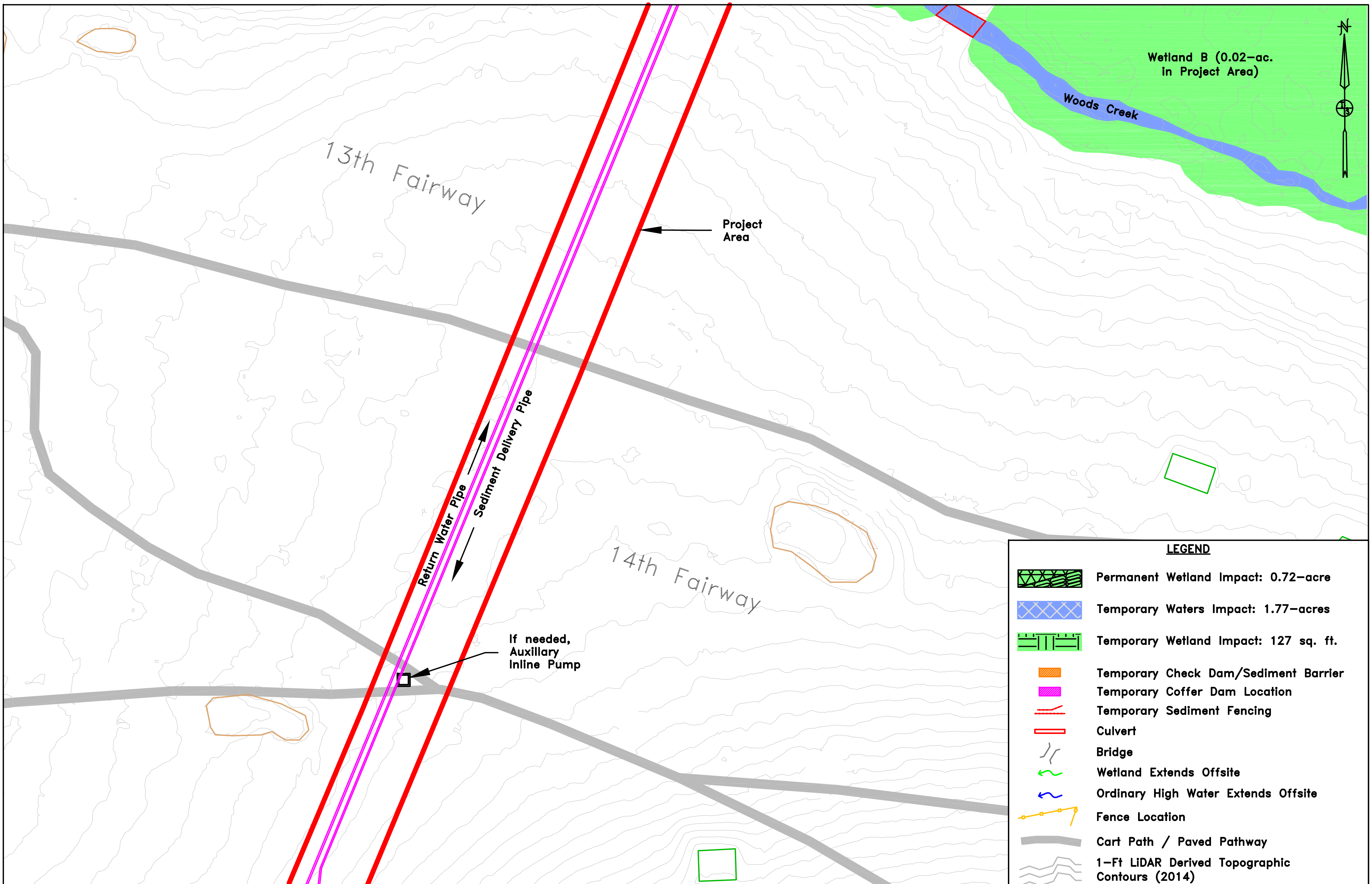
GRAPHIC SCALE
40' 0' 40' 80' 160'

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

December 2022 (Updated June 2023)

SITE PLAN
(SEDIMENT REMOVAL AREA)

INSET 6A



SOURCES: LiDAR: Dept. of Geology and Mineral Industries. OLC Metro 2014: Final Delivery. Watershed Sciences, Inc.
Tax Lot Boundaries: Washington County GIS, 2021.

Terra Science, Inc.
Soil, Water, & Wetland Consultants

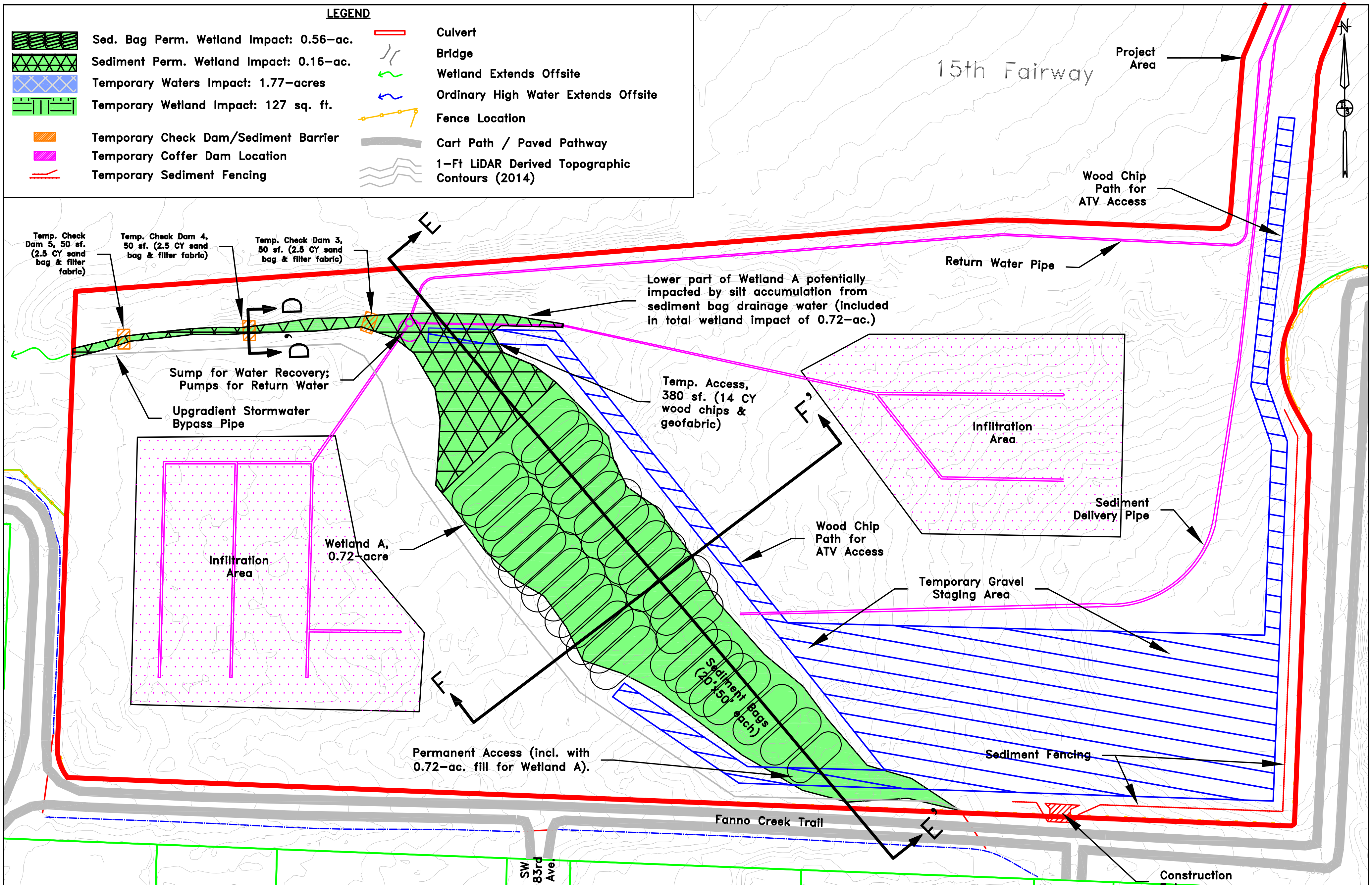
GRAPHIC SCALE
40' 0' 40' 80' 160'

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

December 2022 (Updated June 2023)

SITE PLAN
(FAIRWAYS 13, 14 & 15)

INSET 6B



SOURCES: LiDAR: Dept. of Geology and Mineral Industries. OLC Metro 2014: Final Delivery. Watershed Sciences, Inc.
Tax Lot Boundaries: Washington County GIS, 2021.

Terra Science, Inc.
Soil, Water, & Wetland Consultants

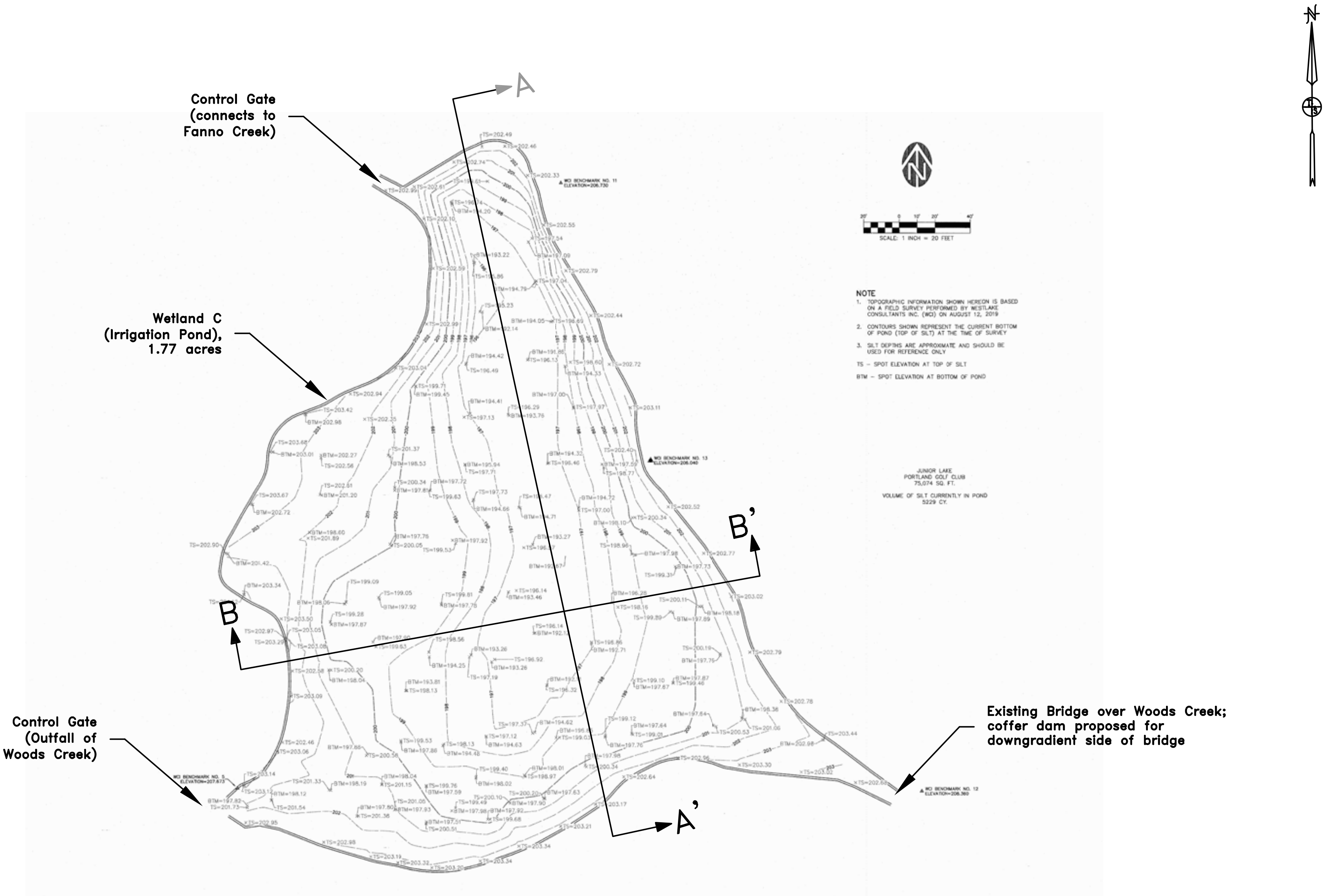
GRAPHIC SCALE
40' 0' 40' 80' 160'

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

December 2022 (Updated June 2023)

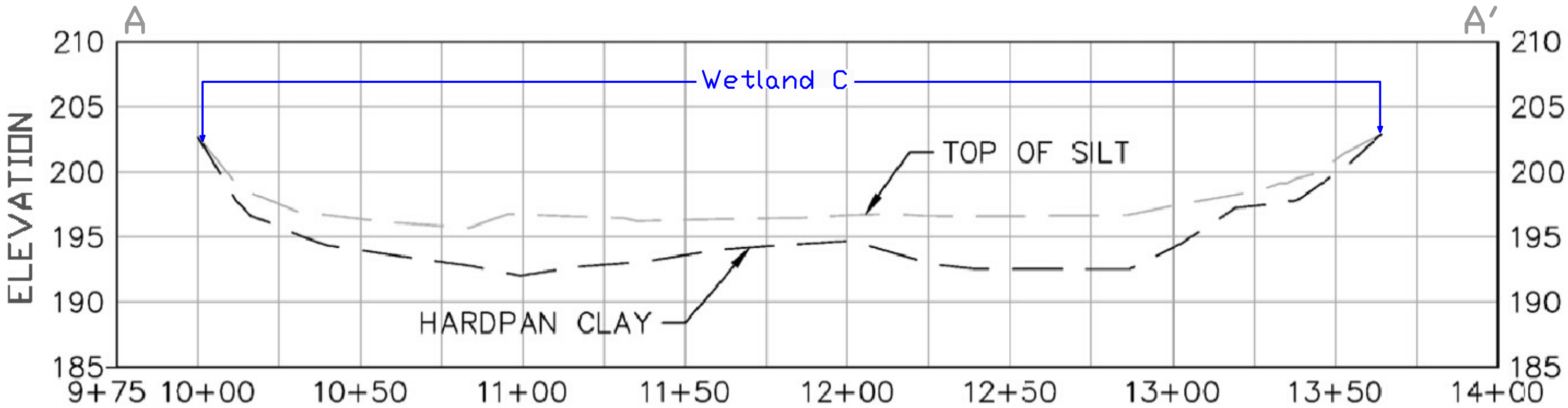
SITE PLAN
(SEDIMENT PLACEMENT AREA)

INSET 6C



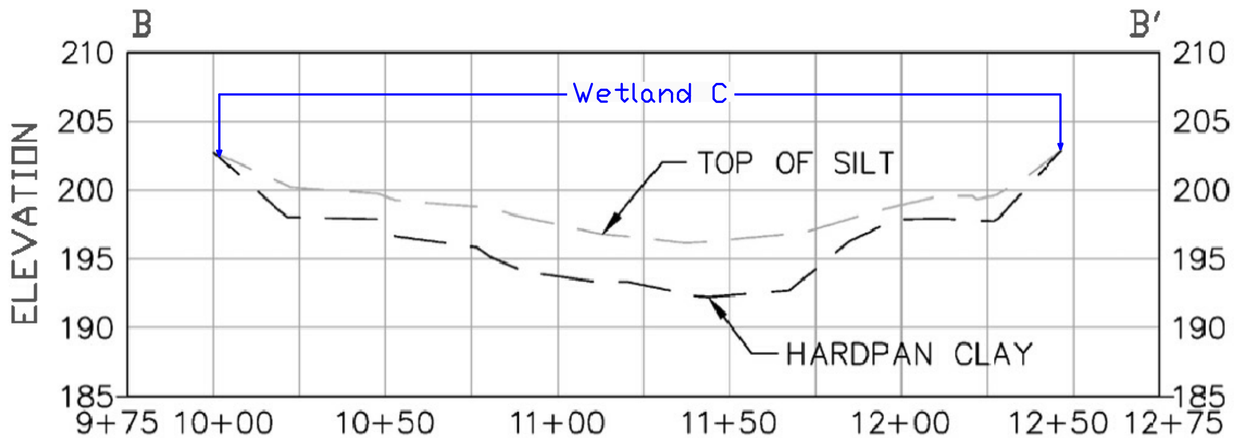
SOURCES: Westlake Consultants Planning–Engineering–Surveying, September 2019.

Terra Science, Inc. Soil, Water, & Wetland Consultants GRAPHIC SCALE 40' 0' 40' 80' 160'	JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon December 2022 (Updated June 2023)	WETLAND C EXISTING BATHYMETRY OF IRRIGATION POND FIGURE 7A



CROSS SECTION A

HORIZONTAL SCALE: 1"=60'
VERTICAL SCALE: 1"=15'

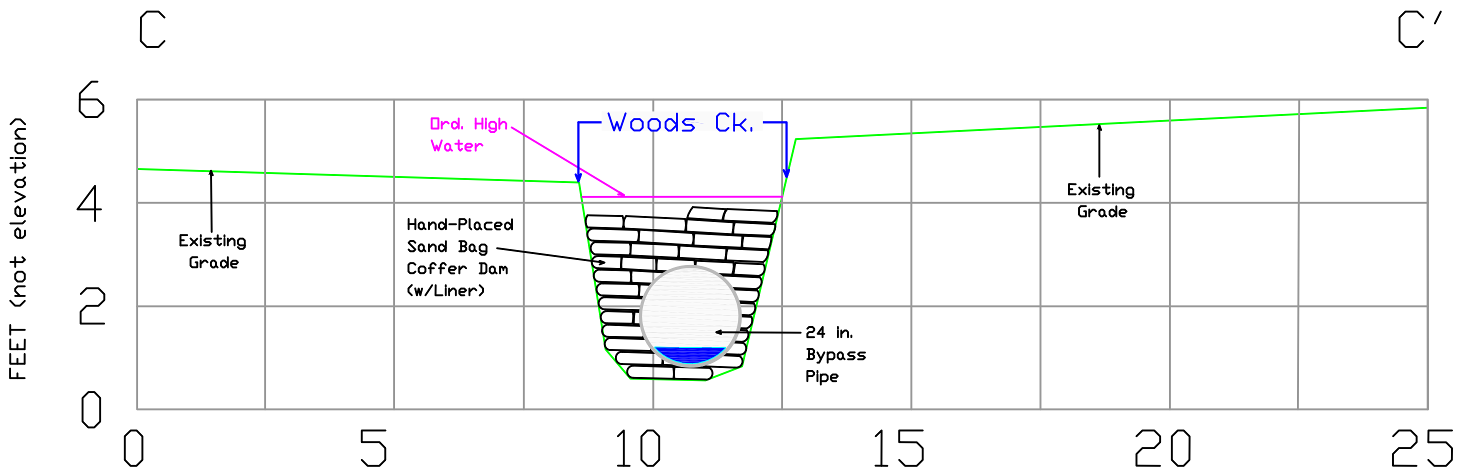


CROSS SECTION B

HORIZONTAL SCALE: 1"=60'
VERTICAL SCALE: 1"=15'

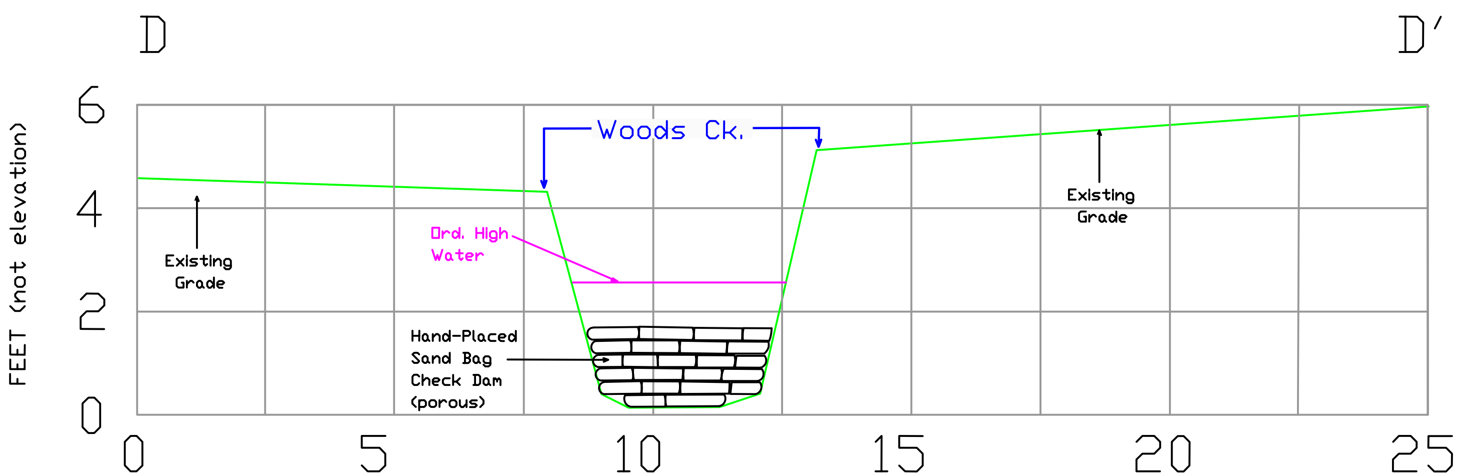
SOURCES: Westlake Consultants Planning–Engineering–Surveying, September 2021.

Terra Science, Inc. Soil, Water, & Wetland Consultants	JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon	WETLAND C CROSS–SECTIONS WITH ACCUMULATED SEDIMENT
GRAPHIC SCALE – SEE SECTIONS ABOVE	December 2022 (Updated June 2023)	FIGURE 7B



CROSS-SECTION C -- CONCEPTUAL, NOT FOR CONSTRUCTION

Horizontal Scale: 1 in. = 2 ft.



CROSS-SECTION D -- CONCEPTUAL, NOT FOR CONSTRUCTION

Horizontal Scale: 1 in. = 2 ft.

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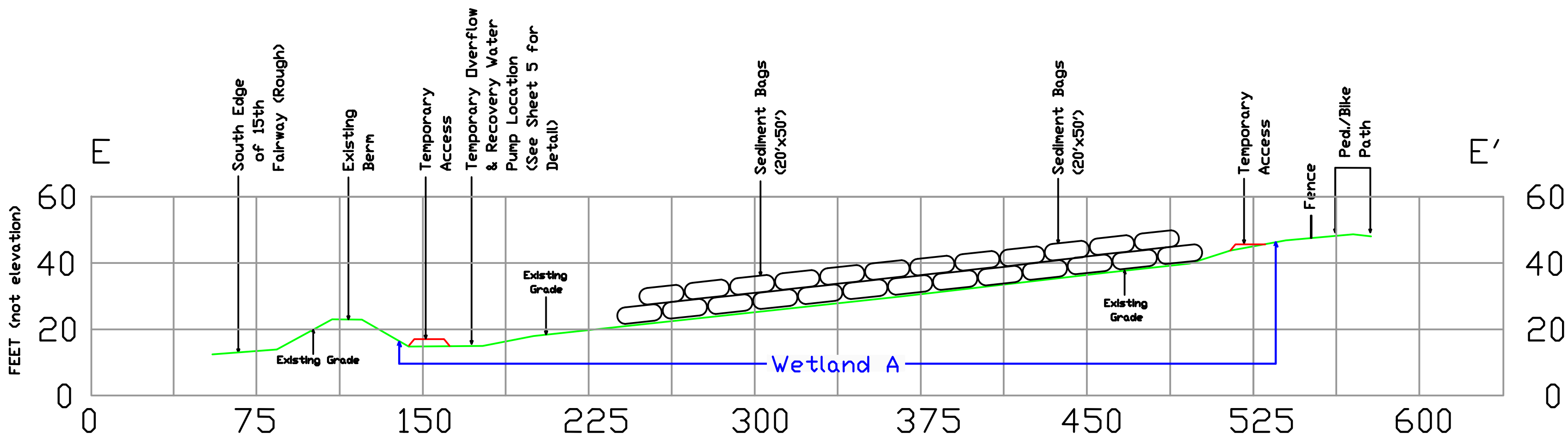
GRAPHIC SCALE
40' 0' 40' 80' 160'

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

June 2023

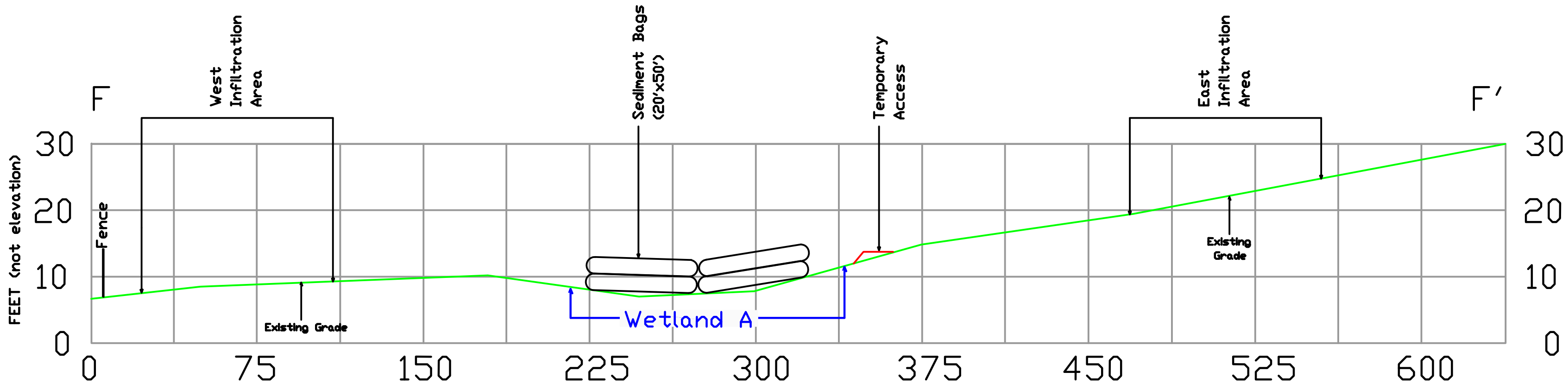
WOODS CREEK CROSS-SECTIONS
SAND BAG COFFER DAM AND
TYPICAL CHECK DAM

FIGURE 7C



CROSS-SECTION E -- CONCEPTUAL, NOT FOR CONSTRUCTION

Horizontal Scale: 1 in. = 80 ft.



CROSS-SECTION F -- CONCEPTUAL, NOT FOR CONSTRUCTION

Horizontal Scale: 1 in. = 80 ft.

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GRAPHIC SCALE
40' 0' 40' 80' 160'

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
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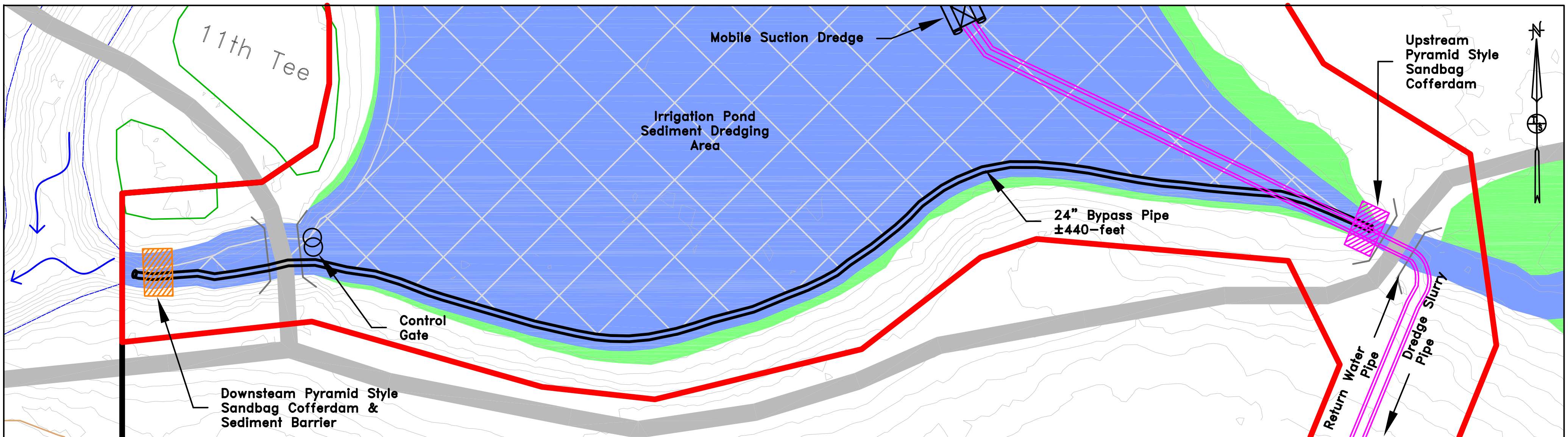
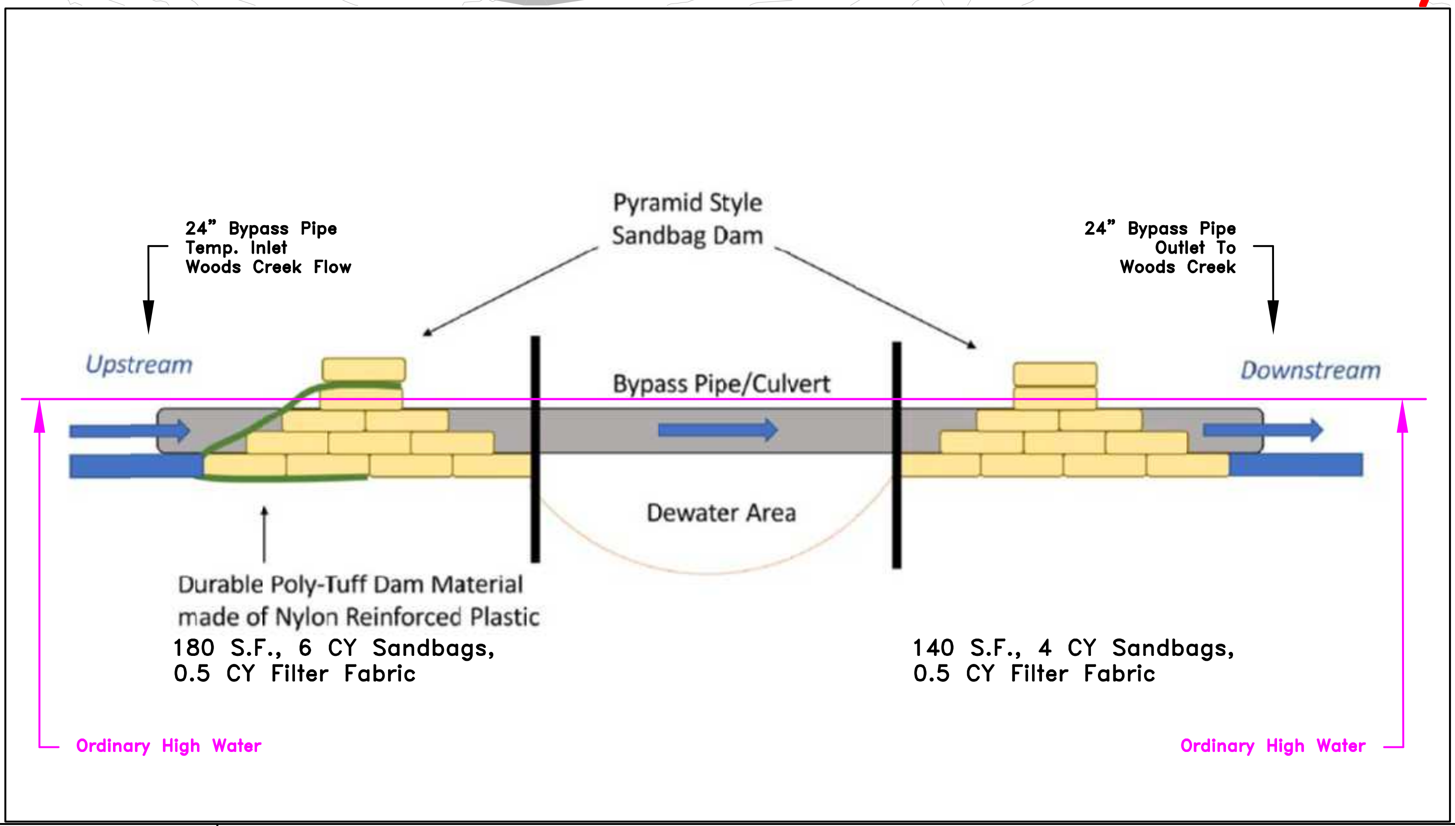
December 2022 (Updated June 2023)

WETLAND A CROSS-SECTIONS
SEDIMENT BAG PLACEMENT

FIGURE 8





Terra Science, Inc.
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GRAPHIC SCALE
25' 0' 25' 50' 100'

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
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December 2022 (Updated June 2023)

WETLAND C COFFERDAM
AND BYPASS PIPE DETAIL

FIGURE 9

P.G.C. WATER CONTROL GATE PHOTOGRAPHS (Feb. 22, 2023)

View northwest at water control gate between irrigation pond and Fanno Creek. View of upgradient side of water control gate, which detains water from Woods Creek.

View southeast at water control gate between irrigation pond and Fanno Creek. View of downgradient side of water control gate. Floating debris from Fanno Creek is stopped from entering irrigation pond.

4710 S.W. Kelly Avenue, Suite 100 / Post Office Box 2100 / Portland, OR 97208-2100 / 503-274-2100 / pscoles@terrascience.com

P.G.C. WATER CONTROL GATE PHOTOGRAPHS (cont'd).

View east at water control gate that impounds Woods Creek and detains water for irrigation pond. View of downgradient side of water control gate.

View northwest at water control gate that impounds Woods Creek and detains water for irrigation pond. View of upgradient side of water control gate.

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APPENDIX B – COMPENSATORY MITIGATION ELIGIBILITY ACCOUNTING DETERMINATION FORM AND MITIGATION BANK CREDIT DETERMINATION FORM

Draft Compensatory Mitigation Eligibility and Accounting Determination Form
STEP 1. ELIGIBILITY

INSTRUCTIONS: This eligibility worksheet is used to determine whether a proposed compensatory mitigation site is ecologically appropriate to offset proposed impacts. Final eligibility is determined by the agency. The expectation is that compensatory mitigation sites provide an ecological match (i.e. class, function, and value) to the impact site. In some circumstances, an exception to ecological match may be allowed if the permittee demonstrates that the proposed compensatory mitigation site addresses local or watershed needs or priorities. Enter data in red boxes only. Yellow boxes will populate automatically.

Criteria		RESPONSE	RESULT	COMMENTS
Expectation for providing ecological match for wetlands impacts	Does the mitigation site replace all of the following:			Aquatic Resources of Special Concern must be replaced in-kind and may not otherwise meet all criteria.
	a) HGM class(es) and subclass(es)? ▪ *Select yes or no from drop-down list.*	Yes	MET	Mitigation bank provides credits to offset HGM-Slope type wetland impacts.
	b) Cowardin system(s) and class(es)? ▪ *Select yes or no from drop-down list.*	Yes	MET	Mitigation bank provides credits to offset PEM-type wetland impacts.
	c) Group-level functions and values? ▪ *Compare ORWAP ratings between the impact site and the mitigation site (predicted scores) to determine this. Select yes or no from drop-down list.*	Yes	MET	Mitigation bank has legacy credits, so this criteria does not apply.
Expectation for providing ecological match for stream impacts	ENSATORY MITIGATION - ROUTINE ELIGIBILITY ACCOUNTING WORKSHEET Does the mitigation site replace all of the following:			Aquatic Resources of Special Concern must be replaced in-kind and may not otherwise meet all criteria.
	a) Flow permanance (intermittent or perennial)? ▪ *Select yes or no from drop-down list.*			Not applicable -- no stream impacts.
	b) Stream size class (small, medium, or large)? ▪ *Select yes or no from drop-down list.*			Not applicable -- no stream impacts.
	c) Essential Indigenous Anadromous Salmonid Habitat (ESH) designation, if the impact is to an ESH stream? ▪ *Select yes, no, or Impact site is not ESH from the drop-down list.*			Not applicable -- no stream impacts.
	d) Group-level functions and values? ▪ *Compare SFAM ratings between the impact site and the mitigation site (predicted scores) to determine this. Select yes or no from drop-down list.*			Not applicable -- no stream impacts.

If any criterion above are not met, determine whether the mitigation site might qualify for an exception (as a watershed priority) by answering the following two questions. If all criteria above were met, skip the next two questions and move to Step 2: Accounting.				Aquatic Resources of Special Concern are not eligible for an exception and must be replaced in-kind
Possible exception to ecological match	Does the mitigation site:			
	a) Address a watershed priority, as identified in a planning or assessment document, report, or other data? ▪ *Must be fully described in the permit application. Select yes or no from the drop-down list.*			Not applicable.
	b) Provide a high level of the functions and values that are relevant to the targeted priority (either currently or post-construction)? ▪ *Must be fully described in the permit application. Select yes or no from the drop-down list.*			Not applicable.

STEP 2. ACCOUNTING

INSTRUCTIONS: This accounting worksheet is used to estimate a permittee's wetland mitigation requirements, specific to a particular impact and proposed mitigation site. There are no minimum requirements defined for streams. Final requirements will be determined by the agency. Requirements are based on (1) the mitigation method, (2) the function/value replacement achieved, (3) function temporal loss factors, (4) level of function replacement, and (5) stewardship and site protection plans. Enter data in red boxes only. Yellow boxes will populate automatically. A separate column must be used for each mitigation method used (e.g. if a mitigation site includes both restoration and enhancement, the mitigation method for those distinct areas must be calculated in separate columns). A separate column may also be used to allow different function temporal loss factors to be applied to different acreages, even if the mitigation method being used on that acreage is the same.

Factor		Method 1	Method 2	Method 3	Notes
Mitigation method	ENSATORY MITIGATION - ROUTINE ELIGIBILITY ACCOUNTI What method(s) of mitigation is proposed? ▪ *Select an option from drop-down list.*	Credit purchase			If purchasing credits, ILF or PIL, select "credit purchase." Minimum requirements for preservation and non-wetland waters are case-by-case, as determined by the Department.
	MINIMUM MITIGATION REQUIREMENT (acres of mitigation required per acre of impact)	1.00			

Note: Adjustments do not apply to non-tidal wetland impacts ≤0.2 acres purchasing credits as mitigation; select "Not applicable" for each factor.

Specific function and value replacement *(increase factor)*	How many specific functions and values from the impact site are replaced at the mitigation site? ▪ *Compare ORWAP ratings between the impact site and the mitigation site (predicted scores) to determine this. Select an option from drop-down list.*	11-12 matches			Select "Not applicable" if the mitigation site is approved/seeking approval as an exception to in-kind replacement under a watershed priority approach, if purchasing legacy credits, or best professional judgement was used to assess functions and values.
		+ 10%			
Function temporal loss *(increase factor)*	Which factor, if any, will cause the greatest temporal loss of function? ▪ *Select **first** applicable option from drop-down list.*	Emergent/shrub impacted			Soil adjustment factors are not applicable to credit purchases or removal of historic fill. Vegetation and soil adjustments may not apply when the mitigation method is preservation.
		+ 20%			

		Method 1		Method 2		Method 3		Notes
High level of function replacement *(decrease factor)*	Does the CM site exceed at least 80% of the specific functions being lost at the impact site? ▪ *Compare ORWAP function ratings between the impact site and the mitigation site (predicted scores) to determine this. Select an option from drop-down list.*	>=13 ORWAP functions exceeded						"Exceed" means replaced beyond an overlapping rating break proximity. Select "Not applicable" if the mitigation site is approved/seeking approval as an exception to in-kind replacement under a watershed priority approach, if purchasing legacy credits, or best professional judgement was used to assess functions and values.
		-	20%					
Mitigation site protection & stewardship *(decrease factor)*	What level of site protection and stewardship is proposed for the mitigation site? ▪ *Select an option from the drop-down list.*	Enhanced stewardship						Mitigation banks and ILFs typically have enhanced stewardship. Minimum mitigation requirement is 1 acre credit to 1 acre of impact.
		-	20%					
	Total adjustment (percent increase)	0%						
	ADJUSTED MITIGATION REQUIREMENT (acres of mitigation required per acre of impact)	1.00						

	Method 1	Method 2	Method 3	Notes
Acreage of impact* (*enter the acreage associated with each method)	0.72			Insert the area of unavoidable permanent impact
COMPENSATORY MITIGATION - MITIGATION ACREAGE REQUIRED **(adjusted mitigation requirement * impacted acreage)**	0.72			**Proposed credit purchase from Butler Mitigation Bank (or other bank in Tualatin Valley).**
TOTAL MITIGATION REQUIRED WITHOUT BUFFERS	0.72	**This is the mitigation acreage required if a buffer is not required by DSL**		

This section is only used if DSL requires a buffer at the compensatory mitigation project

Factor		Method 1		Method 2		Method 3		Notes
Credit for DSL Required Buffers	Buffer acreage							Use multiple methods only if more than one ratio will be applied to the buffer.
	Buffer credit ratio							DSL will determine the credit ratio for required buffers. Enter the acres of buffer required per credit (e.g. for 10:1, enter 10).
	Buffer Credit							
	Total Buffer Credit	0						
	TOTAL MITIGATION REQUIRED WITH BUFFER CREDITS APPLIED			**This is the mitigation acreage required if buffers are required by DSL**				

Draft Credit Determination Form for Mitigation Banks or In-Lieu Fee Projects

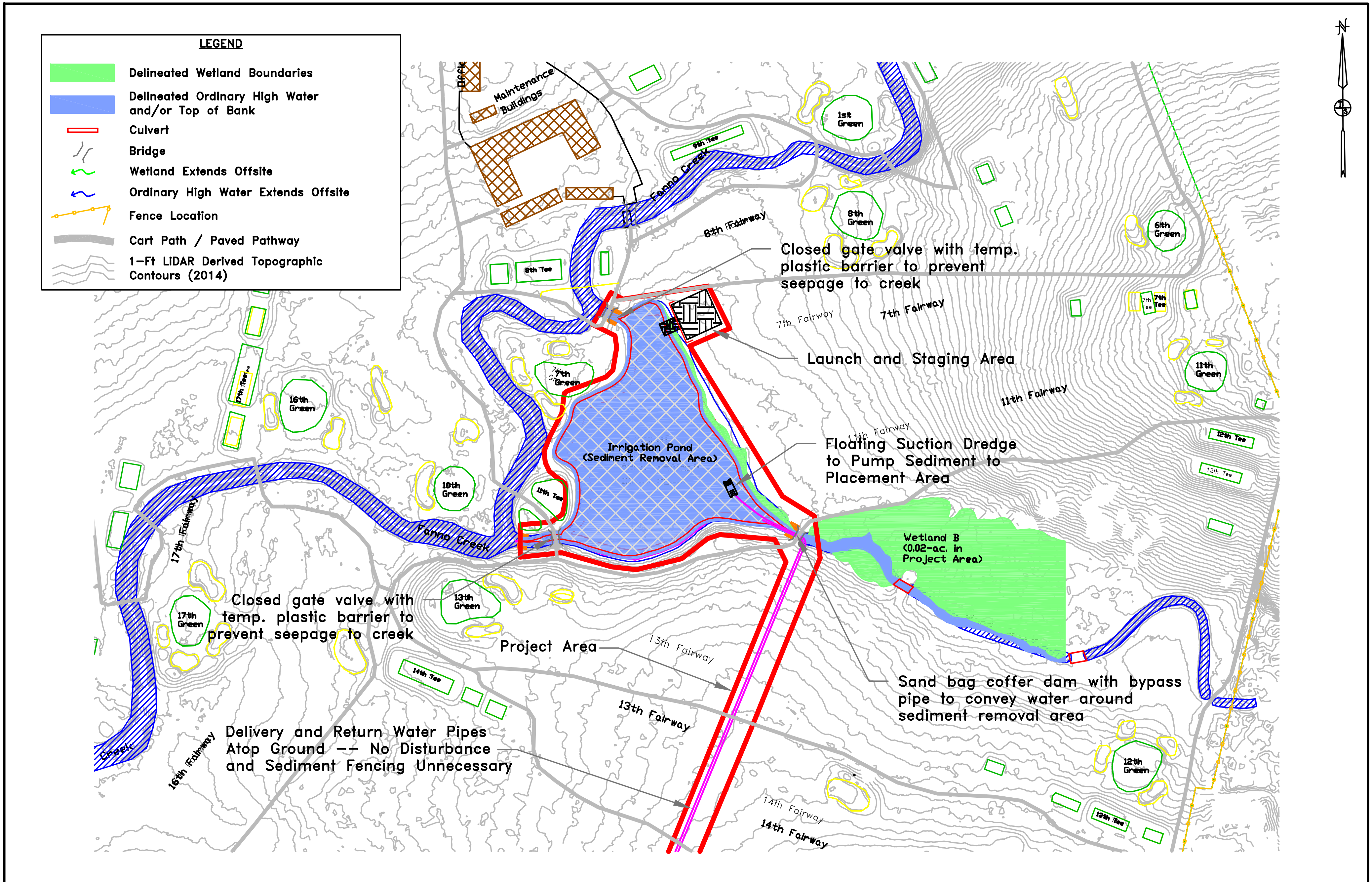
INSTRUCTIONS: This accounting worksheet is used to estimate credits for a mitigation bank or in-lieu fee project. Final credits and requirements will be determined by the agency. Credits are based on (1) the mitigation method, (2) function temporal loss factors, and (3) requied buffers. Enter data in red boxes only. Yellow boxes will populate automatically. A separate column must be used for each mitigation method used (e.g. if a mitigation site includes both restoration and enhancement, the mitigation method for those distinct areas must be calculated in separate columns). A separate column may also be used to allow different function temporal loss factors to be applied to different acreages, even if the mitigation method being used on that acreage is the same.

Factor		Method 1	Method 2	Method 3	Notes
Mitigation method	What method(s) of mitigation is proposed? ▪ *Select an option from drop-down list.*	Restoration			Use multiple methods if more than one ratio applies. Credits for preservation are case-by-case, as determined by the Department and may be adjusted.
		1.00			
Function temporal loss *(increase factor)*	Which soil factor, if any, will cause temporal loss of function? ▪ *Select **first** applicable option from drop-down list.*	None of the above			Soil adjustment factors are not generally applicable to removal of historic fill, or mitigation through preservation.
		+ 0%			
	ADJUSTED MITIGATION RATIO (acres per credit)	1.00			
	Applicable site acreage	0.72			
	POTENTIAL MITIGATION CREDITS	0.72			
	POTENTIAL MITIGATION CREDITS WITHOUT BUFFERS	0.72			

This section is only used if DSL approves a buffer at the compensatory mitigation project

Factor		Method 1	Method 2	Method 3	Notes
Credit for Buffers	Buffer acreage				Use multiple methods if more than one ratio applies
	Buffer credit ratio				DSL will determine the credit ratio for required buffers. Enter the acres of buffer required per credit (e.g. for 10:1, enter 10)
	Buffer Credit				
	POTENTIAL MITIGATION CREDITS WITH BUFFER CREDITS	0.72			

APPENDIX C – SEDIMENT EROSION DRAWINGS



SOURCE: National Oceanic and Atmospheric Administration (NOAA) LiDAR Contours and NAIP OSIP Aerial Photograph, 2019.

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Soil, Water, & Wetland Consultants

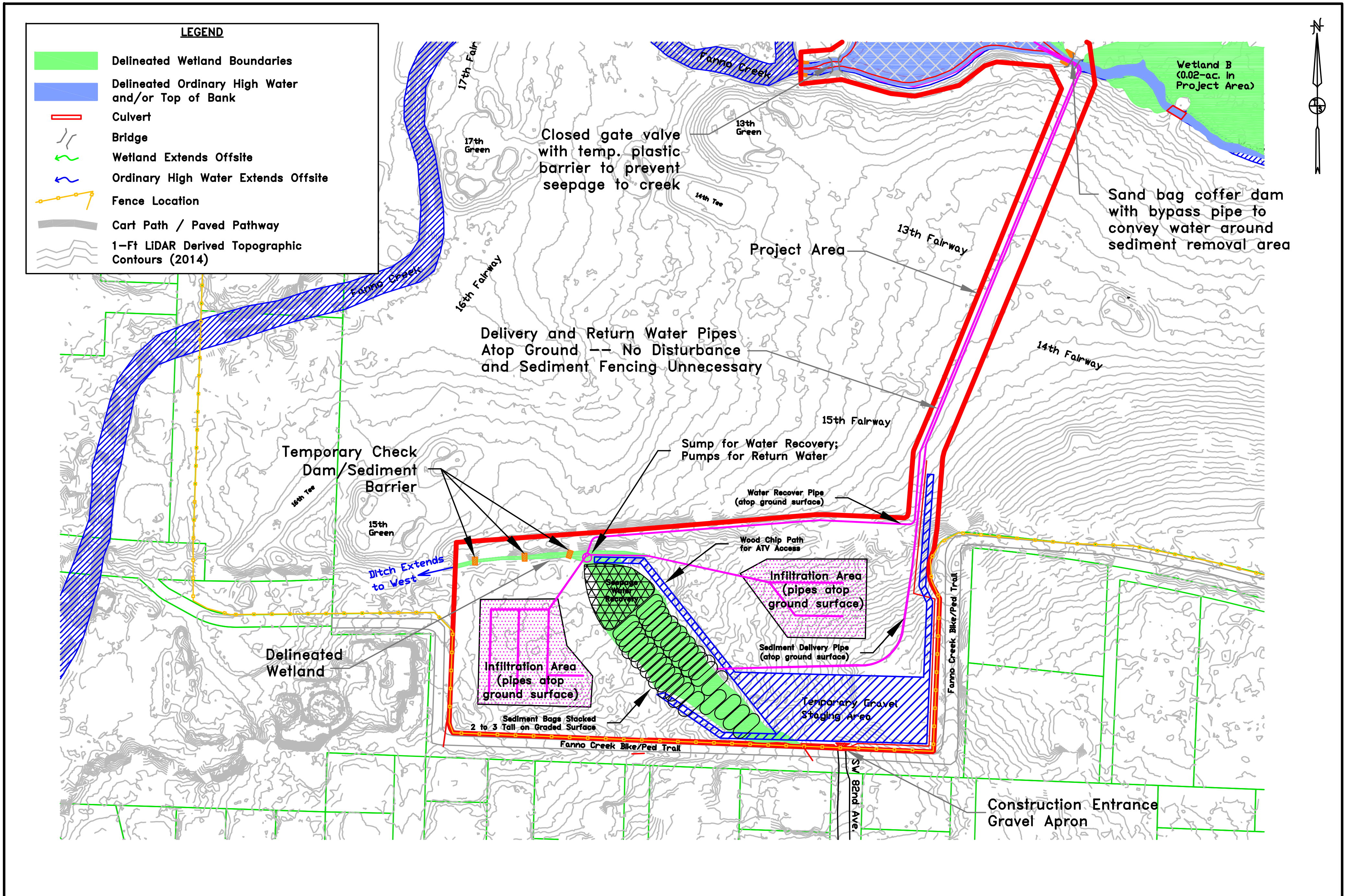
GRAPHIC SCALE
225 0 225 450 900
1 inch = 450 feet

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

December 2022

EROSION CONTROL
FEATURE LOCATIONS
(SEDIMENT REMOVAL AREA)

EROSION-1



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GRAPHIC SCALE
225 0 225 450 900
1 inch = 450 feet

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

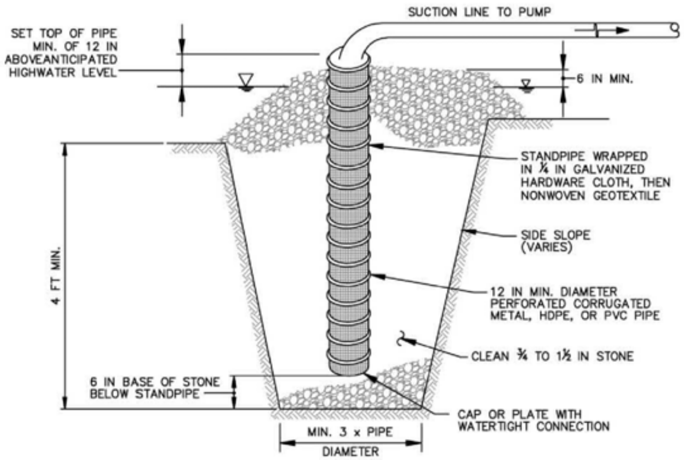
December 2022

EROSION CONTROL
FEATURE LOCATIONS
(SEDIMENT PLACEMENT AREA)

EROSION-2

STANDARD SYMBOL

⊠SP



ELEVATION

CONSTRUCTION SPECIFICATIONS

1. USE 12 INCH OR LARGER DIAMETER CORRUGATED METAL, HDPE, OR PVC PIPE WITH 1 INCH DIAMETER PERFORATIONS, 6 INCHES ON CENTER. BOTTOM OF PIPE MUST BE CAPPED WITH WATERTIGHT SEAL.
2. WRAP PIPE WITH ¼ INCH GALVANIZED HARDWARE CLOTH AND WRAP NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, OVER THE HARDWARE CLOTH.
3. EXCAVATE PIT TO THREE TIMES THE PIPE DIAMETER AND FOUR FEET IN DEPTH. PLACE ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE, 6 INCHES IN DEPTH PRIOR TO PIPE PLACEMENT.
4. SET TOP OF PIPE MINIMUM 12 INCHES ABOVE ANTICIPATED WATER SURFACE ELEVATION.
5. BACKFILL PIT AROUND THE PIPE WITH ¾ TO 1½ INCH CLEAN STONE OR EQUIVALENT RECYCLED CONCRETE AND EXTEND STONE A MINIMUM OF 6 INCHES ABOVE ANTICIPATED WATER SURFACE ELEVATION.
6. DISCHARGE TO A STABLE AREA AT A NONEROSIVE RATE.
7. A SUMP PIT REQUIRES FREQUENT MAINTENANCE. IF SYSTEM CLOGS, REMOVE PERFORATED PIPE AND REPLACE GEOTEXTILE AND STONE. KEEP POINT OF DISCHARGE FREE OF EROSION.

Control Measure	Problems	Possible Remedies
Inlet Protection	Inlet protection not dewatering and geotextile or stone voids filled with sediment	Replace geotextile or stone.
	Runoff undermining the inlet protection	Key-in geotextile, backfill, and compact.
	Sediment exceeds half the height of the structure	Remove sediment when sediment is half the height of the structure.
	Inlet protection leaning or collapsing	Verify construction of inlet protection. Verify drainage area. Reconstruct inlet protection.
Sump Pit	Discharge from hose is sediment laden	Reconstruct and replace geotextile and stone or install new sump pit.
	Water not entering pipe for pumping	Reconstruct and replace geotextile and stone or install new sump pit.
Portable Sediment Tank	Discharge from outlet is sediment laden	Cease pumping and remove sediment from tank, and replace geotextile. If sediment laden discharge continues, slow pumping rate of flow or use sump pit in conjunction.
	Discharge from outlet is becoming sediment laden once it discharges back onto the ground.	Relocate tank to a stabilized area, or place polyethylene sheeting or use hose to convey discharge to stabilized area.

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NO GRAPHIC SCALE

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

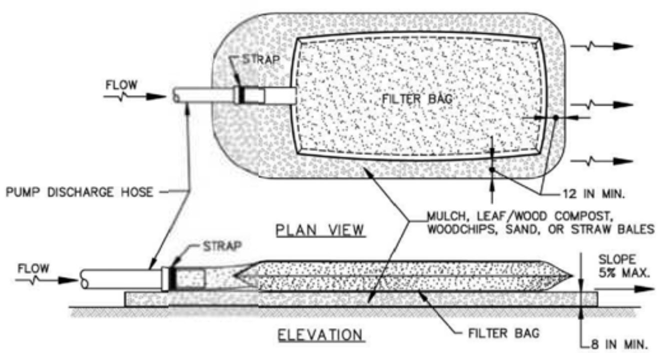
December 2022

DEWATERING SUMP PIT
(Typical)

SHEET 1

STANDARD SYMBOL

☒FB



CONSTRUCTION SPECIFICATIONS

1. TIGHTLY SEAL SLEEVE AROUND THE PUMP DISCHARGE HOSE WITH A STRAP OR SIMILAR DEVICE.
2. PLACE FILTER BAG ON SUITABLE BASE (E.G., MULCH, LEAF/WOOD COMPOST, WOODCHIPS, SAND, OR STRAW BALES) LOCATED ON A LEVEL OR 5% MAXIMUM SLOPING SURFACE. DISCHARGE TO A STABILIZED AREA. EXTEND BASE A MINIMUM OF 12 INCHES FROM EDGES OF BAG.
3. CONTROL PUMPING RATE TO PREVENT EXCESSIVE PRESSURE WITHIN THE FILTER BAG IN ACCORDANCE WITH THE MANUFACTURER RECOMMENDATIONS. AS THE BAG FILLS WITH SEDIMENT, REDUCE PUMPING RATE.
4. REMOVE AND PROPERLY DISPOSE OF FILTER BAG UPON COMPLETION OF PUMPING OPERATIONS OR AFTER BAG HAS REACHED CAPACITY, WHICHEVER OCCURS FIRST. SPREAD THE DEWATERED SEDIMENT FROM THE BAG IN AN APPROVED UPLAND AREA AND STABILIZE WITH SEED AND MULCH BY THE END OF THE WORK DAY. RESTORE THE SURFACE AREA BENEATH THE BAG TO ORIGINAL CONDITION UPON REMOVAL OF THE DEVICE.
5. USE NONWOVEN GEOTEXTILE WITH DOUBLE STITCHED SEAMS USING HIGH STRENGTH THREAD. SIZE SLEEVE TO ACCOMMODATE A MAXIMUM 4 INCH DIAMETER PUMP DISCHARGE HOSE. THE BAG MUST BE MANUFACTURED FROM A NONWOVEN GEOTEXTILE THAT MEETS OR EXCEEDS MINIMUM AVERAGE ROLL VALUES (MARV) FOR THE FOLLOWING:

GRAB TENSILE	250 LB	ASTM D-4632
PUNCTURE	150 LB	ASTM D-4833
FLOW RATE	70 GAL/MIN/FT^2	ASTM D-4491
PERMITTIVITY (SEC^{-1})	1.2 SEC^{-1}	ASTM D-4491
UV RESISTANCE	70% STRENGTH @ 500 HOURS	ASTM D-4355
APPARENT OPENING SIZE (AOS)	0.15-0.18 MM	ASTM D-4751
SEAM STRENGTH	90%	ASTM D-4632

6. REPLACE FILTER BAG IF BAG CLOGS OR HAS RIPS, TEARS, OR PUNCTURES. DURING OPERATION KEEP CONNECTION BETWEEN PUMP HOSE AND FILTER BAG WATER TIGHT. REPLACE BEDDING IF IT BECOMES DISPLACED.

Control Measure	Problems	Possible Remedies
Filter Bag	Sediment laden discharge is escaping around the hose insert.	Cease pumping and insert discharge hose further into bag. Retie bag around the discharge hose or use heavy hose clamps to create a tight seal. Periodically check this connection.
	Bag is not dewatering efficiently.	Remove and replace bag and dispose of bag in proper location.
	Discharge from bag is becoming sediment laden once it discharges on the ground.	Relocate bag to a stabilized area or place polyethylene sheeting to convey discharge to stabilized area.

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NO GRAPHIC SCALE

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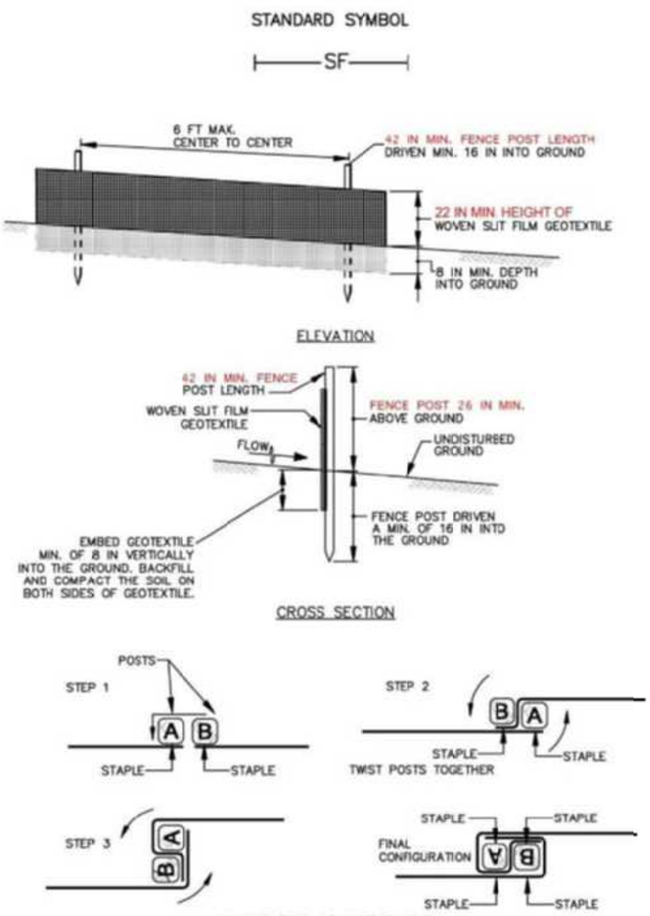
DEWATERING FILTER BAG
(Typical)

SHEET 2



JOINING TWO ADJACENT SILT FENCE SECTIONS (TOP VIEW)

CONSTRUCTION SPECIFICATIONS

1. USE WOOD POSTS 1¾ X 1¾ ± ⅛ INCH (MINIMUM) SQUARE CUT OF SOUND QUALITY HARDWOOD. AS AN ALTERNATIVE TO WOODEN POST USE STANDARD "T" OR "U" SECTION STEEL POSTS WEIGHING NOT LESS THAN 1 POUND PER LINEAR FOOT.
2. USE 42 INCH MINIMUM POSTS DRIVEN 16 INCH MINIMUM INTO GROUND NO MORE THAN 6 FEET APART.
3. USE WOVEN SLIT FILM GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS AND FASTEN GEOTEXTILE SECURELY TO UPSLOPE SIDE OF FENCE POSTS WITH WIRE TIES OR STAPLES AT TOP AND MID-SECTION.

Control Measure	Problems	Possible Remedies
Silt Fence	Flow undermining Fence	Entrench geotextile 8", backfill, and compact.
	Sediment exceeds 25% the height of the fence	Remove sediment when sediment is 25% the height of the fence.
	Fence leaning or collapsing	Verify post size and geotextile. Verify drainage area, slope length, and gradient behind fence. Correct any substandard condition.
	Torn fabric	Replace geotextile from post to post and install properly.
	Runoff escaping around end	Extend fence and turn end upslope.
Temporary Stone Outlet Structure	Excessive sediment	Remove sediment when sediment is within 6" of weir crest.
	Stone voids filled with sediment	Remove sediment filled stone and replace with new stone.
	Displaced stone	Verify drainage area and reconstruct structure.
	Flow escaping around the sides of the structure	Extend stone on each side and provide a low area in the center for spillway.

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Soil, Water, & Wetland Consultants

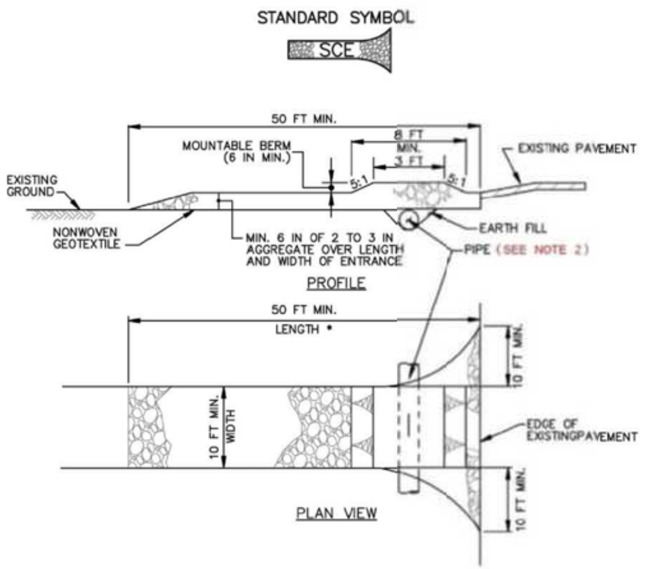
NO GRAPHIC SCALE

JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

December 2022

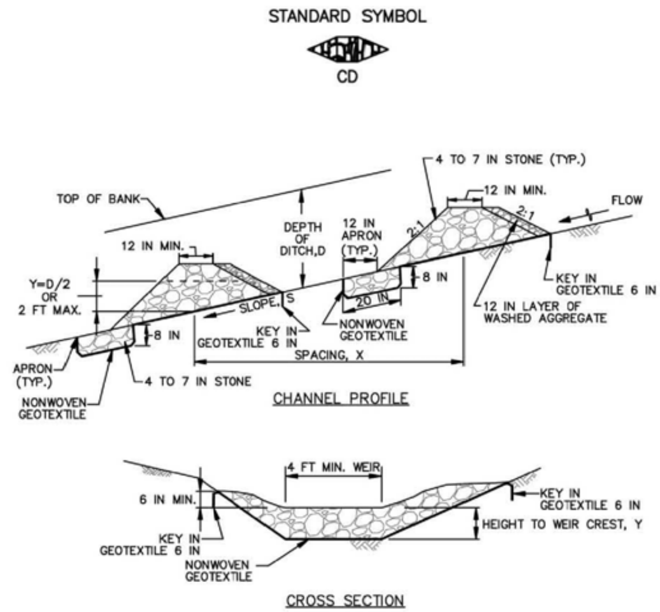
SEDIMENT FENCING
(Typical)

SHEET 3



CONSTRUCTION SPECIFICATIONS

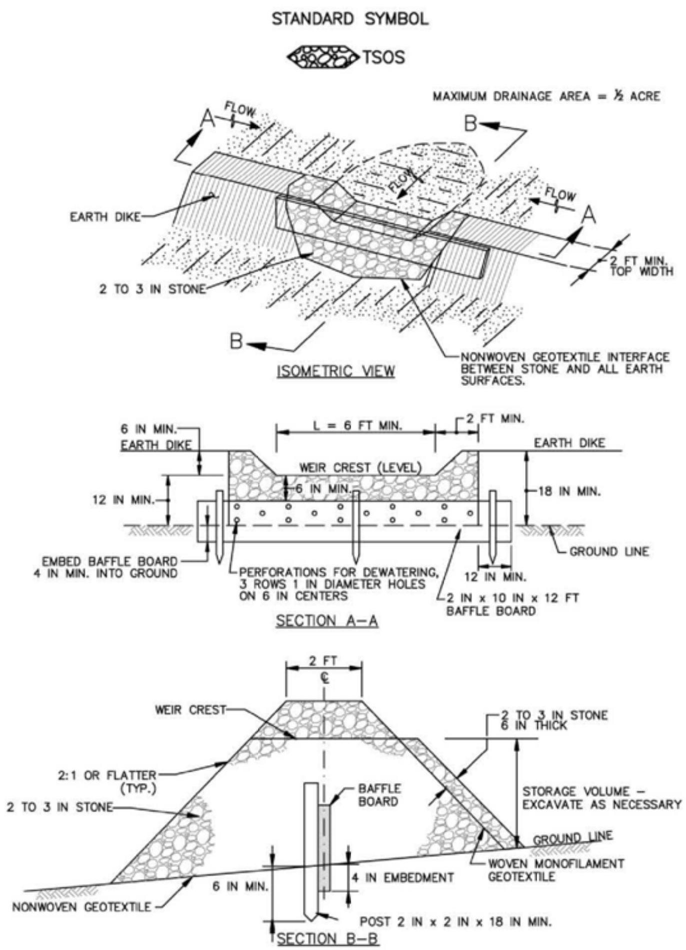
1. PLACE STABILIZED CONSTRUCTION ENTRANCE IN ACCORDANCE WITH THE APPROVED PLAN. VEHICLES MUST TRAVEL OVER THE ENTIRE LENGTH OF THE SCE. USE MINIMUM LENGTH OF 50 FEET (*30 FEET FOR SINGLE RESIDENCE LOT). USE MINIMUM WIDTH OF 10 FEET. FLARE SCE 10 FEET MINIMUM AT THE EXISTING ROAD TO PROVIDE A TURNING RADIUS.
2. PIPE ALL SURFACE WATER FLOWING TO OR DIVERTED TOWARD THE SCE UNDER THE ENTRANCE, MAINTAINING POSITIVE DRAINAGE. PROTECT PIPE INSTALLED THROUGH THE SCE WITH A MOUNTABLE BERM WITH 5:1 SLOPES AND A MINIMUM OF 12 INCHES OF STONE OVER THE PIPE. PROVIDE PIPE AS SPECIFIED ON APPROVED PLAN. WHEN THE SCE IS LOCATED AT A HIGH SPOT AND HAS NO DRAINAGE TO CONVEY, A PIPE IS NOT NECESSARY. A MOUNTABLE BERM IS REQUIRED WHEN SCE IS NOT LOCATED AT A HIGH SPOT.
3. PREPARE SUBGRADE AND PLACE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS.
4. PLACE CRUSHED AGGREGATE (2 TO 3 INCHES IN SIZE) OR EQUIVALENT RECYCLED CONCRETE (WITHOUT REBAR) AT LEAST 6 INCHES DEEP OVER THE LENGTH AND WIDTH OF THE SCE.
5. MAINTAIN ENTRANCE IN A CONDITION THAT MINIMIZES TRACKING OF SEDIMENT. ADD STONE OR MAKE OTHER REPAIRS AS CONDITIONS DEMAND TO MAINTAIN CLEAN SURFACE, MOUNTABLE BERM, AND SPECIFIED DIMENSIONS. IMMEDIATELY REMOVE STONE AND/OR SEDIMENT SPILLED, DROPPED, OR TRACKED ONTO ADJACENT ROADWAY BY VACUUMING, SCRAPING, AND/OR SWEEPING. WASHING ROADWAY TO REMOVE MUD TRACKED ONTO PAVEMENT IS NOT ACCEPTABLE UNLESS WASH WATER IS DIRECTED TO AN APPROVED SEDIMENT CONTROL PRACTICE.



CONSTRUCTION SPECIFICATIONS

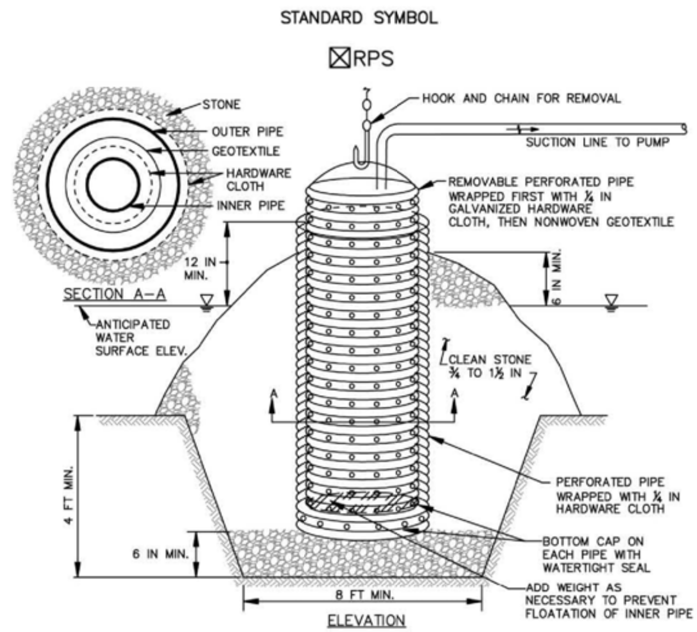
1. PREPARE SWALES IN ACCORDANCE WITH THE CONSTRUCTION SPECIFICATIONS DESCRIBED IN SECTION C-2, STANDARDS AND SPECIFICATIONS FOR TEMPORARY SWALE, OR AS SPECIFIED ON PLAN.
2. PLACE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS, UNDER THE BOTTOM AND SIDES OF THE DAM PRIOR TO PLACEMENT OF STONE. CONSTRUCT THE CHECK DAM WITH WASHED 4 TO 7 INCH STONE OR EQUIVALENT RECYCLED CONCRETE (WITHOUT REBAR) WITH SIDE SLOPES OF 2:1 OR FLATTER AND A MINIMUM TOP WIDTH OF 12 INCHES. PLACE THE STONE SO THAT IT COMPLETELY COVERS THE WIDTH OF THE CHANNEL AND CHANNEL BANKS. FORM THE WEIR SO THAT TOP OF THE OUTLET CREST IS APPROXIMATELY 6 INCHES LOWER THAN THE OUTER EDGES.
3. SET THE HEIGHT FOR THE WEIR CREST EQUAL TO ONE-HALF THE DEPTH OF THE CHANNEL OR DITCH. TO AVOID SCOUR THE MAXIMUM HEIGHT OF THE WEIR CREST MUST NOT EXCEED 2.0 FEET.
4. REMOVE ACCUMULATED SEDIMENT WHEN IT REACHES ONE-HALF OF THE HEIGHT OF THE WEIR CREST. MAINTAIN LINE, GRADE, AND CROSS SECTION.

Terra Science, Inc. Soil, Water, & Wetland Consultants	JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon	CONSTRUCTION ENGTRANCE AND TEMPORARY CHECK DAM (Typical)	SHEET 4
NO GRAPHIC SCALE	December 2022		



CONSTRUCTION SPECIFICATIONS

1. PROVIDE STORAGE VOLUME AS SPECIFIED ON APPROVED PLANS.
2. USE NONWOVEN GEOTEXTILE ON INTERFACE BETWEEN GROUND AND STONE.
3. PERFORATE BAFFLE BOARD WITH 3 ROWS OF 1 INCH DIAMETER HOLES 6 INCHES ON CENTER, EMBED A MINIMUM OF 4 INCHES INTO GROUND, AND EXTEND BAFFEL BOARD MINIMUM OF 12 INCHES INTO EARTH DIKE.



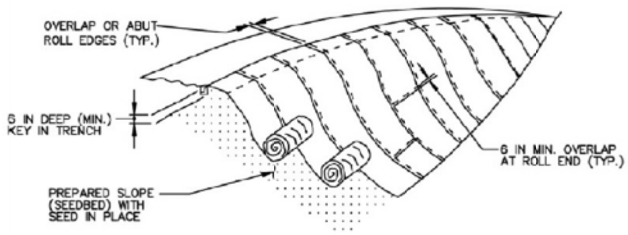
CONSTRUCTION SPECIFICATIONS

1. USE CORRUGATED METAL OR PLASTIC PIPE WITH 1 INCH DIAMETER PERFORATIONS 6 INCHES ON CENTER.
2. USE A MINIMUM 12 INCH DIAMETER INNER PIPE WITH AN OUTER PIPE A MINIMUM 6 INCHES LARGER IN DIAMETER. BOTTOM OF EACH PIPE MUST BE CAPPED WITH WATERTIGHT SEAL.
3. WRAP EACH PIPE WITH ¼ INCH GALVANIZED HARDWARE CLOTH. ON INNER PIPE WRAP NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H–1 MATERIALS, OVER THE HARDWARE CLOTH.
4. EXCAVATE 8 FEET X 8 FEET X 4 FEET DEEP PIT FOR PIPE PLACEMENT. PLACE CLEAN ¾ TO 1½ INCH STONE OR EQUIVALENT RECYCLED CONCRETE, 6 INCHES IN DEPTH PRIOR TO PIPE PLACEMENT.
5. SET TOP OF INNER AND OUTER PIPES MINIMUM 12 INCHES ABOVE ANTICIPATED WATER SURFACE ELEVATION (OR RISER CREST ELEVATION WHEN DEWATERING A BASIN).
6. BACKFILL PIT AROUND THE OUTER PIPE WITH ¾ TO 1½ INCH CLEAN STONE OR EQUIVALENT RECYCLED CONCRETE AND EXTEND STONE A MINIMUM OF 6 INCHES ABOVE ANTICIPATED WATER SURFACE ELEVATION.
7. DISCHARGE TO A STABLE AREA AT A NONEROSIVE RATE.
8. A REMOVABLE PUMPING STATION REQUIRES FREQUENT MAINTENANCE. IF SYSTEM CLOGS, PULL OUT INNER PIPE AND REPLACE GEOTEXTILE. KEEP POINT OF DISCHARGE FREE OF EROSION.

Terra Science, Inc. Soil, Water, & Wetland Consultants	JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon	TEMPORAY OVERFLOW AND RECOVERY PUMP STATION (Typical)	SHEET 5
NO GRAPHIC SCALE	December 2022		

STANDARD SYMBOL

TSSMS – * lb/ft²
(* INCLUDE SHEAR STRESS)

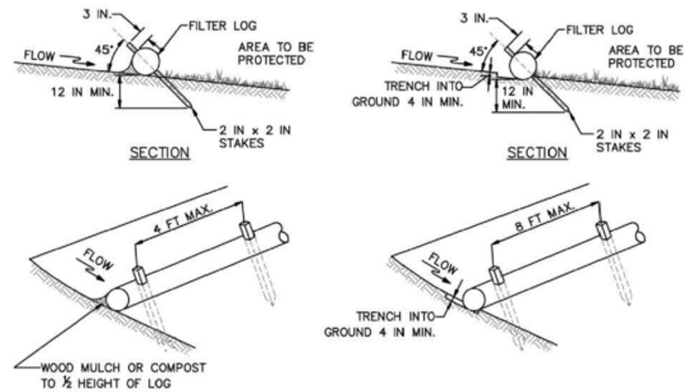


ISOMETRIC VIEW

CONSTRUCTION SPECIFICATIONS

1. USE MATTING THAT HAS A DESIGN VALUE FOR SHEAR STRESS EQUAL TO OR HIGHER THAN THE SHEAR STRESS DESIGNATED ON APPROVED PLANS.
2. USE TEMPORARY SOIL STABILIZATION MATTING MADE OF DEGRADABLE (LASTS 6 MONTHS MINIMUM) NATURAL OR MAN-MADE FIBERS (MOSTLY ORGANIC). MAT MUST HAVE UNIFORM THICKNESS AND DISTRIBUTION OF FIBERS THROUGHOUT AND BE SMOLDER RESISTANT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING AND NON-TOXIC TO VEGETATION AND SEED GERMINATION AND NON-INJURIOUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAXIMUM MESH OPENING OF 2x2 INCHES AND SUFFICIENTLY BONDED OR SEWN ON 2 INCH CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL.
3. SECURE MATTING USING STEEL STAPLES, WOOD STAKES, OR BIODEGRADABLE EQUIVALENT. STAPLES MUST BE "U" OR "T" SHAPED STEEL WIRE HAVING A MINIMUM GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY. "U" SHAPED STAPLES MUST AVERAGE 1 TO 1½ INCHES WIDE AND BE A MINIMUM OF 6 INCHES LONG. "T" SHAPED STAPLES MUST HAVE A MINIMUM 8 INCH MAIN LEG, A MINIMUM 1 INCH SECONDARY LEG, AND A MINIMUM 4 INCH HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12 TO 24 INCHES IN LENGTH, 1x3 INCH IN CROSS SECTION, AND WEDGE SHAPED AT THE BOTTOM.
4. PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREPARATION, AND PERMANENT SEEDING IN ACCORDANCE WITH SPECIFICATIONS. PLACE MATTING WITHIN 48 HOURS OF COMPLETING SEEDING OPERATIONS UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION & SEDIMENT CONTROL PLAN.
5. UNROLL MATTING DOWNSLOPE. LAY MAT SMOOTHLY AND FIRMLY UPON THE SEEDED SURFACE. AVOID STRETCHING THE MATTING.
6. OVERLAP OR ABUT ROLL EDGES PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSLOPE MAT OVERLAPPING ON TOP OF THE DOWNSLOPE MAT.
7. KEY IN THE UPSLOPE END OF MAT 6 INCHES (MINIMUM) BY DIGGING A TRENCH, PLACING THE MATTING ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, AND TAMPING TO SECURE THE MAT END IN THE KEY.
8. STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4 FOOT (MAXIMUM) CENTERS THROUGHOUT AND 2 FOOT (MAXIMUM) CENTERS ALONG SEAMS, JOINTS, AND ROLL ENDS.
9. ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

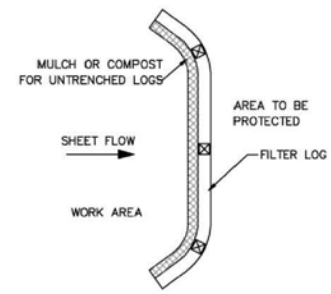
DESIGNATION FL-18 REFERS TO 18 INCH DIAMETER FILTER LOG.



UNTRENCHED INSTALLATION OR ENTRENCHED INSTALLATION*

*THIS APPLICATION MAY NOT BE USED WITH LOGS SMALLER THAN 12 IN.

ISOMETRIC VIEW



PLAN

CONSTRUCTION SPECIFICATIONS

1. PRIOR TO INSTALLATION, CLEAR ALL OBSTRUCTIONS INCLUDING ROCKS, CLODS, AND DEBRIS GREATER THAN ONE INCH THAT MAY INTERFERE WITH PROPER FUNCTION OF FILTER LOG.
2. FILL LOG NETTING UNIFORMLY WITH COMPOST (IN ACCORDANCE WITH SECTION H-1 MATERIALS), OR OTHER APPROVED BIODEGRADABLE MATERIAL TO DESIRED LENGTH SUCH THAT LOGS DO NOT DEFORM.
3. INSTALL FILTER LOGS PERPENDICULAR TO THE FLOW DIRECTION AND PARALLEL TO THE SLOPE WITH THE BEGINNING AND END OF THE INSTALLATION POINTING SLIGHTLY UP THE SLOPE CREATING A "J" SHAPE AT EACH END TO PREVENT BYPASS.

Terra Science, Inc. Soil, Water, & Wetland Consultants	JOINT PERMIT APPLICATION FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon	SLOPE MATTING AND FILTER LOG (WADDLE) (Typical)	SHEET 6
NO GRAPHIC SCALE	December 2022		

Control Measure	Problems	Possible Remedies
Vegetation	Erosion along slopes	Check top-of-slope diversion for positive drainage, install diversion if needed
	Bare soil patches	Fill erosion, regrade eroded slopes, & restabilize
	Sediment at toe-of-slope	Remove sediment, & restabilize
Dikes	Erosion on backside of dike	Verify positive drainage; repair eroded area, compact, & restabilize
	Loose soil	Compact dike
	Erosion on front face of dike	Verify channel lining, repair erosion, & restabilize
Swales	Erosion on slope below swale	Verify positive drainage; repair eroded area, compact, & restabilize
	Water ponding in swale	Verify positive drainage, & regrade swale
	Sediment or debris in channel	Remove material accumulation
	Erosion within swale	Verify channel lining, repair erosion, restabilize & install lining as appropriate; check dams may be necessary

Control Measure	Problems	Possible Remedies
Grass Waterways	Bare areas	Reseed, add lime & fertilizer; install soil stabilization matting
	Channel capacity reduced	Remove sediment/debris accumulations; or mow high growth
Pipe Slope Drain	Blocked inlet or outlet	Remove sediment and debris
	Runoff is eroding slope along pipe	Construct a berm at the inflow point
	Runoff is bypassing inlet	Construct an interceptor berm to direct flow
	Erosion at the outlet	Increase size of riprap apron, use larger riprap; or convey runoff to a more stable outlet
Riprap Lined Waterways	Scour underneath riprap	Verify proper channel dimensions; regrade, install & key-in geotextile, & place riprap
	Scour along the side of the waterway	Verify proper channel dimensions; and reconstruct waterway
	Riprap dislodged	Replace with larger sized riprap

APPENDIX D – LEAST ENVIRONMENTALLY DAMAGING PRACTICABLE ALTERNATE (LEDPA) ANALYSIS

REVISED ALTERNATIVES ANALYSIS FRAMEWORK FOR PORTLAND GOLF CLUB IRRIGATION POND DREDGING PORTLAND, WASHINGTON COUNTY, OREGON

Prepared for

OREGON DEPARTMENT OF STATE LANDS
775 Summer Street N.E., Suite 100
Salem, Oregon 97301-1279
(DSL Application 63610-RF)

and

U.S. ARMY CORPS OF ENGINEERS
Portland District, Eugene Field Office
211 East 7th Avenue, Suite 105
Eugene, Oregon 97401-2763
(USACE Application NWP 2023-0024)

Prepared by

PORTLAND GOLF COURSE
5900 S.W. Scholls Ferry Road
Portland, Oregon 97225

April 2024 (Revised per DSL Comments)

Introduction

On behalf of Portland Golf Club, the following alternative analysis framework supplements Section 7 of PCG's Joint Permit Application (JPA), USACE Application NWP 2023-0024 and DSL Application 63610-RF. This report documents project criteria and alternatives analysis for the proposed Irrigation Pond ("Junor Lake") Sediment Removal-Disposal project located on PGC property in southwest Portland, Washington County, Oregon. Information herein addresses U.S. Army Corps of Engineers' (USACE's) permit program requirements under the National Environmental Policy Act (NEPA) and the Clean Water Act, Section 404(b)(1) guidelines. This analysis also addresses the Department of State Lands' (DSL's) alternatives analysis requirements under OAR 141-085-0550(5)(o). This document supersedes the previous alternatives analysis submitted with the JPA in November of 2023.

Background

Portland Golf Club (PGC, Applicant) is a premier golf course located in eastern Washington County, Oregon located at 5900 S.W. Scholls Ferry Road. PGC was established in 1914, when no roads existed to the property, and the golf course was accessed by the Oregon Electric railroad. PGC's golf course was designed by world-renowned golf course architect, Robert Trent Jones and is highly regarded throughout the golfing world for combining magnificent design with extreme speed. PGC is listed in the National Register of Historic Places by the National Park Service under the National Historic Preservation Act of 1966 to protect PGC as one of America's historic resources.

Over the years, PGC hosted seven Portland Opens, five Portland Classics, the 1969 Alcan Championship, and the 1982 U.S. Senior Open. PGC hosts thousands of golf plays each year as well as local, regional and national tournaments, such as the Western Amateur, Women's Western Open, Oregon Amateur, U.S. Senior Amateur, PGA Championship, Ryder Cup, PNGA Men, PNGA Women, U.S. Women's Amateur Championship, and Fred Meyer Challenge. Such events each bring 100 or more out-of-state amateur and professional golfers to each event who stay locally for lodging, food services, and entertainment.

The PGC property is 147 acres, which is very compact for a modern day golf course. Approximately 95 acres are irrigated and mowed turf, while the remainder of the property consists of a clubhouse, parking lots, maintenance facilities, recreational uses (pool and tennis courts), and natural spaces (such as creeks, forest, and shrub land). The property is a peaceful oasis only minutes from downtown Portland, with two creeks, Woods Creek and Fanno Creek, winding through the golf course, mature tree-lined fairways, manicured greens, wildlife, and floral configurations. PGC offers active open space within the urban environment of the Portland metro area. The PGC property also provides needed floodplain storage when Fanno Creek floods.

Donald Junor, born in Aberdeenshire Scotland in 1889, came to Portland Golf Club in 1920, and at that time he was the most experienced greens keeper (golf professional) on the Pacific Coast. In the 1920s, he dredged a reservoir on the golf course property using horses, which is named " Junor Lake" in his honor. Junor Lake stores water for irrigation, which water is essential to PGC's operations, but the lake is much more than an irrigation reservoir. Junor Lake is essential to PGC's operations (in-ground water reservoir), as well as a golfing hazard for 2 fairways, and open water feature that attracts waterfowl and small mammals that inhabit nearby forest and open spaces, contributing to the overall design, function, and enjoyment of the property.

Project Overview

Junor Lake is 1.77 acres, receives year-round flows from Woods Creek, and, in turn, seasonally overflows into Fanno Creek. Fanno Creek bisects the golf course, with half of the fairways to the north (front 9 holes) and other half to the south (mostly back 9 holes). Woods Creek bisects the southern portion of the property, flowing from the east boundary to the Junor Lake, then overflows to Fanno Creek via gate valves to the northwest and southwest. Fanno Creek flows several miles from the golf course to the southwest and is tributary to the Tualatin River.

Woods Creek watershed extends west and south (almost to Interstate 5 near Capitol Highway). The watershed continues to urbanize with in-fill lots being converted to residences, streets widened for sidewalks, and construction of higher density developments (duplexes, apartments, backyard cottages, etc.). The increased amount of stormwater from the watershed has incised Woods Creek several feet deep both above and within the golf course itself. The resultant sediment primarily originates from the creek banks and channel of Woods Creek, but secondarily comes from dirt washed off roads and dust from roofs and other impervious surfaces in the watershed. The creek banks are now nearly vertical, which is typical of flashy, urban runoff. High intensity rainfall events have very slowly widened and deepened the creek, both onsite and upgradient. Those eroded sediments are carried with flood flows to Junor Lake, and are mostly sequestered in that waterbody. The sediment consists primarily of silt, with lesser amounts of sand, clay, organic debris (leaves, twigs), and inert golf balls.

PGC minimizes erosion potential within the golf course by facilitating infiltration and having very little impervious cover. Additional measures to reduce onsite runoff include continued maintenance of forest and tree corridors that intercept rainfall and facilitate subsurface water movement. PGC also closes a gate valve to prevent sediment-laden water from being deposited in Junor Lake when Fanno Creek carries sediments from rain events. Thus, the loss water storage potential in Junor Lake is due to sediment imported by Woods Creek. Given the urbanizing nature of the Woods Creek watershed, sediment accumulation in Junor Lake is unavoidable.

In 1994, PGC received authorization from DSL and USACE to remove accumulated sediments from Junor Lake, but the attempt was not successful. In particular, the equipment was inadequately sized, and associated labor was only capable of removing a few hundred cubic yards of sediment. See attached photographs at the end of this narrative. The failure of the prior sediment removal only delayed the inevitable need to remove 5,300 cubic yards of sediment.[1] As the accumulated sediment increases in Junor Lake, it reduces water storage capacity, and increases sediment uptake by the golf course's irrigation pump, causing damage to PGC's irrigation system. The sediment accelerates pipe deterioration, lowers water pressure, and shortens pump life. After project completion, PGC plans to seek authorization to remove sediment from Junor Lake on a more regular basis and utilize the same location for sediment bag placement.

Creek restoration and greater sediment trapping from the Woods Creek watershed are beyond the scope of this project. However, PGC is encouraged by regulatory agencies, conservation groups, and neighbors to improve water quality and reduce sediment load in Woods Creek. PGC is supportive of mutually beneficial restoration projects that improve water quality in the Woods Creek watershed. PGC will engage in opportunities to work with Clean Water Services and other entities on such ventures outside of this current project.

Project Purpose and Geographic Area

The **basic purpose** of the proposed project is to maintain the continuing viability of the property as a world-renowned golf course. The **overall/specific purpose** of the project is to maintain Junor Lake by removing and disposing of approximately 5300 cubic yards of accumulated sediment from the reservoir, to provide irrigation water to the golf course while also maintaining the integrity and value of the property for its current purpose and function.

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[1] The sediment removed from Junor Lake will include an unknown amount of golf balls that will not be removed by the dredging process. As such, all references to placement of sediment in this alternatives analysis necessarily include the golf balls within the sediment. PGC will address disposal of golf balls with the Oregon Department of Environmental Quality at the appropriate time and based on the permits issued by USACE and DSL in this JPA process.

For the purposes of USACE review, the dredging activity constitutes a 'water dependent activity' because the removal of accumulated sediment occurs only within jurisdictional wetland and waters.

The **geographic area** of the project is the PGC property. The golf course was developed and has remained at its current location for over a century. The purpose of the project is to maintain the continuing viability of the PGC property as a world-renowned golf course, so other properties are not available to meet the purpose of the project. However, to ensure a reasonable range of alternatives are considered, off-site alternatives are included for portions of the overall project.

Project Criteria

The project requires removal of 5300 cubic yards of sediment from Junor Lake and appropriately disposing of the sediment. The sediment will be removed by dredging and then placed nearby in large sediment bags. The project alternatives are evaluated using six project criteria: 1) Site size, 2) Site availability; 3) Logistics; 4) Environmental impacts; 5) Cost; and 6) Other qualitative factors. Project criteria are further defined below:

1. Site Size

The site must provide minimum necessary water storage capacity or supply, and also allow for disposal of the removed sediment.

1a. Water Storage/Supply Size: Will the site provide an adequate supply of water to the golf course?

To meets Applicant's water use needs, project alternatives must have storage capacity of at least 4 acre-feet of water, based on PGC's state-issued water rights.

1b. Sediment Disposal Size: Will the site allow for disposal of the full volume of sediment removed?

Approximately 5300 cubic yards of sediment must be removed from Junor Lake. This sediment volume would fill approximately 90 sediment bags (roughly 60 cubic yards per bag, or 5 dump truck loads per bag equivalent).

2. Site Availability

2a. Water Storage/Supply Availability: Is the site one which can be reasonably obtained, utilized, expanded, converted, or modified to provide an adequate supply of water to the golf course?

PGC holds state-issued water rights to store surface water in Junor Lake from Woods Creek and Fanno Creek, and to use direct flows from Fanno Creek and groundwater. PGC's water rights may be capable of certain modifications, but no new/different water rights will be issued by the State for irrigation use on the property. Additionally, storage water rights cannot be changed to move the location of storage or points of diversion, as described in more detail below. Alternative sources of available water are explored in conjunction or alternatively to PGC's water rights.

2b. Sediment Disposal Availability: Is the site one which can be reasonably obtained, utilized, expanded, converted, or modified to allow for sediment disposal?

Available sediment storage locations must have topography suitable for capturing water seeping from the sediment bags, and returning it to Junor Lake. Capturing the seepage water is required to keep the dredge afloat and keep turbid water from entering Woods Creek and Fanno Creek. Some locations may necessitate excavation and grading to create berms to capture seepage water for reuse. The availability of offsite sediment disposal is also considered.

3. Logistics

3a. Water Use Infrastructure: Will the alternative allow connection and use with the existing water system?

Junor Lake is situated at the confluence of Woods Creek and Fanno Creek. PGC's entire water use system is designed and constructed to utilize Junor Lake as a "bulge in the system" to provide enough volume and pressure to run the sprinkler system. The size of Junor Lake (i.e. water storage volume) allows water flows to recharge the pond daily for nightly irrigation. A lake of smaller capacity will not adequately serve the pumping demand required to irrigate an 18-hole golf course each night during the dry season.

3.b. Construction Ingress/Egress: Will existing roads, bridges, and staging areas allow for the necessary construction?

The process of dredging Junor Lake and pumping sediment into geofabric bags for onsite storage or offsite disposal requires access by heavy construction equipment. Access to PGC is limited, and internal access is too narrow for and not constructed to withstand heavy equipment. Consequently, construction logistics are very limited.

3c. Infrastructure Damage Avoidance: Will the alternative avoid damage to existing infrastructure?

Portions of the PGC property contain infrastructure that can be easily damaged by heavy machinery. Irrigation infrastructure is located throughout the PGC property. Additionally, many of the fairways, tees, and green have subsurface drainage pipe and tiles to facilitate water percolation through the soil. The south edge of the property has storm and sanitary sewers under the Fanno Creek pedestrian and bike trail.

4. Environmental Impact

As explained above, Woods Creek and Fanno Creek dissect the PGC property. In addition, wetlands are located on the property that are listed in the US Fish & Wildlife Services' National Wetland Inventory, as well as in the Local Wetland Inventory. In particular, Wetland A is a 0.72-acre wetland near the south edge of the golf course property; while Wetland B is a partially forested wetland located north of Woods Creek and east of Junor Lake. Wetland C is a very narrow band of emergent wetland encircling Junor Lake. Wildlife utilize the creeks and wetlands and other portions of PGC's property.

4a. Stream Impacts (Quantitative): Will the alternative have impacts to streams?

To dredge Junor Lake, it is necessary to temporarily isolate it from Fanno and Woods Creeks. Less than 15 feet of Woods Creek will be temporarily disturbed for placement of a coffer dam where Woods Creek enters Junor Lake. The creek channel at this location is mostly unvegetated and has a soil substrate. The coffer dam will use plastic sheeting and sand bags to minimize impacts to the creek sidewalls and bottom. The temporary bypass pipe will be secured to 660 feet of the south edge of Junor Lake. After dredging, the coffer dam and pipe bypass will be removed leaving no damage to Woods Creek. No permanent damage will occur to Woods Creek or Junor Lake.

4b. Stream Functions (Qualitative): Will the alternative have impacts to water quality?

With only 15 feet of temporary channel disturbance, potential stream functions were assessed informally by a wetland scientist. The dredging activity will occur during summer months when rainfall is lowest and the potential need for flood desynchronization is minimal. Fish usage is limited to warm water-adapted species. The coffer dam and bypass pipe will temporarily remove Junor Lake as fish habitat; however, upstream segments of Woods Creek have sufficient waters for temporary habitat displacement. The proposed activity will not adversely impact water temperatures or water quality in Woods Creek. Post dredging conditions will have significantly greater sediment trapping and improved water quality functions.

4c. <u>Wetlands Impacts (Quantitative)</u>: Will the alternative have impacts to wetlands?

Wetland A: Offset from Fanno Creek and Woods Creek, Wetland A is situated at the southern edge of the golf course property. Wetland A is 0.72-acre and palustrine, emergent wetland, per Cowardin Classification System. The wetland water regime best matches HGM-Slope. It is the only wetland in the project area outside of the flood zones for Fanno and Woods Creeks. While sustained by limited urban runoff and precipitation, Wetland A becomes seasonally dry most years and only connected to Fanno Creek during the rainy season. Wetland A provides wildlife habitat for terrestrial mammals, amphibians and birds, but lacks surface water conditions for fish habitat. Wetland A will be impacted by placement of sediment bags in the wetland.

Wetland B: Situated on a low terrace immediately north of Woods Creek (less than one-half located within project area). Roughly 1 acre and palustrine forested and emergent, per Cowardin Classification System. It has an HGM-Slope water regime. This wetland has connectivity to Woods Creek and occasionally floods when upgradient segments of Woods Creek receive heavy rainfall, sometimes once or twice per year. No impact is proposed to Wetland B, since placement of sediment bags in Wetland B will increase stream flows and downgradient flooding (offsite to southwest), as well as reduce onsite sediment trapping.

Wetland C: Portions of Wetland C occur at the base of a retaining wall that encloses Junor Lake. It is anticipated the sediment dredging will replace such portions of Wetland C with open water. There are other portions of Wetland C that consist of mowed lawn near the retaining wall. All of the alternatives will avoid permanent impacts to terrestrial portions of Wetland C.

4d. <u>Wetlands Functions (Qualitative)</u>: Will the alternative have impacts to wetlands quality?

Wetland functions are assessed using Oregon Rapid Wetland Assessment Protocol (ORWAP). Such methodology generates a summary of findings, which is included in Appendix F of the JPA. Wetland functions potentially affected by the proposed dredging and sediment bag placement are limited to Wetlands A and C. Wetland A primarily provides terrestrial habitat, water quality, songbird, and amphibian habitat functions (breeding, nesting and feeding). It has incidental or indirect functions for water storage (desynchronization), sediment trapping, seasonal water for fisheries, carbon sequestration, and nutrient cycling. Wetland C functions are associated with the open water of Junor Lake, namely emergent habitat, water fowl feeding, amphibian nesting and feeding (invertebrates), fisheries support, nutrient cycling, and sediment trapping.

4e. <u>Wildlife Impacts (Quantitative)</u>: Will the alternative have impacts to wildlife?

The proposed dredging activity and sediment bag placement will not impact habitat for any rare, threatened, or endangered species. Anticipated impacts to wildlife are displacement of wetland-dependent species, such as amphibians, songbirds, small mammals, and invertebrates. Loss of such habitat will displace wildlife to the east and/or west where Fanno Creek and Woods Creeks provide similar habitats. In general, impacts to wildlife are proportional to the degree of land disturbance and loss of cover or vertical structure.

4f. <u>Wildlife Functions (Qualitative)</u>: Will the alternative have impacts to wildlife quality/diversity?

Urban wildlife functions are evaluated within the context that potential habitat is already highly fractured and affected by stressors like artificial lighting, vehicle/equipment noises, and human intrusion. Urban wildlife functions are often diminished, when compared to rural and large tracts of forest, range and open space. Typical functions include breeding, nesting and feeding opportunities within brush thickets, forests, and scattered clearings. Wetland-dependent wildlife functions typically incorporate near-surface wetness favorable to amphibians and certain invertebrates.

4g. Forest Upland Impacts (Quantitative): Will the alternative have impacts to forest uplands?

Upland forests and forested corridors occur throughout the PGC property, and extend offsite along Woods Creek and Fanno Creek. The alternatives proposed to avoid potential impacts to forest lands, since such areas require 50 to 100 years to mature. Additionally, loss of forest lands within an urban area increases summer temperatures, reduces wildlife habitat, decreases water quality, and interrupts migration corridors.

4h. Forest Upland Functions (Qualitative): Will the alternative have impacts to forest uplands quality?

Forested habitats have many terrestrial functions for urban wildlife, namely breeding, nesting, feeding, and migration. These habitats provide vertical habitat for small mammals and birds sensitive to ground predation. Forested areas also provide shelter from rain/snow with dense foliage, nesting cavities, natural platforms atop branches, and snags for perching. Forest area provide refugia for small mammals and song birds that reside offsite, but occasional travel through such corridors. Additionally, nearby residents greatly desire tall trees for visual purposes, windbreaks, air quality and temperature regulation. Humans also have a great affinity for urban wildlife, wildlife sounds, and diversity of other species utilizing forested habitats.

5. Cost

A comparative analysis of the cost of different alternatives. If the cost of an alternative is clearly exorbitant compared to similar actions and the proposed alternative, the alternative is eliminated as not practicable.

Projects costs include, but are not limited to, dredging, excavation and grading (land contouring), sediment bag placement or alternative transportation and disposal, and labor. Some alternative scenarios include the costs of bridge replacement, temporary road construction, alternative reservoir construction, fairway rehabilitation, trucking, and more. The cost of compensatory mitigation is not factored into any of the alternative scenarios. Also, the costs do not include profits or other financial gains to the golf course from the project, but do take into consideration the damages to the golf course caused by project interference and/or permanent impairments.

5a. Dredging, Excavation, or Reservoir Costs:

The floating dredge and pumping system expenses include mobilization, set-up, operations for 6 to 8 weeks, demobilization, and ground rehabilitation.

5b. Sediment Bag Placement Cost:

This category includes expenses for sediment bag manufacturing, staging area preparation, grading, operations for 6 to 8 weeks, soil cover placement, and staging area rehabilitation.

5c. Infrastructure Costs:

Several alternatives require supplemental work for construction access, such as bridge replacement, temporary road construction, fairway rehabilitation, and protection of subsurface utilities.

5d. Implementation Costs:

Each alternative results in disruption of golf course operations and player utilization of golf course fairways. The dredging approach with sediment bag placement at Wetland A minimizes such disruption with temporary closures for pipe installation, setup and decommissioning. Several alternatives require closure of entire fairways for construction of access roads, and/or sediment bag placement. And a few alternatives would reduce length of fairways and/or result in extensive damage to fairways that must rebuild the underlying drainage network and new turf. The cost of these rehabilitation efforts is an unavoidable project expense. Not included in this cost are temporary loss of revenue, loss of membership and loss of tournament income, which are difficult to assess for this alternatives analysis, and are therefore considered without precise dollar figures.

6. Other Qualitative Factors

Other qualitative factors are necessary to evaluate the relative suitability and practicability of alternatives to fulfill the basic and overall/specific purposes of the project. These factors are assessed on a yes/no basis as related to essential elements of the golf course. Alternatives that do not satisfy these factors will damage the golf course property and therefore cannot fulfill the basic and overall/specific purposes for the project. Moreover, if PGC cannot maintain a world-class golf course, event sponsors will no longer hold golf tournaments at PGC. Attached in support of these criteria and the associated analyses are letters from golf course architect, Dan Hixson, and golf course advisor, Henry DeLozier.

6a. Complete Golf Course: Will the alternative maintain the use of all 18 holes of the golf course, as well as practice greens and the driving range?

6b. Design Integrity: Will the alternative maintain the design integrity of the golf course, including the tees, greens, roughs, and golfing hazards?

6c. Drainage: Will the alternative maintain optimal soil and drainage conditions to support golf course irrigation and landscaping?

6d. Accessory Work Areas: Will the alternative maintain accessory work areas that are essential to golf course functions, such as a yard debris area and turf farm?

Sediment Excavation versus Sediment Dredging

The proposed dredging and sediment bag placement project is complex. Removing sediment from Junor Lake has only two approaches – excavation or dredging. To excavate, the pond must be drained, haul roads constructed, sediment lifted out with excavators and bulldozers, and reconstruction of damaged fairways, retaining walls, and associated landscaping. The excavated sediment ~~would~~ will also amount to 5200 cubic yard (similar amount as dredging). Such approach involves a lot of machinery, equipment operators, truckers and inspectors. Unlike most excavation projects, removal of the sediment will be messy, destructive, and risky due to potential opportunities for spillage, equipment failures and unintentional accidents. The excavated sediment must be hauled to a location where containment cells ~~could~~ can be constructed. Given the excavated sediment contains about 50 percent water, the containment cell area ~~would~~ will utilize the entirety of Wetland A, plus more working space for topsoil storage, truck haul roads, and excavator maneuvering. The remaining portion of the golf course lacks sufficient space for containment cell construction and associated haul roads.

In contrast, the dredging approach is rather surgical, with only the dredge cutting head and discharge pipeline having contact with the removed sediment. The equipment needed is limited to a floating dredge, pump and generators, temporary pipeline laid on the surface, and a pilot aided by several assistants. To keep the dredge floating, water will captured at the sediment placement site and pumped back to Junor Lake (hence a closed loop). There would be no water discharge to Fanno or Woods Creeks. The dredging approach is clearly the Least Environmentally Damaging Practicable Alternative for the removal of the accumulated sediment in Junor Lake.

Onsite Sediment Containment versus Onsite Sediment Bag Placement

Placement or hauling of the dredged sediment also has limited approaches, namely onsite containment cells, onsite sediment bags, and offsite disposal. All approaches involve removal (salvage) of topsoil, excavation of subsoil to desired grades, final contouring, and eventual return placement of the salvaged topsoil. Construction of sediment containment cells requires extensive work to create basins capable of holding a slurry of sand, silt, clay, and water. Such basins must be of sufficient size to hold the materials (about 5300 cubic yards) – either hauled in by truck, or pumped from dredge. Such construction is involves excavators, bulldozers, soil compactors, culverts, rock spillways, and road construction directly to each containment cell.

In contrast, construction for sediment bag placement utilizes less space (hence less grading) to build a sloping surface and small downgradient berm to capture and recycle drainage water. Such construction requires fewer excavators and bulldozers, as well as less durable road construction (for pickups, rather than 12CY dump trucks). The sediment bag placement approach also requires less water storage capacity, since the drainage water is continuously cycled back to Junor Lake to maintain water levels for the floating dredge (whereas the containment cell approach must hold more water and has a larger construction footprint). Thus, the sediment bag placement approach has less overall impacts and it is the Least Environmentally Damaging Practicable Alternative.

Equipment/Truck Access From North of Fanno Creek versus Access From South of Fanno Creek.

Several alternative explored by the project team highlight a significant issue for either transporting sediment by truck or use of heavy equipment. Access from the north side of Fanno Creek is via S.W. Scholls Ferry Road and an interior road designed for pickups and maintenance carts. To access Junor Lake, it is necessary to use a weight restricted bridge, since it is old. While pickup trucks can utilize the bridge, it is not sufficiently strong to bear the weight of loaded dump trucks or equipment like excavators, or bulldozers. A replacement bridge is needed for such use, which has an estimated cost of $800,000 for engineering and construction. It is cost-prohibitive to replace the bridge for this project, as well as logistically difficult to bring in cranes, flatbed trailers and concrete mixing trucks to place the bridge decking.

In contrast, truck and heavy equipment access to the southernmost portion of the property (where sediment placement is proposed) is possible with safety and structural precautions. Specifically, it is necessary to add steel plating atop the Fanno Creek trail (paved path) to prevent damage to underlying sewer lines. The preferred alternative would have minimal crossings by heavy equipment and loaded dump trucks. Several other alternatives that would haul away the sediment would require further reinforcement to protect the underground utilities. That is, there is a significant risk of damage to the sewer lines when up to 600 roundtrips of dump trucks must cross the Fanno Creek trail. Regardless, the alternatives which haul away the sediment will have dump truck fuel usage of 2500 and 3000 gallons, as well as street sweeping needs. The truck hauling alternatives require additional handling (movement) of the sediment, tipping fees and associated labor adds a minimum of 520,000 to the project cost. Aside from the logistical challenges, hauling away the sediment can only be done during the dry season when construction costs are highest and pedestrian use of Fanno Creek is greatest.

Project Alternatives and Criteria Evaluation

No-Action Alternative

The no-action alternative will result in Junor Lake filling with silts and clays, and eventually becoming a vegetated marsh. The irrigation uptake structure will become unusable due to clogging and the pumping system running dry, causing PGC to be unable to use water from the lake. PGC's state-issue water storage right will be forfeited and potentially cancelled, and PGC will not be able to utilize its other water rights without several acre-feet of water storage to irrigate the golf course with high volume pumps. Without irrigation, turf and landscaping at the golf course will die and the golf course will become unusable. Specifically, the turf will seasonally become dormant, weeds will invade lawn areas, turf quality will become hard and undesirable, and golfing use will plummet to unsustainable levels. PGC will not be able to host events. The no-action alternative is unviable and will ultimately destabilize the golf course and force its closure. The no-action alternative cannot meet the project purpose.

No-Action Alternative			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	N	Sediment will replace water storage in Junor Lake.
	1b. Sediment Disposal Size	N/A	Not applicable.
Site Availability	2a. Water Storage/Supply Availability	N	Loss of water storage will result in forfeiture of water rights
	2b. Sediment Disposal Availability	N/A	Not applicable.
Logistics	3a. Water Use Infrastructure	N	Sediment accumulation in Junor Lake will clog irrigation system intake and irrigation will cease.
	3b. Construction Ingress/Egress	N/A	Not applicable.
	3c. Infrastructure Damage Avoidance	N	Ongoing sediment accumulation will block water control gates for Junor Lake and irrigation system intake will become non-functional. Loss of water storage may also increase erosion around downstream bridge abutments. Some underground utilities (downgradient) may become seasonally unserviceable.
Environmental Impact	4a. Stream Impacts	N	As Junor Lake fills with sediment, Woods Creek will also accumulate sediment, resulting in offsite backflooding and increase onsite flooding frequency.
	4b. Stream Functions	Y	Loss of in-stream flood storage will destabilize creek banks and collapse sidewalls. Increased sediment in creek channel reduces fish and invertebrate habitat.
	4c. Wetland Impacts	N	Wetland C (Junor Lake fringe) will expand, while open water is eventually displaced by accumulated sediments.
	4d. Wetland Functions	Y	As sediment fills Junor Lake, Wetland C will have reduced flood storage capacity of pond, and convert open water to palustrine, emergent wetland. Reduced waterfowl use.
	4e. Wildlife Impacts	N	Reduced waterfowl use due to loss of open water. Incidental increased opportunity for songbird and migratory birds.
	4f. Wildlife Functions	N	While decreased use for waterfowl, there is a minor increase for song bird nesting and feeding, and slight improved habitat for amphibians (due to less open water).
	4g. Forest Upland Impacts	N	No impact to upland forests.
	4h. Forest Upland Functions	N	No impact to upland forests.
Cost	5a. Dredging or Excavation and Reservoir Cost	N/A	Not applicable.
	5b. Sediment Bag Placement Cost	N/A	Not applicable.
	5c. Infrastructure Cost	N	An unknown range of modifications will be attempted to keep the golf course running as long as possible, but will eventually become ineffective
	5d. Implementation Cost	N	Approximately $25 million loss when golf course closes

Other Qualitative Factors	6a. Complete Golf Course	N	Lack of irrigation will cause necessary elements of the golf course to be unusable
	6b. Design Integrity	N	A golf course without irrigation cannot perform landscaping upkeep to maintain landscape design elements
	6c. Drainage	N	The golf course will not be capable of continued irrigation
	6d. Accessory Work Areas	N	The golf course will not be able to maintain its turf farm or perform dust management in work areas

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Sediment Excavation Alternative

PGC previously submitted (and later withdrew) a wetland fill application for the same sediment removal project, using excavation instead of dredging as proposed in the current application. To remove the accumulated sediment by excavation, Junor Lake will be dewatered by draining water via control gates, then pumping remaining water with submersible pumps. The sediment will be removed using one or more excavators (aka trackhoes), and a bulldozer. Excavators with smooth-bucket shovels will transfer the gel-like sediment into dump trucks with special liner beds. The trucks will haul the sediment to Wetland A for placement in constructed containment cells. Such cells need to be located where water and sediments can be sequestered, such as the low topographic setting of Wetland A. It will be necessary to construct a haul road for the dump trucks to cross three fairways. Topsoil at Wetland A will be excavated with a trackhoe and/or bulldozer (it is seasonally dry in summer months), then such equipment will sculpt the sloping swale into three containment cells. The containment features will be built with soil excavated from adjacent upland using a trackhoe and/or bulldozer. This approach will create similar rock and geofabric check dams in the narrow outlet for Wetland A. Dump trucks will progressively fill the containment cells with excavated sediment. Throughout this excavation process, dump trucks, service trucks and limited heavy equipment will utilize internal golf course roads and bridges, and residential street(s) for ingress/egress. When excavation is complete, the containment cells will be seeded with native grasses and forbs, then allowed to naturally drain off excess water.

This alternative is rejected due to greater damage to forested upland habitat, significantly greater interruption to golf course usage, and higher project costs. Specifically, this alternative is more costly because it requires 4 to 8 dump trucks to be retrofitted with sealed beds to prevent water and sediment leakage when travelling to the sediment placement area. It also involves construction of a haul road between Junor Lake and the sediment placement area. Another cost is the repair of subsurface drainage pipes and irrigation lines that will be unavoidably damaged by truck traffic. The repair to fairway and subsurface infrastructure will cost approximately $200,000 in addition to the cost of excavation, hauling, and containment cell construction. Another factor that makes this alternative less viable is the removal of approximately 40 trees for the haul road and a larger staging area next to the sediment placement area. Since this alternative will cause significant interruption to 6 fairways, 1 tee box, and 1 putting green, it reduces the number of active players by 10 to 15 percent. In turn, this alternative decreases daily revenue by a similar amount for 2 months of excavation and hauling, and 9 months for fairway restoration and subsurface replacement. While the revenue loss is a contributing factor in rejecting this excavation alternative, more importantly, it has the same impact to Wetland A, higher construction costs, and substantially greater upland habitat loss.

Sediment Excavation Alternative			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Removes accumulated sediment from Junor Lake.
	1b. Sediment Disposal Size	Y	About 3.5 acres including Wetland A and surrounding land for staging, containment cell grading, and temporary topsoil storage
Site Availability	2a. Water Storage/Supply Availability	Y	Excavation will restore water capacity of Junor Lake.
	2b. Sediment Disposal Availability	Y	Vicinity of Wetland A has an appropriate topographic setting for containment cell and adjacent upland for infiltration of drainage water (from containment cells)
Logistics	3a. Water Use Infrastructure	Y	Will maintain the viability of PGC's irrigation system
	3b. Construction Ingress/Egress	N	Containment cell construction is accessible via SW 82nd Ave across Fanno Creek trail; excavation equipment access requires temporary haul road across Fairways 13, 14 and 15. Bridge weight constraints prohibit access via SW 86th Ave. (near maintenance buildings).
	3c. Infrastructure Damage Avoidance	N	Damage will occur to subsurface irrigation and drainage systems and to Fairways 13, 14 and 15; steel plating is necessary to protect underground sewer lines and utilities below Fanno Creek trail
Environmental Impact	4a. Stream Impacts	Y	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during excavation
	4b. Stream Functions	Y	Temporary loss of fish, invertebrate and amphibian habitat during excavation phase, but improved habitats after project completion (when temporary controls removed).
	4c. Wetland Impacts	Y	Containment cell grading and sediment placement will impact entirety of Wetland A; emergent fringe of Junor Lake will be reduced by excavation of sediment. Temporary impact to terrestrial Wetland C during excavation phase, but restored after project completion; Wetland B is avoided
	4d. Wetland Functions	Y	Loss of water storage, terrestrial and amphibian habitat, songbird nesting and feeding, and carbon sequestration within Wetland A.
	4e. Wildlife Impacts	Y	Most birds and small mammals will be displaced by excavation and sediment placement activity (due to ground disturbance, construction noise and equipment movement)
	4f. Wildlife Functions	Y	Typical nesting, breeding and feeding habitat loss during excavation and sediment placement phase. Except for tree-dependent wildlife, most wildlife functions restored over subsequent decade after project is completed.
	4g. Forest Upland Impacts	Y	Temporary access road and containment cell grading will impact 40% of forested upland adjacent to Wetland A
	4h. Forest Upland Functions	Y	Removal of 40 trees from upland forest near Wetland A will reduce habitat for song birds, predatory birds, small mammals, and increase fragmentation of forest corridor along former electric railroad alignment.
Cost	5a. Dredging or Excavation and Reservoir Cost	Y	Approx. $450,000 for excavation, temporary road construction/ removal, and onsite trucking of excavated sediment
	5b. Sediment Bag Placement Cost	Y	Approx. $250,000 for staging, grading of containment cells, and post-construction revegetation (larger disturbance area)
	5c. Infrastructure Cost	N	Approx. $50,000 for temporary access via S.W. 82nd Avenue, including steel plate covers for sewer lines/utilities (increased truck traffic); approx. $200,000 cost to remove temporary road and replace damaged irrigation and drainage systems in Fairways 13, 14 and 15
	5d. Implementation Cost	N	About 30 days disruption to golf course for mobilization, set-up, temporary road removal; about 9 months rehabilitation for

			damage to Fairways 13, 14 and 15; daily disruption to golf course for 3 hours each day for truck transport across fairways
Other Qualitative Factors	6a. Complete Golf Course	N	Multiple fairways will be disrupted for an extended period of time
	6b. Design Integrity	Y	When all work is completed, the golf course will maintain its essential elements
	6c. Drainage	Y	When all work is completed, PGC will be able to maintain its irrigated landscaping
	6d. Accessory Work Areas	Y	No impact to accessory work areas

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Periodic (Reduced) Dredging and Sediment Disposal Alternative

Agency personnel inquired about dredging less sediment material, and thus disposing of a correspondingly lower volume of sediment. PGC's project need requires dredging 5,300 cubic yards of sediment from Junor Lake to maintain its state-issued water rights and avoid damage to its irrigation system. This alternative is downsized version of the Preferred Alternative; consequently, dredging and sediment bag placement costs are less in the short-run, but fixed expenses for equipment mobilization, dredge piping and pumps, Fanno Creek trail infrastructure protection, sediment check-dams and other temporary structures, and ground restoration remain unchanged. In particular, a downscaled dredging will need to remove at least 3000 cubic yards (about 40% reduction) to provide the minimum of water necessary for average irrigation demand. The reduced capacity of the pond will require PGC to increasingly supplement pond water with well water during heat waves and summers with drier than average conditions. Such approach will likely require dredging every 7 to 8 years to avoid having the accumulated sediment sucked into the irrigation system as is currently occurring. Sediment passing through pumps, pipes and sprinkler heads accelerates normal wear and tear, plus results in clogged lateral lines and sprinkler heads. Thus, future dredging events will need to remove approximate 1500 cubic yards of additional accumulated sediment per dredge event. Sediment bag placement will have the same need for an area that slopes toward a berm to capture drainage water to return to the pond (as needed for a floating dredge system). Sediment bag placement at locations other than Wetland A will require extensive grading, temporary storage and removal as described in the alternatives considering sediment bag placement between fairways, at the yard debris area, at the turf farm, at the driving range and in the upland forest. Since this approach does not restore water storage capacity to Junor Lake, this downsized alternative does not satisfy the project purpose. Instead, this alternative defers the same wetland impacts to a future time (presumably 10 years later) when sediment accumulation in the irrigation requires removal. That is, future dredging will eventually impact Wetland A to the same degree as the preferred alternative. Future dredging conducted on a more frequent basis done on a smaller scale is not practicable and it is more costly due to repeatedly incurring fixed expenses with each future dredging.

Periodic (Reduced) Dredging & Sediment Disposal Alternative			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	N	Sediment will replace some water storage in lake
	1b. Sediment Disposal Size	N	Less sediment will be removed
Site Availability	2a. Water Storage/Supply Availability	N	Failure to restore Junor Lake storage capacity will result in partial forfeiture of water rights
	2b. Sediment Disposal Availability	Y	Less sediment will be removed
Logistics	3a. Water Use Infrastructure	N	Lake infill will damage the irrigation system
	3b. Construction Ingress/Egress	Y	Dredge equipment access via existing maintenance road connecting S.W. Scholls Ferry Road and interior bridge over Fanno Creek; dredge mobilization on tilt-trailer towed by pickup; sediment bag placement construction access to S.W. 82nd Avenue (crossing Fanno Creek trail)
	3c. Infrastructure Damage Avoidance	Y	Dredge slurry pipes placed atop turf avoids damage to subsurface irrigation and drainage systems in Fairways 13, 14 and 15; steel plating necessary to protect underground sewer lines and utilities below Fanno Creek trail
Environmental Impact	4a. Stream Impacts	N	Only temporary impacts to creek bed and sidewalls for coffer dam and bypass pipe. Full restoration upon removal. Similar temporary impacts repeated for future dredging.
	4b. Stream Functions	N	No permanent loss to stream function, but long-term gain in water quality, temperature regulation, and sediment trapping. Stream functions will have similar improvements as the preferred alternative.
	4c. Wetland Impacts	Y	Sediment bag placement will impact a portion of Wetland A
	4d. Wetland Functions	Y	Emergent fringe of Junor Lake partially replaced with open water, adjacent terrestrial wetland (lawn) avoided
	4e. Wildlife Impacts	Y	Partial filling of Wetland A will displace breeding, nesting and feeding habitat for wetland-dependent songbirds, small mammals, and amphibians. Temporary displacement of invertebrate habitat within pond fringe (Wetland C).
	4f. Wildlife Functions	Y	Loss of wildlife functions is limited to land disturbance, which is smaller than preferred approach. Future dredging will also have temporary, incidental wildlife function disturbances.
	4g. Forest Upland Impacts	N	No impact to upland forests
	4h. Forest Upland Functions	N	No impact to upland forests
Cost	5a. Dredging or Excavation and Reservoir Cost	N:	Partial dredging of sediments will cost approx. $300,000, which includes mobilization, operations, and removal. This cost repeated twice more in subsequent 30 years.
	5b. Sediment Bag Placement Cost	Y	Approx. $100,000 for manufacturing, ground preparation and post-construction revegetation. This cost repeated twice more in subsequent 30 years.
	5c. Infrastructure Cost	Y	Approx. $50,000 for temporary access via S.W. 82nd Avenue, including steel plate covers for sewer lines/utilities. This cost repeated twice more in subsequent 30 years.
	5d. Implementation Cost	Y	About 10 days disruption to golf course for mobilization, set-up, post-dredging turf restoration; golf course disruption limited to Fairways 7, 11, 13, 14 and 15 for 1 hour durations
Other Qualitative Factors	6a. Complete Golf Course	Y	Temporary disruption to essential elements of the golf course
	6b. Design Integrity	N	Junor Lake will have insufficient long-term maintenance and water storage
	6c. Drainage	N	The golf course irrigation system will be damaged and PGC will not be able to adequately irrigate the grounds
	6d. Accessory Work Areas	N	With less water, the golf course will not be able to maintain its turf farm or perform dust management in work areas

New Site for Golf Course Alternative

Applicant began its alternatives analysis evaluation in January of 2020 by considering approaches to remove accumulated sediment in Junor Lake and potential options for sediment placement or offsite transport. Unlike construction of a new residential subdivision, commercial center, or industrial facility, the golf course cannot be relocated to a different property. It is surrounded by residential subdivisions and schools in all directions, so it is land-locked. The nearest vacant ground of sufficient size and suitability is more than six miles to the southwest and situated outside the Urban Growth Boundary. Such location does not serve the golf course membership, who live locally, and a replacement location would double or triple their commute to the golf course. PGC's water rights permit use of local water sources that cannot be piped or transferred to a distant new site. Additionally, the cost of constructing a new golf course would far exceed any other alternative discussed herein. As such, an alternate golf course location is not viable or practicable under any circumstance and will not satisfy the project purpose.

Replacement Golf Course Alternative			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	New water source will be sized for irrigation needs
	1b. Sediment Disposal Size	N/A	No sediment disposal.
Site Availability	2a. Water Storage/Supply Availability	N	New water rights must be secured go irrigate new golf course
	2b. Sediment Disposal Availability	N/A	Not applicable.
Logistics	3a. Water Use Infrastructure	Y	New construction will utilize water control structures
	3b. Construction Ingress/Egress	Y	New construction will have street access..
	3c. Infrastructure Damage Avoidance	Y	New construction will avoid damage to existing infrastructure
Environmental Impact	4a. Stream Impacts	--	To be determined upon new site selection
	4b. Stream Functions	--	To be determined upon new site selection
	4c. Wetland Impacts	--	To be determined upon new site selection
	4d. Wetland Functions	--	To be determined upon new site selection
	4e. Wildlife Impacts	--	To be determined upon new site selection
	4f. Wildlife Functions	--	To be determined upon new site selection
	4g. Forest Upland Impacts	--	To be determined upon new site selection
	4h. Forest Upland Functions	--	To be determined upon new site selection
Cost	5a. Dredge or Excavation and Reservoir Cost	N/A	No pond dredging.
	5b. Sediment Bag Placement Cost	N/A	No sediment bag placement.
	5c. Infrastructure Cost	N	Approx. $10 million for new infrastructure, including water supply, wastewater treatment, gas-electric-cable installation, as well as development fees for planning, fire protection, etc.
	5d. Implementation Cost	N	Approx. $30 million for excavation, grading, roads, irrigation and drainage systems, buildings, maintenance facilities, landscaping and other recreational features; cost of land is undetermined, but sale of the current property may provide funds for new property acquisition
Other Qualitative Factors	6a. Complete Golf Course	--	To be determined upon new site selection
	6b. Design Integrity	--	To be determined upon new site selection
	6c. Drainage	--	To be determined upon new site selection
	6d. Accessory Work Areas	--	To be determined upon new site selection

Replacement Irrigation Pond Alternative

This alternative proposes constructing a new irrigation pond in the vicinity of Junor Lake, such as directly to the south or east. Pond construction will close 3 fairways for 12 to 18 months for preparation, excavation, and fairway reconstruction/realignment. Potential locations north and west of Junor Lake are too congested for a 1.5- to 2-acre pond, since such areas have insufficient space to reconfigure existing tee boxes, fairways, bunkers and greens. Excavated spoils will be transported by dump truck to uplands flanking Wetland A; however, access to such area will have an unavoidable impact to Wetland A (about 0.3-acre). Potential areas to the east are limited by topography existing waterways (Fanno Creek and Woods Creek). Specifically, positioning a new irrigation pond immediately to the east would more than double the distance that golfer must hit golf balls over a water hazard, which would destroy the golf course design and make the course not playable.

Constructing a new irrigation pond to the south will add water hazards to fairways no. 13 and 14 (both par 4). Such hazards will substantially increase play difficulty, resulting in par 5 fairways. Considering the need to balance play difficulty with inherent variety of play conditions, additional water hazards are undesirable challenges for the majority of golfers that encounter water hazards on fairways no. 7 and 11. Again, this would damage the property for use as a golf course.

The area south of the existing Junor Lake will have an additional problem – no connection to Fanno Creek and Woods Creek. Both creeks are 4 to 6 feet topographically lower than fairways no. 13 and 14, which makes it impractical to divert water into a new irrigation pond. It will also be impossible to obtain local, state and federal approvals to reroute Fanno and Woods Creeks to connect to a new irrigation pond. Unless constructed with a flexible liner (rubber), natural siltation and capture of eroded sediments from the side banks of the replacement pond will require the replacement pond to be periodically dredged or excavated similar to Junor Lake.

Ultimately, these alternative irrigation pond locations will require permanent changes to several fairways that will damage the use of the PGC property as a golf course. Furthermore, PGC hosts several golf tournaments each year, and occasionally hosts national and international golf tournaments. Such tournaments are valuable to retaining memberships and make a significant economic benefit to the local community in terms of lodging, food service, tourism, car rentals, and recreation. Hosting such tournaments requires the course to meet national guidelines for course length and fairway configuration. The alternate pond locations have such significant impacts that PGC will no longer be eligible for national and international tournaments, and likely fewer local tournaments. This alternative is not viable and actually detrimental to the PGC membership and long-term sustainability of the property. New pond construction will temporarily close three fairways for 1 year and drastically reduce revenue (green fees and pro shop sales that cover day-to-day expenses) and decreases new memberships.

Finally, there is significant legal risk in attempting to relocate the points of diversion for any new irrigation pond. The Oregon Water Resources Department determined it cannot approve applications to change (transfer) places of use or points of diversion for storage water rights. The Oregon Legislature has since amended ORS 540.510(1)(b) to allow changes to the character of use for stored water (for example, changing the use from irrigation to aesthetic), but changes to points of diversion and places of use for stored water are still not allowed. Absent another change in the law, PGC would have to use water illegally on its property to change the location of the stored water and points of diversion, resulting in potential cancellation of PGC's water rights. See attached memo from the Oregon Department of Justice regarding the Department's lack of authority to transfer storage water rights.

Replacement Irrigation Pond Alternative			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	A new pond of similar size is capable of being constructed
	1b. Sediment Disposal Size	N/A	No sediment will be removed from Junor Lake
Site Availability	2a. Water Storage/Supply Availability	N	A new pond can be constructed to hold a sufficient quantity of water, however, the water rights for the pond cannot be modified to allow storage in a new pond
	2b. Sediment Disposal Availability	N/A	No sediment will be removed from Junor Lake
Logistics	3a. Water Use Infrastructure	N	Woods Creek and Fanno Creek will not be connected to the new pond and cannot be rerouted to the new pond location
	3b. Construction Ingress/Egress	N	New irrigation pond access from S.W. 82nd Avenue (crossing Fanno Creek trail); temporary road construction across Fairways 13, 14 and 15, as well as through part of upland forest east of Wetland A
	3c. Infrastructure Damage Avoidance	N	Irrigation pipelines installed through Fairways 7, 8, 11 and 13; thus significant damage to subsurface irrigation and drainage systems; steel plating necessary to protect underground sewer lines and utilities below Fanno Creek trail
Environmental Impact	4a. Stream Impacts	N	No permanent impact to Fanno or Woods Creeks, but temporary disturbance to both creeks for conveyance pipes between new irrigation pond and pumping station
	4b. Stream Functions	Y	Lack of water storage in Junor Lake will likely cause back-flooding in Woods Creek during heavy rain events
	4c. Wetland Impacts	Y	Grading impact to approx. 30-40% of Wetland A; higher functioning Wetland B is avoided; emergent fringe of Junor Lake would expand to entire lake as sediment accumulates (Wetland C)
	4d. Wetland Functions	Y	Water quality, nutrient cycling, and sediment trapping functions removed.
	4e. Wildlife Impacts	Y	Songbird, small mammals and amphibian habitats associated with portion of Wetland A removed.
	4f. Wildlife Functions	Y	Habitats for breeding, nesting and feeding will be further fragmented that reduces usage for migration-oriented wildlife. Songbird and small mammals habitat degraded by reduced forest area.
	4g. Forest Upland Impacts	Y	Construction and disposal of new irrigation pond spoils will impact 30% of forested upland adjacent to Wetland A
	4h. Forest Upland Functions	Y	Forest uplands will be further fragmented that reduces usage for migration-oriented wildlife. Songbird and small mammals habitat degraded by reduced forest area.
Cost	5a. Dredge or Excavation and Reservoir Cost	N	Approx. $1.2 million for excavation, temporary road to south part of property, trucking spoils to upland flanking Wetland A, and an additional $100,000 for re-vegetation of disturbed ground
	5b. Sediment Bag Placement Cost	N/A	No sediment removed from Junor Lake
	5c. Infrastructure Cost	Y	Approx. $50,000 for temporary access via S.W. 82nd Avenue, including steel plate covers for sewer lines/utilities (increased truck traffic), plus, $75,000 cost to remove temporary road and replace damaged irrigation and drainage systems in Fairways 13, 14 and 15
	5d. Implementation Cost	N	About 20 days disruption to golf course for mobilization, set-up, and construction; disruption to golf course for 60 days for new irrigation pond excavation and pipe installation across 5 fairways; 12 months rehabilitation for damage to Fairways 7, 8, 11, 13, 14 and 15; reduced length of Fairway 13 diminishes golf play and reduces opportunities for tournaments

Other Qualitative Factors	6a. Complete Golf Course	N	Reduced length of Fairway 13 removes an essential element of the golf course
	6b. Design Integrity	N	Reduced length of Fairway 13 damages the golf course design and precludes ability to hold golf tournaments
	6c. Drainage	N	Water rights cannot be modified to allow use from new irrigation pond
	6d. Accessory Work Areas	Y	No impact to accessory work areas

Metal or Concrete Reservoir Alternative

This alternative is similar to the preceding alternative insofar as requiring adequate space and access to Woods Creek. The needed water capacity for a standing reservoir storage will be one 10-foot tall tank with 150-foot diameter or two 10-foot tall tanks with 80-foot diameters. Such reservoir(s) will need to be constructed of steel or concrete. The only vacant area within the PGC property having suitable size and location is the same area proposed for the proposed sediment bag placement (Wetland A and adjacent upland to west). Otherwise, the placement on PGC's property will damage the golf course design and make golf play impossible. The planning and construction will take 18 to 24 months and is estimated cost of $4 million. Using retaining walls, the reservoir(s) will impact 50 to 60% of Wetland A. It will also require temporary closure of the Fanno Creek bike and pedestrian trail, since construction access through the golf course is not practical without replacing a bridge ($800,000) and suspending play on 6 fairways for 18 months. Additional environmental impacts will include removal of dozens of large trees, daily construction traffic through narrow residential neighborhoods, and extensive restoration of disturbed upland and riparian habitat. This alternative will entail the largest amount of construction on the PGC property and greatest degree of disruption to neighbors and visitors, in addition to being more than double the cost of the preferred alternative. Finally, changing the location of stored water under existing storage water rights is not currently authorized under State law.

Metal or Concrete Reservoir Alternative			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Utilizes 2.5 acres of upland and 0.5-acre wetland for 1 to 2 reservoirs, including ground leveling and compaction
	1b. Sediment Disposal Size	N/A	No sediment will be removed from Junor Lake
Site Availability	2a. Water Storage/Supply Availability	N	A new reservoir can be constructed to hold a sufficient quantity of water, however, the water rights for Junor Lake cannot be modified to allow storage in a new reservoir
	2b. Sediment Disposal Availability	N/A	No sediment will be removed from Junor Lake
Logistics	3a. Water Use Infrastructure	N	Woods Creek and Fanno Creek will not be connected to the new reservoir and cannot be rerouted to the new reservoir
	3b. Construction Ingress/Egress	Y	Reservoir construction access from S.W. 82nd Avenue (crossing Fanno Creek trail); pumping and piping construction access via existing maintenance road connecting S.W. Scholls Ferry Road and interior bridge over Fanno Creek
	3c. Infrastructure Damage Avoidance	N	Water capture and water delivery pipelines installed through Fairways 7, 8, 11, 13, 14 and 15; thus significant damage to subsurface irrigation and drainage systems; steel plating necessary to protect underground sewer lines and utilities below Fanno Creek trail
Environmental Impact	4a. Stream Impacts	N	No permanent impact to Fanno or Woods Creeks, but temporary disturbance to both creeks for conveyance pipes between new reservoir and pumping station
	4b. Stream Functions	Y	Lack of water storage in Junor Lake will likely cause back-flooding in Woods Creek during heavy rain events
	4c. Wetland Impacts	Y	Grading impact to approx. 30-40% of Wetland A; higher functioning Wetland B is avoided; emergent fringe of Junor Lake would expand to entire lake as sediment accumulates (Wetland C)

	4d. Wetland Functions	Y	Water quality, nutrient cycling, and sediment trapping functions removed.
	4e. Wildlife Impacts	Y	Songbird, small mammals and amphibian habitats associated with portion of Wetland A removed.
	4f. Wildlife Functions	Y	Habitats for breeding, nesting and feeding will be removed and habitat further fragmented that reduces usage for migration-oriented wildlife.
	4g. Forest Upland Impacts	N	Conveyance pipes will avoid the forested upland adjacent to Wetland A
	4h. Forest Upland Functions	N	Conveyance pipes will avoid the forested upland adjacent to Wetland A
Cost	5a. Dredge or Excavation and Reservoir Cost	N	Approx. $4 million for 1 to 2 above-ground reservoirs
	5b. Sediment Bag Placement Cost	N/A	No sediment removed from Junor Lake
	5c. Infrastructure Cost	Y	Approx. $50,000 for temporary access via S.W. 82nd Avenue, including steel plate covers for sewer lines/utilities (increased construction traffic), plus, $100,000 cost to rebuild damaged irrigation and drainage systems in Fairways 7, 8, 11, 13, 14 and 15
	5d. Implementation Cost	N	About 10 days disruption to golf course for mobilization, set-up, and construction.; disruption to golf course for 5 days for dual pipelines installation across 5 fairways; 6 months rehabilitation for damage to Fairways 7, 8, 11, 13, 14 and 15
Other Qualitative Factors	6a. Complete Golf Course	Y	Essential elements of the golf course will be maintained
	6b. Design Integrity	N	Lack of a water hazard damages the golf course design and precludes ability to hold golf tournaments
	6c. Drainage	N	Water rights cannot be modified to allow use from new reservoir
	6d. Accessory Work Areas	Y	No impact to accessory work areas

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Well and Domestic Water Source Alternative

During summer months, the golf course may us approximately 200,000 gallons in a single night. This amount (aka 0.6-acre feet) is equivalent to 4300 households (about 10 percent of City of Beaverton). PGC explored alternate sources of irrigation water, namely groundwater (well water), domestic water, and recycled water. Groundwater in this vicinity must be drilled to sufficient depth to yield pumping rates suitable for a golf course (much greater well yield than a simple domestic well and most commercial wells). The only geologic formation that has sufficient yield at the location of the golf course is an aquifer that also has higher salt content than typical drinking water. PGC currently holds water rights for ground water; however, if used alone this ground water permanently damages soil, turf and landscaping, eventually killing the plants. It must be used sparingly and in combination with surface water to prevent the salt toxicity from damaging plants and turf. PGC will need to secure contracts from two water districts for large quantities of water and obtain additional groundwater rights to have sufficient irrigation volumes. That is, potential water suppliers have indicated they cannot not commit to large volume water delivery, so it will be necessary to supplement with groundwater. Furthermore, potential providers will reserve the right to cease water deliveries during periods of excessive heat and/or long-term drought. Without adequate water supply, the golf course will need to close temporarily until water service is resumed, and long-term damage to its landscaping is likely from any such closure. Attached in support of this analysis is a letter from Raleigh Water District. Lastly, population growth in Washington County is expected to increase sufficiently that water providers may eventually cease all deliveries due to competing urban needs (households, retail, and food services, etc.).

The anticipated cost of domestic water will be a least 10 times more expensive than the cost of removing the accumulated sediment from Junor Lake. Over 20 years, the cost of irrigation using domestic water is expected to be a minimum of $6,000,000 but such cost does not account for increased growth in the Portland-Metro area, nor climate change and the need to use larger volumes of water. Consequently, the use of domestic water for PGC irrigation is not practicable and has an added risk that the water supply can be cut off during critical periods or outright ended if there is insufficient water for domestic water use needs.

Well and Domestic Water Source Alternative			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	N	Junor Lake will be replaced by new connection to new trunk line that distributes water from municipal reservoirs. This approach lacks in-line storage to meet night-time irrigation water volume demand.
	1b. Sediment Disposal Size	N/A	Not applicable.
Site Availability	2a. Water Storage/Supply Availability	N	Existing water rights will be forfeited and replaced with domestic water purchase from water supplier and expanded groundwater rights to meet turf irrigation volume needs; additional groundwater rights may not be granted at location of PGC; local water providers cannot guarantee water deliveries
	2b. Sediment Disposal Availability	N/A	Not applicable.
Logistics	3a. Water Use Infrastructure	N	A pond or reservoir is necessary to hold enough volume and create enough pressure to run the irrigation system
	3b. Construction Ingress/Egress	N	Pipeline construction access via existing maintenance road connecting S.W. Scholls Ferry Road; offsite construction of water delivery trunk line will require extensive use of public right-of-way to connect to municipal reservoir or trunk line with sufficient capacity
	3c. Infrastructure Damage Avoidance	N	Municipal water pipeline installed through Fairways 10 and 18 will result in damage to subsurface irrigation and drainage systems; incalculable installation conflicts with urban infrastructure to install large-diameter trunk line from municipal source
Environmental Impact	4a. Stream Impacts	N	As pond fills with sediment, then Woods Creek would also accumulate sediment, resulting in offsite backflooding and increase onsite flooding frequency.
	4b. Stream Functions	Y	Loss of in-stream flood storage will destabilize creek banks and collapse sidewalls. Increased sediment in creek channel reduces fish and invertebrate habitat.
	4c. Wetland Impacts	N	Wetland C (pond fringe) will expand, while open water is eventually displaced by accumulated sediments.
	4d. Wetland Functions	Y	As sediment fill irrigation pond, Wetland C will have reduced flood storage capacity of pond, and convert open water to palustrine, emergent wetland. Reduced waterfowl use.
	4e. Wildlife Impacts	N	Reduced waterfowl use due to loss of open water. Incidental increased opportunity for songbird and migratory birds.
	4f. Wildlife Functions	N	While decreased use for waterfowl, there is a minor increase for song bird nesting and feeding, and slight improved habitat for amphibians (due to less open water).
	4g. Forest Upland Impacts	N	No impact to upland forests.
	4h. Forest Upland Functions	N	No impact to upland forests.
Cost	5a. Dredge or Excavation and Reservoir Cost	N/A	Not applicable.
	5b. Sediment Bag Placement Cost	N/A	Not applicable.
	5c. Infrastructure Cost	N	Approx. $100,000 for onsite pipeline, and new well having greater water yield; approx. $6 million over two decades for domestic water purchase and offsite trunk line construction; approx. $60,000 cost to rebuild damaged irrigation and drainage systems in Fairways 10 and 18

	5d. Implementation Cost	N	About 6 days disruption to golf course for mobilization, set-up, and construction; disruption to golf course for 3 days for domestic waterline installation across 2 fairways; 12 months rehabilitation for damage to Fairways 10 and 18
Other Qualitative Factors	6a. Complete Golf Course	Y	Essential elements of the golf course will be maintained
	6b. Design Integrity	N	Lack of a water hazard damages the golf course design and precludes ability to hold golf tournaments
	6c. Drainage	N	A pond or reservoir is needed to hold enough water for nigh irrigation
	6d. Accessory Work Areas	N	Without guaranteed water delivery, periods of unavailable water will negatively impact (heat-stress or desiccate) all turf areas, sod farm, and other landscaping features

Recycled Water Source Alternative

Another alternative is construction of two or more water above-ground reservoirs, having an estimated minimum cost of $4 million, and using recycled water to fill the reservoirs. Reservoirs will be constructed of steel and/or reinforced concrete. Two reservoirs are needed because golf course irrigation occurs at night, but recycled water is primarily available during morning to early evenings when human activity also peaks. At present, recycled water (aka treated effluent) is not available, since this option requires a pipeline from the treatment facility located in Tigard (Durham). Several years of planning and implementation are need to install a large diameter pipe, pump stations, siphons under creeks, and related infrastructure to deliver water to onsite reservoirs. The estimated cost of the pipeline would be a minimum of $5 million and 2 to 3 years of planning, permitting and construction. It is not known if the recycled water would also have an associated volume fee, but the costs of this alternative are already exorbitant. Annual pumping and maintenance of the conveyance system is estimated at $150,000 per year (increasing annually for inflation). The likely location of such reservoirs would be the vacant land in the south part of the golf course property. With retaining walls and grading, it is likely wetland impacts would be under 0.3-acre.

Recycled Water Source Alternative			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Utilizes 2.5 acres of upland and 0.3-acre wetland for 2 reservoirs, including ground leveling and compaction
	1b. Sediment Disposal Size	N/A	No sediment will be removed from Junor Lake
Site Availability	2a. Water Storage/Supply Availability	N	Two new reservoirs can be constructed to hold a sufficient quantity of water, however, no connection to receive recycled water currently exists
	2b. Sediment Disposal Availability	N/A	No sediment will be removed from Junor Lake
Logistics	3a. Water Use Infrastructure	Y	New infrastructure can be constructed to connect from the reservoirs to the existing irrigation system
	3b. Construction Ingress/Egress	Y	Reservoir construction access from S.W. 82nd Avenue (crossing Fanno Creek trail); pumping and piping construction access via existing maintenance road connecting S.W. Scholls Ferry Road and interior bridge over Fanno Creek
	3c. Infrastructure Damage Avoidance	N	Recycled water pipes installed through Fairways 7, 8, 11, 13, 14 and 15, thus significant damage to subsurface irrigation and drainage systems; steel plating necessary to protect underground sewer lines and utilities below Fanno Creek trail; incalculable installation conflicts with urban infrastructure to install large-diameter pipe from treatment facility
Environmental Impact	4a. Stream Impacts	N	Additional sediment will remain instream and the connection between Woods Creek and Fanno Creek will be changed; temporary disturbance to both creeks for conveyance pipe between reservoirs and pumping station

	4b. Stream Functions	Y	Lack of water storage in Junor Lake will likely cause back-flooding in Woods Creek during heavy rain events
	4c. Wetland Impacts	Y	Grading impact to approx. 30-40% of Wetland A; higher functioning Wetland B is avoided; emergent fringe of Junor Lake would expand to entire lake as sediment accumulates (Wetland C)
	4d. Wetland Functions	Y	Water quality, nutrient cycling, and sediment trapping functions removed.
	4e. Wildlife Impacts	N	Partial filling of Wetland A will displace breeding, nesting and feeding habitat for wetland-dependent songbirds, small mammals, and amphibians. Temporary displacement of invertebrate habitat within pond fringe (Wetland C).
	4f. Wildlife Functions	N	Habitats for breeding, nesting and feeding will be reduced but not significantly fragmented (compared to pre-impact). Songbird and small mammals habitat degraded by reduced wetland area.
	4g. Forest Upland Impacts	N	No impact to upland forests
	4h. Forest Upland Functions	N	No impact to upland forests
Cost	5a. Dredge or Excavation and Reservoir Cost	N	Approx. $4 million for 1 to 2 above-ground reservoirs, plus additional $5 million for pipeline from Durham facility.
	5b. Sediment Bag Placement Cost	N/A	No sediment removed from Junor Lake
	5c. Infrastructure Cost	Y	Approx. $50,000 for temporary access via S.W. 82nd Avenue, including steel plate covers for sewer lines/utilities (increased construction traffic), plus, $100,000 cost to rebuild damaged irrigation-drainage systems in Fairways 7, 8, 11, 13, 14 and 15
	5d. Implementation Cost	N	About 10 days disruption to golf course for mobilization, set-up, and construction.; disruption to golf course for 5 days for dual pipelines installation across 5 fairways; 12 months rehabilitation for damage to Fairways 7, 8, 11, 13, 14 and 15
Other Qualitative Factors	6a. Complete Golf Course	Y	Essential elements of the golf course will be maintained
	6b. Design Integrity	N	Lack of a water hazard damages the golf course design and precludes ability to hold golf tournaments
	6c. Drainage	Y	Optimal drainage for irrigation of golf course will be maintained
	6d. Accessory Work Areas	Y	No impact to accessory work areas

Onsite Sediment Bag Placement in Wetland A (Preferred Alternative)

The sediment will be removed from Junor Lake by floating dredge, then pumped 1300 feet to a sediment placement location immediately south of the playing area. The sediment placement location is 0.72-acre emergent wetland flanked by higher topography on all sides with a narrow outlet. The sediment removal volume is approximately 5300 cubic yards and will be considered permanent removal, and the wetland fill area is 0.72-acre permanent fill. The fill incudes a small portion of Wetland A (where it overflows to the west) that may indirectly become filled with sediment from sediment bag drainage water, so the project impact accounts for such indirect sedimentation. Minor temporary wetland or waters impacts associated with construction measures will also occur. The project will not discharge water to Fanno Creek or Woods Creek. The dredging is expected to take 4 to 6 weeks to complete, with 2 to 4 weeks of preparation and decommissioning afterwards.

The proposed dredging will utilize sediment bag placement to permanently store the removed sediment in the southmost portion of the golf course property. This portion of the golf course property is not currently in use, and such use will not impact the flood storage surrounding Fanno and Woods Creeks. The topography is ideally suited for placing sediment bags with higher ground on all four sides and a narrow outlet. In particular, the land to the east, south, and west slope toward the sediment placement area (known as Wetland A on project maps). Wetland A slopes northwesterly to a former railroad berm that forms a 4- to 6-foot tall impoundment and a narrow overflow to the west. Such sediment bag placement cannot be done on the adjacent slopes without substantial excavation and contouring because the dredge water must be recovered and pumped back to Junor Lake. The bowl-like shape of Wetland A will be difficult to create on adjacent upland. Further, the adjacent upland slopes are also needed for infiltration of captured dredge water that need additional treatment to reduce sediment in the return water to Junor Lake. The preferred alternative meets all project criteria and it can be practicably implemented.

NOTE 1: A variation of this alternative is utilizing Wetland A for temporary sediment bag placement, letting water drain out, then later hauling away the sediment and restoring Wetland A to pre-disturbance condition. This variation has the same impact footprint as the preferred alternative, as well as the same water storage capacity to cycle drainage water back to Junor Lake. To remove the sediment, the bags are too heavy and not strong enough to be lifted out, so they will need to be cut open to remove the drained sediment. The effort and cost of such removal, then hauling offsite is included in several other alternative, which generally adds $520,000 to the project cost. A discussion with a quarry operator (who accepts fill material to decommission the excavated mining pit) revealed that presence of golf balls in the sediment disqualifies it as "clean fill." Further research found that OAR 340-093-0030 states that “clean fill” means “material consisting of soil, rock, concrete, brick, building block, tile or asphalt paving, which do not contain contaminants which could adversely impact the waters of the State or public health.” Further, the regulation states that the definition of clean fill" excludes putrescible wastes, construction and demolition wastes and industrial solid wastes." Solid waste may be disposed under a location-specific permit exemption, a solid waste letter authorization, or in a permitted landfill. Solid waste may not be disposed of in a quarry or construction site as clean fill. The cost for disposal at an authorized landfill has an approximate fee of $800,000, plus haul cost – such variation is not practicable.

Onsite Sediment Bag Placement in Wetland A - Preferred Alternative			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Utilizes existing Junor Lake
	1b. Sediment Disposal Size	Y	About 1.5 acres including Wetland A and surrounding land for staging, grading, sediment bag disposal, and temporary topsoil storage
Site Availability	2a. Water Storage/Supply Availability	Y	Existing Junor Lake will have adequate water storage capacity once dredging is complete
	2b. Sediment Disposal Availability	Y	Vicinity of Wetland A has ideal topographic setting for placement of sediment bags, capture of dredge seepage, and pumping location to return water to Junor Lake
Logistics	3a. Water Use Infrastructure	Y	Junor Lake is compatible with existing water use infrastructure
	3b. Construction Ingress/Egress	Y	Dredge equipment access via existing maintenance road connecting S.W. Scholls Ferry Road and interior bridge over Fanno Creek; dredge mobilization on tilt-trailer towed by pickup; sediment bag placement construction access to S.W. 82nd Avenue (crossing Fanno Creek trail)
	3c. Infrastructure Damage Avoidance	Y	Dredge slurry pipes placed atop turf avoids damage to subsurface irrigation and drainage systems in Fairways 13, 14 and 15; steel plating necessary to protect underground sewer lines and utilities below Fanno Creek trail
Environmental Impact	4a. Stream Impacts	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4b. Stream Functions	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4c. Wetland Impacts	Y	Preparatory grading and sediment bag placement would impact entirety of Wetland A; emergent fringe of Junor Lake will be reduced by excavation of sediment. Temporary impact to terrestrial Wetland C during excavation phase, but restored after project completion; Wetland B is avoided

	4d. Wetland Functions	Y	Loss of water storage, terrestrial and amphibian habitat, songbird nesting and feeding, and carbon sequestration within Wetland A.
	4e. Wildlife Impacts	Y	Most birds and small mammals will be displaced by preparatory grading and sediment bag placement activity (ground disturbance, construction noise and equipment movement)
	4f. Wildlife Functions	Y	Typical nesting, breeding and feeding habitat loss during excavation and sediment placement phase. Except for tree-dependent wildlife, most wildlife functions restored over subsequent decade after project is completed.
	4g. Forest Upland Impacts	N	No impact to upland forests.
	4h. Forest Upland Functions	N	No impact to upland forests.
Cost	5a. Dredge or Excavation and Reservoir Cost	Y	Approx. $400,000 for dredge operations
	5b. Sediment Bag Placement Cost	Y	Approx. $125,000 for manufacturing, ground preparation and post-construction revegetation
	5c. Infrastructure Cost	Y	Approx. $25,000 for temporary access via S.W. 82nd Avenue, including steel plate covers for sewer lines/utilities
	5d. Implementation Cost	Y	About 10 days disruption to golf course for mobilization, set-up, post-dredging turf restoration; golf course disruption limited to Fairways 7, 11, 13, 14 and 15 for 1 hour durations
Other Qualitative Factors	6a. Complete Golf Course	Y	Interruption to essential golf course features will be avoided
	6b. Design Integrity	Y	The golf course design will remain intact
	6c. Drainage	Y	PGC will be able to maintain its irrigated landscaping
	6d. Accessory Work Areas	Y	No impact to accessory work areas

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Onsite Sediment Bag Placement in Wetland B

This alternative is the same as the preceding alternative, but proposes filling forested upland situated between fairways 11, 12, and 13, and Wetland B instead of Wetland A. Wetland B has a direct connection to Woods Creek and floods when upgradient lands receive heavy rainfall. Potential impacts to Wetland B are likely significant due to loss of flood storage capacity and desynchronization. Placement of sediment bags in Wetland B will likely increase flood flows on downgradient lands (offsite to southwest), as well as reduce insitu sediment trapping. Placement of sediment bags in this location will also destroy a grove of mature ash trees. Sediment bag placement in this wetland will have a significantly greater environmental impact than placement in Wetland A. Finally, the upper portion of this open space is a hillside with 15 to >25% slopes, so it is not suitable for sediment bag placement without substantial excavation and contouring.

Onsite Sediment Bag Placement in Wetland B			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Utilizes existing Junor Lake
	1b. Sediment Disposal Size	Y	About 1.5 acres including Wetland B and surrounding land for staging, grading, sediment bag disposal, and temporary topsoil storage
Site Availability	2a. Water Storage/Supply Availability	Y	Existing Junor Lake will have adequate water storage capacity once dredging is complete
	2b. Sediment Disposal Availability	Y	Vicinity of Wetland B will work for sediment disposal, but grading and berming needed for capture of seepage water, then pump return water to Junor Lake
Logistics	3a. Water Use Infrastructure	Y	Junor Lake is compatible with existing water use infrastructure
	3b. Construction Ingress/Egress	Y	Dredge equipment access via existing maintenance road connecting S.W. Scholls Ferry Road and interior bridge over Fanno Creek; dredge mobilization on tilt-trailer towed by

			pickup. To utilize existing bridge (weight restricted), smaller excavator and bulldozer necessary.
	3c. Infrastructure Damage Avoidance	Y	No damage to subsurface drainage or irrigation pipes, since no fairways to cross.
Environmental Impact	4a. Stream Impacts	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4b. Stream Functions	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4c. Wetland Impacts	Y	Preparatory grading and berming would impact the entirety of Wetland B; emergent fringe of Junor Lake will be reduced by excavation of sediment. Temporary impact to terrestrial Wetland C during excavation phase, but restored after project completion; Wetland A is avoided
	4d. Wetland Functions	Y	Loss of water storage, flood desynchronization, terrestrial and amphibian habitat, songbird nesting and feeding, and sediment trapping within Wetland B.
	4e. Wildlife Impacts	Y	Most birds and small mammals will be displaced by preparatory grading and sediment bag placement activity (ground disturbance, construction noise and equipment movement)
	4f. Wildlife Functions	Y	Typical nesting, breeding and feeding habitat loss during excavation and sediment placement phase. Except for tree-dependent wildlife, most wildlife functions restored over subsequent decade after project is completed.
	4g. Forest Upland Impacts	N	No impact to upland forests.
	4h. Forest Upland Functions	N	No impact to upland forests.
Cost	5a. Dredge or Excavation and Reservoir Cost	Y	Approx. $375,000 for dredge operations
	5b. Sediment Bag Placement Cost	Y	Approx. $100,000 for manufacturing, ground preparation and post-construction revegetation
	5c. Infrastructure Cost	N	Approx. $800,000 for replacement bridge over Fanno Creek for excavator and bulldozer.
	5d. Implementation Cost	Y	About 10 days disruption to golf course for mobilization, set-up, post-dredging turf restoration; golf course disruption limited to Fairways 7 and 11 for 1 hour durations
Other Qualitative Factors	6a. Complete Golf Course	Y	Interruption to essential golf course features will be avoided
	6b. Design Integrity	N	The upland trees are part of the golf course design that will be destroyed
	6c. Drainage	Y	PGC will be able to maintain its irrigated landscaping
	6d. Accessory Work Areas	Y	No impact to accessory work areas

Onsite Sediment Bag Placement between Fairways

When evaluating options for sediment bag placement and sediment placement within the golf course property, options are limited, since the majority of the land is already in use for fairways, tees and greens. There are narrow corridors between fairways that contain cart paths, trees and shrubs, and such areas are also heavily used as part of the golf game and overall design of the golf course. To utilize the space between fairways will require relocating cart paths, removing tree/landscaping, and narrowing the fairways. Such narrowing of fairways is detrimental to the golfing game, which makes the golf course less desirable, more difficult and creates a cramped play environment. This will make it less likely that PGC can hold golf tournaments in the future. Furthermore, narrowing of several fairways will require relocation of key infrastructure, like irrigation lines and drainage pipes. The retrofit effort will require closure of fairways for greater than 6 months. Such closure will occur during the summer months when construction is viable, but also when golf play is at a peak, so the work will severely interfere with the property.

Two additional factors for placing sediment between fairways are: the land slope and loss of flood storage parallel to Fanno and/or Woods Creeks. In particular, placement of filled sediment bags near the creeks will decrease capacity of the floodplain and alter the flood dynamics, such as backwater flooding in Woods Creek (offsite to east) or headwater flooding downstream in Fanno Creek. Approximately 10 of the fairways have portions of their slopes greater than 10 percent, which makes sediment bag placement not feasible. For the south side of Fanno Creek, none of the non-floodplain land (between fairways) has appropriate slope (under 10 percent) to be used for sediment bag placement. Steeper slopes, if utilized, will require stair-step excavation to place the sediment bags. Such arrangement will require more space (less efficient stacking of the sediment bags). For the north side of Fanno Creek (fairways no. 1 to 9, except no. 7), space between fairways is already very narrow, often less than 50 feet, which is an insufficient width to place sediment bags. For the purposes of this alternatives analysis, the following text examines theoretical sediment bag placement could occur and have sufficient space to construct containment berms to capture seepage water and return it to Junor Lake. Such construction requires excavators and bulldozers, which are sufficiently heavy and damage cart paths, subsurface drainage lines, irrigation pipes, and cannot be driven across bridges (not structurally strong enough). To maintain golf course appearance and use standards, placement of sediment bags along perimeter of fairways will be temporary; thus, later cut open and hauled to another location using smaller landscape carts. Such transport to a final location will double the cost of sediment bag placement.

Onsite Sediment Placement between Fairways			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Utilizes existing Junor Lake
	1b. Sediment Disposal Size	N	There is not a site (or multiple sites) with adequate size between fairways
Site Availability	2a. Water Storage/Supply Availability	Y	Existing Junor Lake will have adequate water storage capacity once dredging is complete
	2b. Sediment Disposal Availability	N	The areas between fairways cannot be modified to provide enough space and other necessary elements for sediment placement
Logistics	3a. Water Use Infrastructure	Y	Junor Lake is compatible with existing water use infrastructure
	3b. Construction Ingress/Egress	Y	Containment berm construction only accessible via SW 86th Ave and via internal cart and maintenance paths. To minimize weight damage to cart paths and interior road, smaller excavator and bulldozer necessary.
	3c. Infrastructure Damage Avoidance	N	Subsurface drainage pipes and irrigation lines will be crushed by heavy equipment and must be rebuilt. Cart paths potentially damaged by same heavy equipment.
Environmental Impact	4a. Stream Impacts	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging. If sediment bags placed in floodplain, then increased risk of downstream flooding.
	4b. Stream Functions	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging. If sediment bags placed in floodplain, then flood storage capacity and desynchronization will be reduced.
	4c. Wetland Impacts	N	Emergent fringe of Junor Lake will be reduced by excavation of sediment. Temporary impact to terrestrial Wetland C during excavation phase, but restored after project completion; Wetlands A and B are avoided
	4d. Wetland Functions	N	Temporary displacement of invertebrate habitat within pond fringe (Wetland C). Increased flood storage in Wetland C.
	4e. Wildlife Impacts	Y	Sediment bag placement will remove trees and low shrub which provide shelter and feeding habitat for songbirds and small mammals.
	4f. Wildlife Functions	Y	Loss of bird and small mammal shelter habitat in trees, as well as reduced travel corridors for wildlife that resides offsite.

	4g. Forest Upland Impacts	Y	Sediment bag placement at multiple locations likely requires removal of mature trees, since bags cannot be placed atop tree roots near trunk.
	4h. Forest Upland Functions	Y	Loss of vertical structure, perching and nesting sites for owls, hawks and similar predatory birds.
Cost	5a. Dredge or Excavation and Reservoir Cost	Y	Approx. $500,000 for dredge operations (multiple placement locations increases fixed costs)
	5b. Sediment Bag Placement Cost	Y	Approx. $250,000 for manufacturing, ground preparation and post-construction revegetation (multiple placement locations increases fixed revegetation costs)
	5c. Infrastructure Cost	N	Heavy equipment south of Fanno Creek will require a new bridge ($800,000). Damage to drainage and irrigation pipes in multiple fairways likely require reconstruction $100,000, while repair to damaged cart and maintenance paths about $200,000.
	5d. Implementation Cost	N	About 90 days disruption to golf course for mobilization, set-up, construction and sediment bag placement; 9 months rehabilitation for damage to multiple Fairways.
Other Qualitative Factors	6a. Complete Golf Course	Y	Golf course essential elements will be maintained
	6b. Design Integrity	N	The golf course will design will be damaged
	6c. Drainage	N	Adding sediment between fairways will reduce drainage, harming landscaping
	6d. Accessory Work Areas	Y	No impact to accessory work areas

Onsite Sediment Bag Placement West of Wetland A

The upland area west of Wetland A is approximately 2 times larger than Wetland A. It slopes mostly to the north, but perimeter areas on the west and south also slope toward the surrounding Fanno Creek bike and pedestrian trail. While the preferred sediment bag placement area is situated in a concave topographic position, this upland area has a convex topographic position. Consequently, it is necessary to grade this upland to have a gentle, east-sloping surface drains to Wetland A. The importance of the east-sloping surface is to capture dredge water seeping from the filled sediment bags, then pump it to Junor Lake. That is, the dredge seepage water storage in Wetland A is needed because it can capture the water that keeps the dredge afloat. The narrow ditch on the south side of the former electric railroad berm is needed to prevent dredge water from flowing into wetlands adjacent to Fanno Creek (southwest of fairway 15) – it will be blocked by three check dams at this location.

The volume of excavated topsoil will be roughly 1600 cubic yards and an additional 2500 cubic yards removed to create the east-sloping surface. At least 2400 cubic yards of the excavated soil will need to remain onsite and later used to cap the sediment bags (about 1.5 feet thick). If this soil surplus is placed on the neighboring Fairway 15, it will remove golf play before, during and after dredging. The surplus soil cannot remain permanently on Fairway 15, so it will have to be hauled back as cover material for the sediment bags. Consequently, Fairway 15 will need significant rehabilitation for the subsequent year. Specifically, rehabilitation of Fairway 15 will involve reversal of soil compaction (from the weight of stockpiled soils), replacement of underground drainage pipes and irrigation lines, plus regrowth of new turf. This rehabilitation, including short-haul trucking, excavator loading and importing of sand and sod, is estimated at $440,000, as well as loss of revenue due to less desirable playing conditions and inability to host tournaments.

Resultantly, the only location to temporarily stockpile 2400 cubic yards of soil is the adjacent Wetland A, or a small grove of 100-year old Douglas-fir trees. There is private and public opposition to removing the trees, which provide upland habitat for small mammals, song birds, owls, and raptors. The trees also provide a visual resource to the neighborhood to the east and south, shade a portion of the Fanno Creek trail used daily by local enthusiasts and visitors, and are part of the golf course design. Temporary use of Wetland A to stockpile 2400 cubic yards soil will necessitate restoration activities. Restoration of Wetland A will involve excavation, finished grading, seeding and planting for 3 to 5 years; however, no long-term stewardship obligation. It is estimated restoring Wetland A will cost $125,000 for construction and $75,000 for follow-up maintenance and monitoring (to assure ground cover is re-established). Ultimately, this alternative will disturb three times larger an area for the sediment bag placement, and significantly more air pollution due to more equipment hours. When all factors are considered, this is not practicable alternative.

Onsite Sediment Placement West of Wetland A			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Utilizes existing Junor Lake
	1b. Sediment Disposal Size	Y	Sediment disposal is possible
Site Availability	2a. Water Storage/Supply Availability	Y	Existing Junor Lake will have adequate water storage capacity once dredging is complete
	2b. Sediment Disposal Availability	Y	The site can be modified to allow sediment disposal, also using Wetland A temporarily for holding excavated soil
Logistics	3a. Water Use Infrastructure	Y	Junor Lake is compatible with existing water use infrastructure
	3b. Construction Ingress/Egress	Y	Dredge equipment access via existing maintenance road connecting S.W. Scholls Ferry Road and interior bridge over Fanno Creek; dredge mobilization on tilt-trailer towed by pickup; sediment bag placement construction access to S.W. 82nd Avenue (crossing Fanno Creek trail)
	3c. Infrastructure Damage Avoidance	Y	Dredge slurry pipes placed atop turf avoids damage to subsurface irrigation and drainage systems in Fairways 13, 14 and 15; steel plating and other measures necessary to protect underground sewer lines and utilities below Fanno Creek trail (no damage to underground infrastructure is permissible).
Environmental Impact	4a. Stream Impacts	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4b. Stream Functions	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4c. Wetland Impacts	Y	Preparatory grading in upland will temporarily impact about 80% of Wetland A; emergent fringe of Junor Lake will be reduced by excavation of sediment. Temporary impact to terrestrial Wetland C during excavation phase, but restored after project completion; Wetland B is avoided
	4d. Wetland Functions	Y	Temporary loss of water storage, terrestrial and amphibian habitat, songbird nesting and feeding within Wetland A. Wetland A functions restored after project completion.
	4e. Wildlife Impacts	Y	Most birds and small mammals will be displaced by preparatory grading and sediment bag placement activity (ground disturbance, construction noise and equipment movement)
	4f. Wildlife Functions	Y	Typical nesting, breeding and feeding habitat loss during excavation and sediment placement phase. Except for tree-dependent wildlife, most wildlife functions restored over subsequent decade after project is completed.
	4g. Forest Upland Impacts	N	No impact to upland forests.
	4h. Forest Upland Functions	N	No impact to upland forests.
Cost	5a. Dredge or Excavation and Reservoir Cost	Y	Approx. $400,000 for dredge operations
	5b. Sediment Bag Placement Cost	N	Approx. $250,000 for manufacturing, ground preparation and post-construction revegetation. Additional cost of $300,000 for post-project restoration of Wetland A.
	5c. Infrastructure Cost	Y	Approx. $75,000 for temporary access via S.W. 82nd Avenue, including steel plate covers for sewer lines/utilities

	5d. Implementation Cost	Y	About 10 days disruption to golf course for mobilization, set-up, post-dredging turf restoration; golf course disruption limited to Fairways 7, 11, 13, 14 and 15 for 1 hour durations
Other Qualitative Factors	6a. Complete Golf Course	Y	Golf course essential elements will be maintained
	6b. Design Integrity	Y	The golf course design will be maintained
	6c. Drainage	Y	The golf course's drainage and irrigation will be maintained
	6d. Accessory Work Areas	Y	No impact to accessory work areas

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Onsite Sediment Bag Placement in Yard Debris Area

The yard debris area is a critical component of the golf course operations, which is constantly generating leaf litter, trimmed branches, and fallen trees (sawed apart). The yard debris accumulates during fall, winter and spring, then the stockpiles diminish some in summer when organic materials dry and natural oxidize. This area also serves as a storage area for construction materials, surplus dirt and imported gravel, since it has direct access to S.W. 86th Avenue. Mulched materials are stockpiled for several years, depending upon the amount of decomposing wood in such piles. The yard debris area is located north of Fanno Creek and immediately east of S.W. 86th Avenue. It is roughly 0.6-acre, with half on a gentle slope and half on a steep slope toward Fanno Creek. That is, the steep portion is not suitable for sediment bag placement, and flat portion is too small. An additional complication is that yard debris area is composed of fill material ranging from gravel to old branches and tree trunks. It is highly porous material, and it will be extremely difficult to capture dredge seepage that must be pumped back to Junor Lake. Moreover, the fill material cannot support the sediment placed on top of it and will likely erode the property into Fanno Creek. The golf course also lacks a replacement location for a yard debris area that has similar access to streets where maintenance materials can be loaded and unloaded. Additionally, this location presents a high risk of damage to Fanno Creek if turbid water seeping from the newly filled sediment bags leaked. This location is not well suited for sediment bag placement.

Questions have been raised related to PGC's prior authorization to dispose of sediment in this alternative location. In 1994, PGC hired a contractor to manually suction dredge the bottom of Junor Lake, using scuba diving techniques. The contractor severely underestimated the effort necessary to remove accumulated sediments. It was quickly realized that the scuba diving approach was woefully inefficient and removed relatively little sediment, a couple hundred cubic yards. In particular, the sediment was pumped in a slurry to sediment bags, situated in the vicinity of the landscaping debris yard, located near S.W. 86th Avenue. Several sediment bags were filled after several days, but such progress was slow and had many mechanical difficulties. The debris yard slopes direct toward Fanno Creek, so there was no means of containing the large volume of water draining from the sediment bags. Realizing the sediment removal task was far more technical and substantially greater effort necessary, PGC stopped work to re-evaluate and determine a new approach. The few sediment bags filled were allowed to dry and contents later disposed. The current need requires disposal of 5,300 cubic yards of sediment, which disposal is not practicable in the yard debris area.

Onsite Sediment Placement in Yard Debris Area			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Utilizes existing Junor Lake
	1b. Sediment Disposal Size	N	The size of the area is not adequate for both sediment disposal and additional use of the area for yard debris and construction staging
Site Availability	2a. Water Storage/Supply Availability	Y	Existing Junor Lake will have adequate water storage capacity once dredging is complete
	2b. Sediment Disposal Availability	N	The yard debris area is on top of existing fill and cannot be modified to be stable enough for sediment storage nor for capture of dredge drain water
Logistics	3a. Water Use Infrastructure	Y	Junor Lake is compatible with existing water use infrastructure

	3b. Construction Ingress/Egress	Y	Dredge equipment access via existing maintenance road connecting S.W. Scholls Ferry Road and interior bridge over Fanno Creek; dredge mobilization on tilt-trailer towed by pickup; sediment bag placement area has direct access to S.W. 86th Avenue
	3c. Infrastructure Damage Avoidance	Y	Dredge slurry pipes placed atop turf avoids damage to subsurface irrigation and drainage systems in Fairways 13, 14 and 15
Environmental Impact	4a. Stream Impacts	Y	Temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging. Turbid water will leach through loose, old fill into Fanno Creek.
	4b. Stream Functions	Y	Temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging. Significant damage to water quality functions in Fanno Creek and risk of accidental sediment release to creek harming fish, invertebrates and downstream properties.
	4c. Wetland Impacts	N	No direct impacts to Wetlands A and B; emergent fringe of Junor Lake would expand to entire lake as sediment accumulates (Wetland C)
	4d. Wetland Functions	N	No loss of wetland functions.
	4e. Wildlife Impacts	N	Only incidental wildlife use of yard debris area, since area is regularly disturbed. No significant impacts.
	4f. Wildlife Functions	N	No loss of wildlife functions..
	4g. Forest Upland Impacts	N	No impact to upland forests.
	4h. Forest Upland Functions	N	No impact to upland forests.
Cost	5a. Dredge or Excavation and Reservoir Cost	Y	Approx. $400,000 for dredge operations
	5b. Sediment Bag Placement Cost	N	Approx. $650,000 for manufacturing, remove old, loose fill, grading, dump truck hauling, and quarry tipping fees.
	5c. Infrastructure Cost	Y	Approx. $75,000 to temporarily relocate yard debris area to alternate location, and post-project restoration of yard debris area.
	5d. Implementation Cost	Y	About 6 days disruption to golf course for mobilization, set-up, post-dredging turf restoration; golf course disruption limited to Fairways 7, 11, 16, 17 and 18 for 1 hour durations
Other Qualitative Factors	6a. Complete Golf Course	Y	Essential elements for golf play will be maintained
	6b. Design Integrity	Y	The golf course design will be maintained
	6c. Drainage	Y	PGC will be able to maintain its irrigated landscaping
	6d. Accessory Work Areas	N	The alternative will destroy the yard debris area

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Onsite Sediment Bag Placement in Turf Farm Area

The land immediately north of the yard debris area is used for turf production (aka turf farm). This area amounts to approximately 0.5-acre and it slopes south toward a maintenance path that separates it from the yard debris area. The turf farm is an essential part of the golf course, since there is a perpetual need to replace patchy and worn turf with healthy turf. In addition, ongoing maintenance of irrigation and subsurface drainage systems creates a constant need for replacement turf. While the turf farm area is always needed, it lacks sufficient size to store sediment bags. For example, it will be necessary to stack the sediment bags 4 or 5 high, which is unsafe and risky that the bottom layers could split open. There are no viable places within the PGC to relocate the turf farm, so the sediment would need to be hauled offsite after the excess water has drained off. See alternatives for offsite sediment disposal.

Onsite Sediment Placement in Turf Farm Area			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Utilizes existing Junor Lake
	1b. Sediment Disposal Size	N	The size of the area is not adequate for both sediment disposal and additional use of the area for the turf farm
Site Availability	2a. Water Storage/Supply Availability	Y	Existing Junor Lake will have adequate water storage capacity once dredging is complete
	2b. Sediment Disposal Availability	Y	The area can be modified for sediment storage if the turf farm is destroyed
Logistics	3a. Water Use Infrastructure	Y	Junor Lake is compatible with existing water use infrastructure
	3b. Construction Ingress/Egress	Y	Dredge equipment access via existing maintenance road connecting S.W. Scholls Ferry Road and interior bridge over Fanno Creek; dredge mobilization on tilt-trailer towed by pickup; sediment bag placement area has direct access to S.W. 86th Avenue
	3c. Infrastructure Damage Avoidance	Y	Dredge slurry pipes placed atop turf avoids damage to subsurface irrigation and drainage systems in Fairways 13, 14 and 15
Environmental Impact	4a. Stream Impacts	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging.
	4b. Stream Functions	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging.
	4c. Wetland Impacts	N	No direct impacts to Wetlands A and B; emergent fringe of Junor Lake would expand to entire lake as sediment accumulates (Wetland C)
	4d. Wetland Functions	N	No loss of wetland functions.
	4e. Wildlife Impacts	N	Only incidental wildlife use of turf farm area, since area is regularly disturbed. No significant impacts.
	4f. Wildlife Functions	N	No loss of wildlife functions..
	4g. Forest Upland Impacts	N	No impact to upland forests.
	4h. Forest Upland Functions	N	No impact to upland forests.
Cost	5a. Dredge or Excavation and Reservoir Cost	Y	Approx. $400,000 for dredge operations
	5b. Sediment Bag Placement Cost	N	Approx. $520,000 for manufacturing, ground preparation, dump truck hauling, and quarry tipping fees. Additional cost of $100,000 for post-project restoration of turf farm
	5c. Infrastructure Cost	Y	Approx. $25,000 for direct purchase of replacement turf for 9 months. About $100,000 for post-project turf farm restoration.
	5d. Implementation Cost	Y	About 6 days disruption to golf course for mobilization, set-up, post-dredging turf restoration; golf course disruption limited to Fairways 7, 11, 16, 17 and 18 for 1 hour durations
Other Qualitative Factors	6a. Complete Golf Course	Y	Essential elements for golf play will be maintained
	6b. Design Integrity	Y	The golf course design will be maintained
	6c. Drainage	N	PGC will not be able to maintain its irrigation of the turf farm
	6d. Accessory Work Areas	N	The alternative will destroy the turf farm area

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Onsite Sediment Bag Placement at Driving Range

An alternate location for sediment placement is the driving range, located in the north-center of the golf course (east of the clubhouse). The driving range is surrounded by Fairways 3, 4 and 5. It is an integral component of the golf game, particularly for player warm-up and driving (swing) practice. When a player does not have sufficient time for a 9- or 18-holes of golf, the driving range serves as a 1 or 2 hour substitute. Said differently, the driving range often has greater use than other facilities at the golf course.

It cannot be removed to create room for a sediment placement area. From a practicality point of view, the driving range is the farthest distance from Junor Lake, specifically 2000 feet (nearly half a mile). Such distance and upslope position will require two auxiliary pumps to transport the sediment to this location. In addition, use of such area will also require substantial grading to recover seepage water, since the natural topography slopes away from the driving range and ultimately toward Fanno Creek. This location is not available, nor practical for sediment placement.

Onsite Sediment Placement at Driving Range			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Utilizes existing Junor Lake
	1b. Sediment Disposal Size	N	The size of the area is not adequate for both sediment disposal and additional use of the area for the driving range
Site Availability	2a. Water Storage/Supply Availability	Y	Existing Junor Lake will have adequate water storage capacity once dredging is complete
	2b. Sediment Disposal Availability	Y	The area can be modified for sediment storage if the driving range is destroyed
Logistics	3a. Water Use Infrastructure	Y	Junor Lake is compatible with existing water use infrastructure
	3b. Construction Ingress/Egress	Y	Dredge equipment access via existing maintenance road connecting S.W. Scholls Ferry Road and interior bridge over Fanno Creek; dredge mobilization on tilt-trailer towed by pickup; sediment bag placement area has indirect access to S.W. 86th Avenue (crosses
	3c. Infrastructure Damage Avoidance	Y	Dredge slurry pipes placed atop turf avoids damage to subsurface irrigation and drainage systems in Fairways 1, 7, 8 and 9
Environmental Impact	4a. Stream Impacts	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging.
	4b. Stream Functions	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging.
	4c. Wetland Impacts	N	No direct impacts to Wetlands A and B; emergent fringe of Junor Lake would expand to entire lake as sediment accumulates (Wetland C)
	4d. Wetland Functions	N	No loss of wetland functions.
	4e. Wildlife Impacts	N	Only incidental wildlife use of driving range, since area is disturbed hourly during business hours. No significant wildlife impacts.
	4f. Wildlife Functions	N	No loss of wildlife functions.
	4g. Forest Upland Impacts	N	No impact to upland forests.
	4h. Forest Upland Functions	N	No impact to upland forests.
Cost	5a. Dredge or Excavation and Reservoir Cost	Y	Approx. $450,000 for dredge operations (requires additional pumping to reach driving range in north-center of golf course)
	5b. Sediment Bag Placement Cost	Y	Approx. $150,000 for manufacturing, ground preparation and post-construction revegetation.
	5c. Infrastructure Cost	N	Approx. $375,000 to close driving range for 8 months while area is restored after project completion. Additional cost of $125,000 to temporarily convert turf farm and short game practice area into driving range.
	5d. Implementation Cost	Y	About 6 days disruption to golf course for mobilization, set-up, post-dredging turf restoration; golf course disruption limited to Fairways 7, 11, 16, 17 and 18 for 1 hour durations
Other Qualitative Factors	6a. Complete Golf Course	N	The driving range is an essential feature to the golf course that will be destroyed
	6b. Design Integrity	N	The design of the golf course will be destroyed
	6c. Drainage	N	Irrigated landscaping of the driving range will be destroyed
	6d. Accessory Work Areas	Y	The alternative will maintain accessory work areas

Onsite Sediment Bag Placement in Upland Forest

A potential sediment bag location is an upland forest between fairways 14, 15 and 16. The trees in this vicinity are greater than 100 years old. This dense cluster of older and taller trees provides habitat for numerous bird species, and has perch branches for predator birds. It also has close proximity to Fanno Creek, Woods Creek, and Junor Lake. This wooded grove also serves as a scenic resource for residences located to the west, and is designated as a scenic resource by Washington County, unlike Wetland A. Destruction of this natural resource would also be contrary to PGC's land stewardship policy and golf course design to balance mowed fairways and greens with tree and shrub corridors. Removal of such a natural resource is not supported by PGC, and Washington County is extremely unlikely to approve such resource removal.

Onsite Sediment Bag Placement in Upland Forest			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Utilizes existing Junor Lake
	1b. Sediment Disposal Size	Y	The size of the area is adequate for sediment storage
Site Availability	2a. Water Storage/Supply Availability	Y	Existing Junor Lake will have adequate water storage capacity once dredging is complete
	2b. Sediment Disposal Availability	N	PGC will not be able to get Washington County approval to remove the trees to store sediment bags at this location
Logistics	3a. Water Use Infrastructure	Y	Junor Lake is compatible with existing water use infrastructure
	3b. Construction Ingress/Egress	N	Sediment bag containment berm construction is accessible via SW 82nd Ave across Fanno Creek trail; excavation equipment access requires temporary haul road across Fairways 13, 14 and 15. Bridge weight constraints prohibit access via SW 86th Ave. (near maintenance buildings).
	3c. Infrastructure Damage Avoidance	N	Damage will occur to subsurface irrigation and drainage systems and to Fairways 13, 14 and 15; steel plating is necessary to protect underground sewer lines and utilities below Fanno Creek trail
Environmental Impact	4a. Stream Impacts	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4b. Stream Functions	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4c. Wetland Impacts	N	Emergent fringe of Junor Lake will be reduced by excavation of sediment. Temporary impact to terrestrial Wetland C during excavation phase, but restored after project completion; Wetlands A and B are avoided
	4d. Wetland Functions	N	Temporary displacement of invertebrate habitat within pond fringe (Wetland C). Increased flood storage in Wetland C.
	4e. Wildlife Impacts	Y	Sediment bag placement will remove trees and low shrub which provide shelter and feeding habitat for songbirds and small mammals.
	4f. Wildlife Functions	Y	Loss of bird and small mammal shelter habitat in trees, as well as reduced travel corridors for wildlife that resides offsite.
	4g. Forest Upland Impacts	Y	Sediment bag placement between trees in forested grove will likely damage and kill mature trees, since bag weight and water seepage compact ground and reduce porosity.
	4h. Forest Upland Functions	Y	Loss of vertical structure, perching and nesting sites for owls, hawks and similar predatory birds.
Cost	5a. Dredge or Excavation and Reservoir Cost	Y	Approx. $300,000 for dredge operations

	5b. Sediment Bag Placement Cost	Y	Approx. $225,000 for manufacturing, tree felling, ground preparation and post-construction re-establishment of forest grove.
	5c. Infrastructure Cost	N	Approx. $50,000 for temporary access via S.W. 82nd Avenue, including steel plate covers for sewer lines/utilities. Damage to drainage and irrigation pipes in multiple fairways likely require reconstruction $150,000, while repair to damaged cart paths about $30,000.
	5d. Implementation Cost	Y	About 10 days disruption to golf course for mobilization, set-up, post-dredging turf restoration; golf course disruption limited to Fairways 7, 11, 13, 14 and 15 for 1 hour durations
Other Qualitative Factors	6a. Complete Golf Course	Y	Interruption with golf course features will be avoided
	6b. Design Integrity	N	The grove of trees is an essential element of the golf course design that will be destroyed
	6c. Drainage	Y	PGC will be able to maintain its irrigated landscaping
	6d. Accessory Work Areas	Y	No impact to accessory work areas

Onsite Sediment Placement in Fairway 15 or Multiple Fairways

Another option for sediment placement is temporary decommissioning of the middle segment of Fairway 15, where it has slopes less than 10 percent. It is the only fairway large enough and logistically positioned to place sediment bags, which will then drain for several months. Next, the sediment bags will be cut open, and the moist sediment spread to dry. The spread-out area will require an area 150 feet wide and 700 feet long, and result in a net ground elevation increase of 1.5 feet. To facilitate drying and reuse as a turf substrate, it will be necessary to use farming equipment to disk into the native soil. That is, the silt sediment is unusable as a topsoil because it is too compressible and highly erodible. Therefore, it must be mixed with the native soil to balance the amount of silt to natural clay loam soil. Such mixing can only be done in 2- to 3-inch lifts. The dredged sediment is so plentiful that it will take 5 lifts to mix the sediment into the native soil. The mixing process will require 2 to 4 weeks per lift, since the silty material is non-cohesive and tends not to form clumps, requiring multiple passes with farming equipment of the entire volume of sediment. There is insufficient volume of natural soil to mix with the sediment to achieve a suitable soil condition for turf. That is, for each cubic foot of sediment, 4 cubic feet of native soil is needed to achieve the soil structure and low-erosive qualities – that equals roughly 5 feet of native soil. The natural soils in this vicinity have 2 to 3 feet of suitable material, since the substratum is not viable as a growing medium for turf and landscaping.

Lastly, the irrigation and drainage system for Fairway 15 will need to be reconstructed after two rainy seasons (about 18 months) to allow for settling and ground cover stabilization. This approach will not be viable, since the mixed soil materials will be substantially inferior to the native soils and subsurface drainage conditions will be plagued by irregular settling. Without confidence this alternative will work, and given the large disruption to the golf course (and associated revenue and new memberships), this alternative is considered impracticable and experimental.

In discussions with regulatory agencies, it was suggested that PGC place the captured sediment as a thin layer (less than 0.5-inch) atop multiple fairways. This approach anticipates having turf grasses buried by a light application of sediment, then allowing the grasses to grow and sequester the sediment. This approach is akin to having volcanic ash gently burying the land surface and allowing plants to poke upward through the thin layer. This approach still requires the sediment to be pumped into sediment bags and excess water to drain out. When the solids have adhered together (no excess water), the sediment bags will be cut open and a backhoe used to transfer it to small trucks or farm equipment. Such vehicles will drive across flat portions of fairways and other available areas to thinly distribute the sediment. Given that most of the fairways are sloping, it will be precarious to utilize any slope more than 2 percent due to re-mobilization as soon as irrigation or precipitation occurs. Thus, such application will be possible only on portions of Fairways 7, 10, 11, 13, 14, 15, 16, and 18. Assuming ideal weather conditions for such applications, it will take 3 to 4 weeks of turf growth to incorporate the sediment. During such period, these fairways will remain closed. Given the quantity of sediment, this procedure will need to be conducted four times each summer for 4 years, which effectively closes those fairways during peak play times and tournaments. While there are many logistical challenges with this approach, it will also be completely contrary to common turf management practices that seek to have well-aerated soils. PGC has spent decades improving drainage in its soils via aeration, nutrient balance and subsurface drain pipes. The applied silts and clays will immediately fill interstitial pores in the upper part of the soil, resulting in poor infiltration, damaged root zones, and insufficient oxygen to turf grasses. Consequently, one or two applications of sediment will create a patchy turf surface that has higher rates of runoff, and repeatedly burying the grass will kill the grass. Such conditions are simply unacceptable for a golf course and not considered practicable.

Onsite Sediment Placement in Fairway 15 or Multiple Fairways			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Utilizes existing Junor Lake
	1b. Sediment Disposal Size	Y	The size of the area is adequate for sediment disposal
Site Availability	2a. Water Storage/Supply Availability	Y	Existing Junor Lake will have adequate water storage capacity once dredging is complete
	2b. Sediment Disposal Availability	N	The area cannot be modified for sediment storage without severely damaging the impacted areas
Logistics	3a. Water Use Infrastructure	Y	Junor Lake is compatible with existing water use infrastructure
	3b. Construction Ingress/Egress	Y	Dredge equipment access via existing maintenance road connecting S.W. Scholls Ferry Road and interior bridge over Fanno Creek; dredge mobilization on tilt-trailer towed by pickup. Farming equipment to spread out sediment can utilize existing bridges over Fanno and Woods Creeks.
	3c. Infrastructure Damage Avoidance	N	Dredge slurry pipes placed atop turf, but sediment bag placement and spreading sediments will severely damage turf. If sediment is tilled into soil at Fairway 15, then irrigation and drainage pipes will need to be replaced.
Environmental Impact	4a. Stream Impacts	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4b. Stream Functions	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4c. Wetland Impacts	N	Emergent fringe of Junor Lake will be reduced by excavation of sediment. Temporary impact to terrestrial Wetland C during excavation phase, but restored after project completion; Wetlands A and B are avoided
	4d. Wetland Functions	N	Temporary displacement of invertebrate habitat within pond fringe (Wetland C). Increased flood storage in Wetland C.
	4e. Wildlife Impacts	N	No impact to wildlife.
	4f. Wildlife Functions	N	No loss of wildlife functions..
	4g. Forest Upland Impacts	N	No impact to upland forests.
	4h. Forest Upland Functions	N	No impact to upland forests.
Cost	5a. Dredge or Excavation and Reservoir Cost	Y	Approx. $400,000 for dredge operations
	5b. Sediment Bag Placement Cost	Y	Approx. $100,000 for manufacturing and ground preparation (must create water catchment berm).
	5c. Infrastructure Cost	N	Approx. $325,000 to transport the sequestered sediment to one or more fairways, then rehabilitate turf where damaged by sediment bag placement and spreading out sediment. Given potential long-term damage to turf condition, PGC may expend an additional $200,000 rehabilitating fairways where sediment was placed.
	5d. Implementation Cost	N	4 to 5 fairways become inoperable when sediment bags placed, then later spread out on turf. Rehabilitation time is estimated at 6 to 8 months, which makes course unviable.

Other Qualitative Factors	6a. Complete Golf Course	N	This option removes essential elements of the golf course
	6b. Design Integrity	N	The golf course design will no longer be suitable for golf play or tournaments
	6c. Drainage	N	Irrigated landscaping and drainage for landscaping health will be destroyed
	6d. Accessory Work Areas	Y	The alternative will maintain accessory work areas

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Offsite Quarry Sediment Placement Alternative

Sediment placement at a quarry site was examined, which will involve hauling the sediment captured in the sediment bags offsite. Quarries commonly accept clean fill material to backfill previously-mined areas (for future reclamation). Like traditional fill operations, quarries accept clean soil and that soil can be delivered in dump trucks once it is solid material. To attain solid-like consistency, excess water must first drain out of the sediment bags, then it can be loaded into dump trucks. At least a year is needed to remove the excess water from the sequestered sediment. The most suitable location is Wetland A, which has a natural configuration to capture drain water. Since the filled sediment bags are too heavy to lift individually, each bag will be cut open, then sediment loaded by backhoe into dump truck. The anticipated number of truck loads is 550 to 600 (assuming 12 cubic yard capacity).

There are several quarries in their late stages of mining and/or already in their reclamation phase in the vicinity of S.W. Tonquin Road and S.W. Morgan Road (23 miles away), about 2 miles south of Sherwood and 3 miles southwest of Tualatin. This vicinity is approximately 14 miles south by southwest of Portland Golf Club (45- to 60-minute roundtrip travel). This vicinity is more desirable than quarries in the Cooper Mountain area and Burlington area, since it is closer; the travel route is mostly on highways/arterials; and will cause a lesser impact on neighborhoods. A highway travel route has wider, safer roads, better visibility (especially for loaded trucks), and heavier-duty construction. The only available travel route will be via S.W. 82nd Avenue, then S.W. Garden Home Road and S.W. Oleson Road to Oregon Highway 217. While it is not preferred to drive dump trucks through residential neighborhoods with narrow streets, it is the only access route available for this activity (no road through the golf course, for example). Such route dramatically increases the risk of damaging underground sewer lines under the Fanno Creek trail – this is unacceptable risk for PGC, as well as the adjacent neighborhood and downgradient Fanno Creek floodplain.

The trucking time is approximately 7 trips per truck per day (including 1 hour lunch) to the nearest, available quarry. The excavator is capable of filling 4 trucks per hour; therefore, about 28 trucks per day will haul the sediment to the nearest, available quarry site. Given weekends, holidays and mechanical difficulties, the sediment hauling is estimated to span approximately 5 weeks. Recent inflation has substantially increased the expected loading and hauling cost to $350,000, plus an additional dumping cost of roughly $115,000. There will also be labor and support equipment costs (such as flaggers, street sweeping, etc.) that add another estimated $55,000. Lastly, project completion and restoring Wetland A will be $125,000 for construction and $75,000 for follow-up maintenance and monitoring (to assure ground cover is re-established). Added together, the option to haul the sediment offsite to a quarry will cost approximately $720,000. Such cost is substantially higher than the cost of the proposed alternative. The project team considered this supplemental hauling, and disposal cost impracticable.

Please note, golf balls exist in the sediment that will be dredged, and the golf balls will not be removed by the dredging process. As such, the dredged material does not meet the definition of "clean fill" under OAR 340-093-0030(18), and cannot therefore be disposed at a quarry or construction site. OAR 340-093-0040(1). PGC is aware of its responsibility to handle and dispose of the golf balls as required by law, and will work with the Oregon Department of Environmental Quality to ensure proper disposal based on its permits issued by the USACE and DSL in this JPA process. As such, PGC has analyzed offsite quarry sediment placement, but the alternative is ultimately not possible.

Offsite Quarry Sediment Placement			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Utilizes existing Junor Lake
	1b. Sediment Disposal Size	Y	Sediment disposal volume is possible
Site Availability	2a. Water Storage/Supply Availability	Y	Existing Junor Lake will have adequate water storage capacity once dredging is complete
	2b. Sediment Disposal Availability	N	Due to golf balls mixed with sediment, quarries cannot accept the dredged material as clean fill. Instead, the sediment mixture if hauled offsite, must go to an authorized landfill.
Logistics	3a. Water Use Infrastructure	Y	Junor Lake is compatible with existing water use infrastructure
	3b. Construction Ingress/Egress	Y	Dredge equipment access via existing maintenance road connecting S.W. Scholls Ferry Road and interior bridge over Fanno Creek; dredge mobilization on tilt-trailer towed by pickup; sediment bag placement construction access to S.W. 82nd Avenue (crossing Fanno Creek trail)
	3c. Infrastructure Damage Avoidance	Y	Dredge slurry pipes placed atop turf avoids damage to subsurface irrigation and drainage systems in Fairways 13, 14 and 15; steel plating and other measures necessary to protect underground sewer lines and utilities below Fanno Creek trail (no damage to underground infrastructure is permissible).
Environmental Impact	4a. Stream Impacts	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4b. Stream Functions	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4c. Wetland Impacts	Y	Sediment bag placement will temporarily impact Wetland A; emergent fringe of Junor Lake replaced with open water and adjacent terrestrial Wetland C avoided; higher functioning Wetland B is avoided
	4d. Wetland Functions	Y	No permanent impact to Fanno or Woods Creeks. Wetland A would temporarily lose water storage and desynchronization functions, as well as sediment trapping, wildlife and amphibian habitat, and songbird habitat.
	4e. Wildlife Impacts	Y	Temporary filling of Wetland A will displace breeding, nesting and feeding habitat for wetland-dependent songbirds, small mammals, and amphibians. Temporary displacement of invertebrate habitat within pond fringe (Wetland C).
	4f. Wildlife Functions	Y	Temporary loss of wildlife functions will be restored after project completion and wetland rehabilitation.
	4g. Forest Upland Impacts	N	No impact to upland forests
	4h. Forest Upland Functions	N	No impact to upland forests
Cost	5a. Dredge or Excavation and Reservoir Cost	Y	Approx. $400,000 for dredge operations
	5b. Sediment Bag Placement Cost	N	Approx. $520,000 for manufacturing, ground preparation, dump truck hauling, and quarry tipping fees. Additional cost of $200,000 for post-project restoration of Wetland A.
	5c. Infrastructure Cost	Y	Approx. $75,000 for temporary access via S.W. 82nd Avenue, including steel plate covers for sewer lines/utilities
	5d. Implementation Cost	Y	About 10 days disruption to golf course for mobilization, set-up, post-dredging turf restoration; golf course disruption limited to Fairways 7, 11, 13, 14 and 15 for 1 hour durations
Other Qualitative Factors	6a. Complete Golf Course	Y	Golf course elements will be maintained
	6b. Design Integrity	Y	The golf course design will be maintained
	6c. Drainage	Y	The golf course's drainage and irrigation will be maintained
	6d. Accessory Work Areas	Y	No impact to accessory work areas

Offsite Traditional Sediment Placement Alternative

Another alternative for sediment disposal is hauling it offsite as construction fill. Traditional fill sites, like quarry fill sites, require clean material that can be piled and later re-worked with bulldozers and blade graders. The quarry sediment placement alternative describes the excavation and hauling process, including utilizing Wetland A for temporary sediment bags placement (drain off excess water, then offsite hauling). Assuming a similar haul distance as the quarry sediment placement alternative, this alternative may not have a dump or "tipping" fee, however, as predominantly silt material, it would be difficult to find someone to accept it. Specifically, the sediment is highly compressible and requires substantially extra work to mix it with other soil that has greater soil strength and more consistently has a firmness suitable for building atop. It is unlikely a property owner or contractor would accept this material as fill due to its compressible attributes, and large volume. Given these limitations (both cost and feasibility), traditional clean fill sites are not viable.

Offsite Traditional Sediment Placement			
Project Criteria		**Met**	**Comments**
Site Size	1a. Water Storage/Supply Size	Y	Utilizes existing Junor Lake
	1b. Sediment Disposal Size	Y	Sediment disposal volume is possible
Site Availability	2a. Water Storage/Supply Availability	Y	Existing Junor Lake will have adequate water storage capacity once dredging is complete
	2b. Sediment Disposal Availability	N	Due to golf balls mixed with sediment, construction sites cannot accept the dredged material as clean fill. Instead, the sediment mixture if hauled offsite, must go to an authorized landfill.
Logistics	3a. Water Use Infrastructure	Y	Junor Lake is compatible with existing water use infrastructure
	3b. Construction Ingress/Egress	Y	Dredge equipment access via existing maintenance road connecting S.W. Scholls Ferry Road and interior bridge over Fanno Creek; dredge mobilization on tilt-trailer towed by pickup; sediment bag placement construction access to S.W. 82nd Avenue (crossing Fanno Creek trail)
	3c. Infrastructure Damage Avoidance	N	Dredge slurry pipes placed atop turf avoids damage to subsurface irrigation and drainage systems in Fairways 13, 14 and 15; steel plating and other measures necessary to protect underground sewer lines and utilities below Fanno Creek trail (no damage to underground infrastructure is permissible).
Environmental Impact	4a. Stream Impacts	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4b. Stream Functions	N	No impact to Fanno Creek, temporary coffer dam placed in Woods Creek with bypass pipe to isolated flow during dredging
	4c. Wetland Impacts	Y	Sediment bag placement will temporarily impact Wetland A; emergent fringe of Junor Lake replaced with open water and adjacent terrestrial Wetland C avoided; higher functioning Wetland B is avoided
	4d. Wetland Functions	Y	No permanent impact to Fanno or Woods Creeks. Wetland A would temporarily lose water storage and desynchronization functions, as well as sediment trapping, wildlife and amphibian habitat, and songbird habitat.
	4e. Wildlife Impacts	Y	Temporary filling of Wetland A will displace breeding, nesting and feeding habitat for wetland-dependent songbirds, small mammals, and amphibians. Temporary displacement of invertebrate habitat within pond fringe (Wetland C).
	4f. Wildlife Functions	Y	Temporary loss of wildlife functions will be restored after project completion and wetland rehabilitation.
	4g. Forest Upland Impacts	N	No impact to upland forests
	4h. Forest Upland Functions	N	No impact to upland forests

Cost	5a. Dredge or Excavation and Reservoir Cost	Y	Approx. $400,000 for dredge operations
	5b. Sediment Bag Placement Cost	N	Approx. $600,000 for manufacturing, ground preparation, dump truck hauling to construction site, and post-construction revegetation
	5c. Infrastructure Cost	Y	Approx. $75,000 for temporary access via S.W. 82nd Avenue, including steel plate covers for sewer lines/utilities
	5d. Implementation Cost	Y	About 10 days disruption to golf course for mobilization, set-up, post-dredging turf restoration; golf course disruption limited to Fairways 7, 11, 13, 14 and 15 for 1 hour durations
Other Qualitative Factors	6a. Complete Golf Course	Y	Golf course elements will be maintained
	6b. Design Integrity	Y	The golf course design will be maintained
	6c. Drainage	Y	The golf course's drainage and irrigation will be maintained
	6d. Accessory Work Areas	Y	No impact to accessory work areas

Summary of Alternatives

The project team for Portland Golf Club evaluated 19 alternative scenarios, ranging from no-action, replacement golf course, new irrigation pond or reservoir, sediment placement in Wetland A or Wetland B, sediment placement within golf course fairways or driving range, and several variations of these alternatives. Five alternatives were immediately rejected for exorbitant cost ($4M to $40M). The excavation of loose sediment alternative and sediment placement in Wetland B alternative were also immediately rejected due to greater environmental impact. The removal of mature upland forest (>100 year old trees) was rejected for significant loss of wildlife habitat and valuable design resource for golf course. Four alternatives were rejected on basis of significantly disrupting golfing play by closure of fairway(s) or driving range for 9 to 12 months, as well as exceeding $1M expense. Two alternatives were dismissed because sediment bag placement would severely interrupt golf course maintenance, as well as exceeding $1M expense. An alternative to remove only half of the accumulated sediment and remove smaller amounts over several decades was rejected for more than doubling the project cost, but having the same environmental impacts. Two alternatives that would temporarily store the sediment in Wetland A, then later transport offsite were not practicable, since hauling costs add a minimum of $500,000 to the project expense. And another alternative that would temporarily store salvaged soil in Wetland A, then later cover sediment bags was not practicable since disturbs 2 times larger area and it doubled the project cost. The following table summarizes each alternative, estimated cost and reason(s) for rejecting such alternative.

Alternative	Estimated Cost	Rejection Rationale
No-Action	$25 million	Loss of irrigation water storage in Junor Lake would result in golf course closure. Not financially viable alternative.
Sediment Excavation, loose material placement in Wetland A	$950,000	Impacts Wetland A, large cost to build haul road across 3 fairways, then restore afterwards. Temporary closure of 3 fairways for 9 months. Significant disruption of golf course operations (player activity). Not financially viable alternative.
Periodic Dredging, sediment bag placement in Wetland A.	$1.35 million	Initial impacts 0.4-acre of Wetland A; however, future dredging ultimately fills entire wetland. Repeated costs for two additional dredging within 30 years. Not financially viable alternative.

Alternative (continued)	Estimated Cost	Rejection Rationale
Replacement Golf Course	$40 million	Not financially viable alternative.
Replacement Irrigation Pond	$1.5 million	Impacts Wetland A with excess spoils from new pond excavation. Temporary closure of 3 fairways for 9 months during pond excavation and post-project fairway restoration. Not financially viable alternative.
Metal or Concrete Reservoir(s)	$4.2 million	Partial impact to Wetland A due to size of reservoir(s). Restoration of damaged fairway irrigation and drainage systems. Not financially viable alternative.
Well and Domestic Water Source	$6.7 million	Unstable water source and extensive construction to bring new water source to golf course. Not financially viable alternative.
Recycled Water Source	$9.2 million	Water source not currently available and extensive construction to bring recycled water source to golf course. Not financially viable alternative.
Temporary Sediment Bag Placement at Wetland, Haul sediment to quarry	$1.2 million	Temporary impact to Wetland A, then later haul away sediment to quarry. Post-project restoration of Wetland A. Not financially viable alternative.
Temporary Sediment Bag Placement at Wetland A, Haul sediment to offsite location	$1.1 million	Temporary impact to Wetland A, then later haul away sediment to undetermined location. Unlikely to find land owner or contractor to accept silty material with golf balls. Post-project restoration of Wetland A. Not financially viable alternative.
Sediment Bag Placement at Yard Debris Area	$1.2 million	Small area requires removal of loose, old fill material, then later haul away sediment to restore land back to yard debris area. Significant disruption of golf course maintenance activities. Not financially viable alternative.
Sediment Bag Placement at Turf Farm Area	$1.1 million	Temporary impact to turf farm, then later haul away sediment to restore land back to turf farm. Significant disruption of golf course maintenance activities. Not financially viable alternative.
Sediment Bag Placement at Driving Range	$950,000	Driving range temporarily relocated to turf farm and short game practice area. Driving range reconstructed after sediment spread out. Replacement of irrigation and drainage systems. Significant disruption of golf course operations (player activity). Not financially viable alternative.
Sediment Bag Placement at Fairway 15 or multiple fairways	$1.1 million	1 to 3 fairways closed for at least 1 year for sediment placement, then fairway reconstructed after sediment spread out. Replacement of irrigation and drainage systems. Significant disruption of golf course operations (player activity). Not financially viable alternative.

Alternative (continued)	Estimated Cost	Rejection Rationale
Sediment Bag Placement at Upland Forest	$725,000	Destruction of mature, 100-year old trees, loss of wildlife habitat, loss of golf course design element. Impact to adjacent neighborhood quality of life.
Sediment Bag Placement west of Wetland A	$1.1 million	Temporary impact to Wetland A for overburden storage, then post-project wetland restoration. Disturbs 2 times larger area than other alternatives. Not financially viable alternative.
Sediment Bag Placement between Fairways	$1.6 million	Requires Fanno Ck. bridge replacement, construction of multiple disposal sites, removal of large trees. Significant disruption of golf course operations (player activity). Not financially viable alternative.
Sediment Bag Placement in Wetland B	$1.3 million	Requires Fanno Ck. bridge replacement, loss of forested wetland, loss of floodplain storage. Not financially viable alternative.
Sediment Bag Placement in Wetland A	$550,000	Not rejected. Preferred alternative has less wetland impact than Wetland B alternative. Less ground disturbance, and least disruption to golf course activities and maintenance operations.

Mitigation Analysis

Mitigation cannot be used as a method to reduce environmental impacts in the evaluation of alternatives. Thus, this section addresses the Applicant's proposed mitigation of environmental impacts from the least environmentally damaging practicable alternative identified above.

In accordance with State and Federal Mitigation Rules, mitigation is best accomplished for this project via purchase of credits from an established wetland mitigation bank. Applicant responsible compensatory mitigation (onsite wetland replacement) is not economically, spatially, or environmentally feasible. As such, Applicant's team analyzed potential purchase of credits from agency-approved Butler Mitigation Bank.

As per principal objectives for Compensatory Wetland Mitigation (CWM), the mitigation credit purchase will satisfy the following objectives:

A) Replacing wetland functions and values lost at the impact site – The mitigation bank site has wetland functions and values that are greater, namely: 1) moderate to high wildlife/bird habitat and hydraulic functioning and value (due to plant diversity, habitat maturation, proximity to Tualatin River); 2) preferrable mitigation bank location, which is located away from urban development and stressors; 3) the mitigation bank possess moderate to high terrestrial habitat value (particularly for mammals and birds, and 4) mitigation bank exhibits similar hydrologic characteristics (mostly precipitation-driven seasonal wetlands, HGM-Slope). There is no ORWAP score from Butler Mitigation Bank to compare to the ORWAP score for Wetland A.

B) Providing local replacement of said functions and values – The impact to Wetland A is within the service area of the mitigation bank site, which provides local replacement of wetlands in the Tualatin Valley.

C) Providing self-sustaining wetland with minimal long-term maintenance – The mitigation bank site has achieved target functioning, which requires minimal maintenance. Long-term stewardship is a component of the mitigation bank obligations. Onsite or nearby mitigation (same vicinity as development) will be adversely affected by existing adjacent urban development and ongoing golfing activities/maintenance.

The proposed sediment bag placement will permanently impact 0.72-acre of wetland, which best qualifies as Palustrine, Emergent wetland (PEM) Cowardin and Slopes / Flat (S/F) Oregon Hydrogeomorphic (OHGM) classification. To more fully replace function and value lost by the proposed development, and as guided by DSL's *Compensatory Mitigation Eligibility and Accounting Determination Form*, purchase of PEM credits is deemed the environmentally superior strategy. Therefore, this is the preferred mitigation approach.

Conclusion

To restore capacity to Junor Lake, PGC has thoroughly evaluated numerous alternatives, including no-action, offsite sediment transport, recycled water use, and sediment bag placement. While PGC initially proposed sediment excavation and placement in Wetland A, further analysis found an environmentally preferrable solution to dredge accumulated sediments and sequester in sediment bags. The most suitable location is Wetland A due to site constraints, logistics, environmental impacts, cost, and the project purpose, which requires maintaining the PGC property as a world renowned golf course. The impact to Wetland A will be offset with a purchase of 0.72-acre PEM credits from Butler Mitigation Bank. Such purchase assures no net loss of wetland acreage, plus no loss of wetland function and value. In fact, the wetland function and value maintained through the mitigation bank purchase will exceed that in Wetland A.

The preceding Least Environmental Damaging Practicable Alternative (LEDPA) analysis documents this decision-making process and provides transparency for the rationale in selecting the preferred alternative. Specifically, the LEDPA analysis concluded that onsite excavation will result in greater environmental damage than sediment bag placement (which has a smaller, less invasive impact). Additionally, the sediment bag replacement approach will be environmentally preferrable than hauling over 600 truckloads of sediment to a rock quarry as fill (not currently allowed due to presence of inert golf balls within the sediment). The sediment bag placement approach will satisfy PGC's need to restore water storage capacity in Junor Lake, minimize golf play interruption, and minimize damage to essential golf infrastructure. While all of the alternatives are expensive, the preferred alternative utilizes less equipment, disturbs less ground, and makes use of natural topography to minimize environmental impacts. The preferred alternative also minimizes impacts to adjacent neighborhoods, avoids damage to an mature groves of Douglas-fir; and recycles water back to Junor Lake. This approach meets all of the project criteria; whereas, the rejected alternatives fail to meet several criteria and often have the same (or similar) environmental impact.

PGC Prior Dredge Sediment Bag Placement Photographs (October 2023)

View south at area used for sediment bag storage (foreground) and dredge equipment staging (background near vehicles). Prior dredging attempt (circa 1990s) was not successful because dredging equipment was too small to handle large volume of sediment accumulated in irrigation pond.

Plan view of area previously used for dredge equipment staging and sediment bag storage, circa 1990s (yellow outline). This location has an access gate to S.W. 86th Avenue.

PGC Prior Dredge Sediment Bag Placement Photographs (Con't.)

View north at area used for sediment bag placement during prior attempt removing sediment from irrigation pond (circa 1990s). This area is part of the turf farm (new turf growing at far left).

View northwest at staging area (foreground) and sediment bag placement area (background). Yard debris is temporarily stored, processed and composted in foreground area, while turf grown in background area.

Terra Science, Inc.

Soil, Water & Wetland Consultants

GRAPHIC SCALE

0 ft. 400 ft. 800 ft.

ALTERNATIVES ANALYSIS FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

June 2023

REPLACEMENT POND ALTERNATIVE

Terra Science, Inc. Soil, Water & Wetland Consultants	ALTERNATIVES ANALYSIS FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon June 2023	METAL OR CONCRETE RESERVOIR AND DOMESTIC WATER SOURCE ALTERNATIVES
GRAPHIC SCALE 0 ft. 400 ft. 800 ft.		

Terra Science, Inc. Soil, Water & Wetland Consultants GRAPHIC SCALE 0 ft. 400 ft. 800 ft.	ALTERNATIVES ANALYSIS FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon June 2023	RECYCLED WATER SOURCE ALTERNATIVE

Terra Science, Inc.
Soil, Water & Wetland Consultants

GRAPHIC SCALE

0 ft. 400 ft. 800 ft.

ALTERNATIVES ANALYSIS FOR PORTLAND GOLF CLUB
IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT
Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC)
Washington County, Oregon

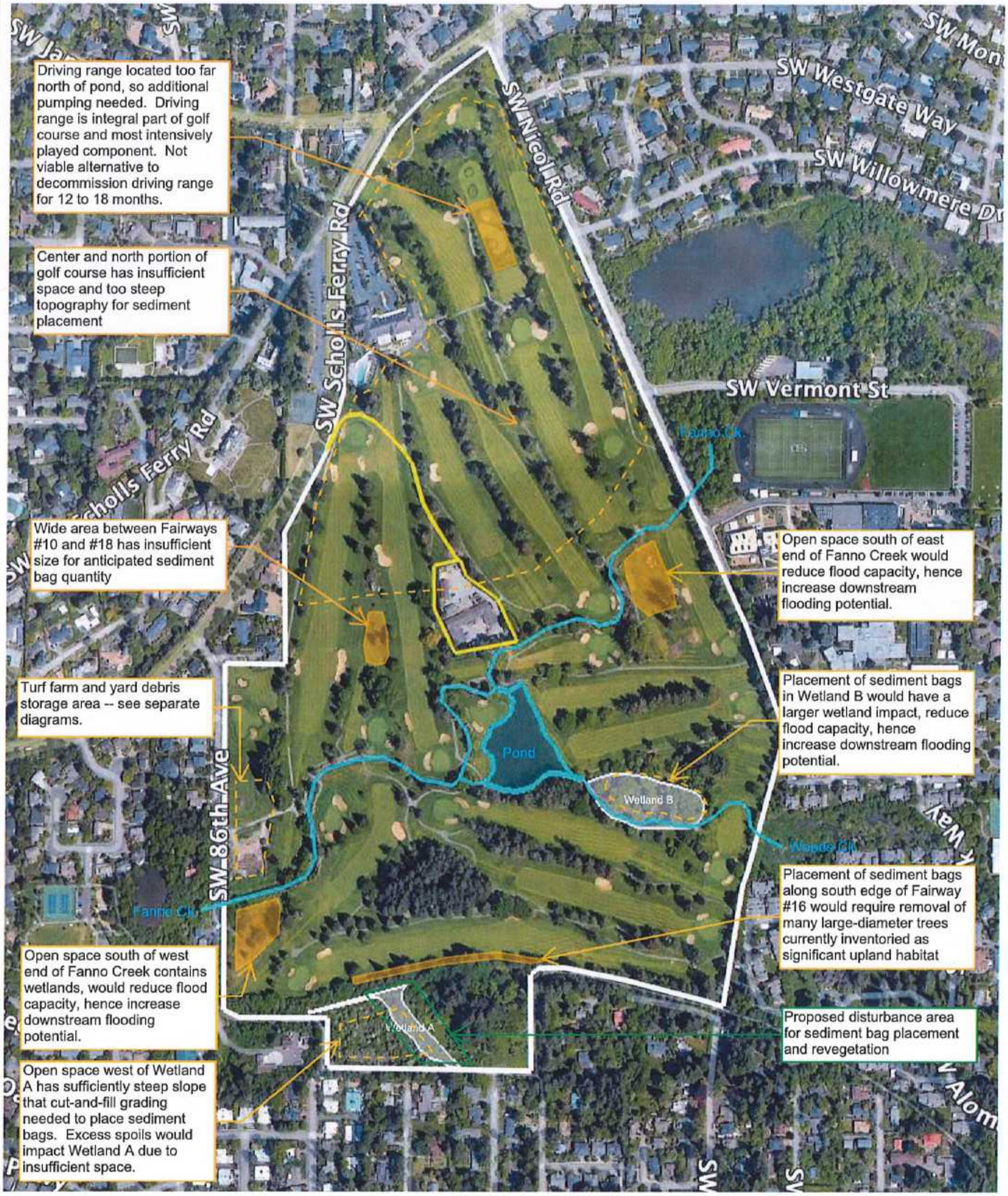
June 2023

SEDIMENT EXCAVATION ALTERNATIVE

Terra Science, Inc. Soil, Water & Wetland Consultants GRAPHIC SCALE 0 ft. 400 ft. 600 ft.	ALTERNATIVES ANALYSIS FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon October 2023	PERIODIC (REDUCED) DREDGING AND SEDIMENT BAG PLACEMENT ALTERNATIVE

Terra Science, Inc. Soil, Water & Wetland Consultants	ALTERNATIVES ANALYSIS FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon October 2023	YARD DEBRIS AREA SEDIMENT BAG PLACEMENT ALTERNATIVE
GRAPHIC SCALE 0 ft. 400 ft. 800 ft.		

Terra Science, Inc. Soil, Water & Wetland Consultants	ALTERNATIVES ANALYSIS FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon October 2023	TURF FARM SEDIMENT BAG PLACEMENT ALTERNATIVE
GRAPHIC SCALE 0 ft. 400 ft. 800 ft.		



Terra Science, Inc. Soil, Water & Wetland Consultants	ALTERNATIVES ANALYSIS FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon October 2023	DRIVING RANGE, FAIRWAY AND OTHER REJECTED LOCATIONS FOR SEDIMENT BAG PLACEMENT
GRAPHIC SCALE 0 ft. 400 ft. 800 ft.		

Terra Science, Inc. Soil, Water & Wetland Consultants	ALTERNATIVES ANALYSIS FOR PORTLAND GOLF CLUB IRRIGATION POND SEDIMENT REMOVAL AND PLACEMENT Portion of TAX LOT 1700, T. 1S, R. 1W, Sec. 24 (BC) Washington County, Oregon June 2023	LEAST ENVIRONMENTALLY DAMAGING PRACTICABLE ALTERNATIVE (LEDPA) SEDIMENT BAG PLACEMENT)
GRAPHIC SCALE 0 ft. 400 ft. 800 ft.		

October 16, 2023

Lonnie Lister
Portland Golf Club
5900 SW Scholls Ferry Road
Portland, OR 97225

Dear Lonnie,

I understand that Portland Golf Club is planning a project to remove sediment from Junor Lake on the golf course property. As part of that project, you are considering alternatives for disposal of the removed sediment, as well as potential options for the lake itself. You inquired regarding the following matters:

- The importance of maintaining Junor Lake as a water feature on the property; and
- The impact of storing large volumes (5,300 cubic yards) of silt sediment on the property:
    - Temporarily on top of a fairway for later disposal,
    - Under a fairway or multiple fairways for permanent disposal,
    - Permanently between fairways, or
    - Permanently in the yard debris area, turf farm area, or driving range area.

I have worked with Portland Golf Club as its golf course architect for the past 11 years, as well as working on the property prior to that time, so I am intimately familiar with the golf course property. I was a PGA Professional prior to transitioning to golf course architecture 23 years ago, and, since that transition, I have designed, improved, and worked on numerous golf courses. My experience is further outlined in the attached CV.

Successful golf course design includes numerous interrelated components that function together to provide the elements essential for golf play. Playability is an important component of golf course design, related to the ability of a course to accommodate all types and levels of play, allowing novice and professional golfers, and all in between, to enjoy a golf course. The width of a playing corridor is directly related to playability, allowing golfers to have options when playing a course. The narrower a course, the less options exist, and options are essential to strategy. Good design allows a less experienced player to take more shots to avoid challenging aspects of the course, while an experienced player will be able to make precise shots through the difficult elements of the design. Moreover, the sequencing of golf play requires variability between holes, and highlighting of the best natural features of the property and topography.

This is not to say that golf course design ends with its fairways and greens. Driving ranges and other practice areas are needed for players to improve their golf games. Transitions between holes are similarly part of the design and aesthetic of the course. Hazards should be beautiful and strategic and include variety, including bunkers, water hazards, rough areas, trees, and contours. Golf course must be constructed properly to incorporate all the necessary design elements, while also ensuring that soil and drainage are both appropriate to support the golf course landscaping. Finally, golf courses are supported by other basic components that are essential to upkeep and operations, such as areas for yard debris and growing replacement turf grass – a golf course without these operational components cannot sustain the vast amount of work that goes into a golf course and its maintenance.

Junor Lake is an essential and central feature of the golf course's design. It is a water hazard, provides natural variety to the course, and serves as the golf course's source of irrigation water. It is extremely important for Portland Golf Club to maintain Junor Lake as part of the golf course's design and to restore and preserve the original depth of the lake to store necessary irrigation water.

Suitable locations for disposal of 5,300 cubic yards of silt do not exist on the golf course portion of Portland Golf Club's property. Portland Golf Club is located on a relatively small property for a modern golf course. Every portion of the golf course is interconnected and functions together to create a playable design. Taking a fairway out of play destroys playability because a 17-hole golf course is not a complete golf course. The areas between fairways are not unused space. To the contrary, the existing slopes and contours of the entire property are part of the design, as well as rough areas, hazards, and trees. Silt material is harmful to golf course drainage. Portland Golf Club employs numerous methods to improve drainage by increasing sand in its soils, and introducing 5,300 cubic yards of silt on the property would be disastrous for proper maintenance of the grounds. Finally, operations on the golf course would be substantially hindered if the yard debris area or turf production area are used for sediment disposal. The Portland Golf Club property would be damaged and less suitable for golf play if large amounts of silt is stored or disposed of within the golf course portion of the property or its necessary accessory areas.

In summary, maintaining Junor Lake is essential to the design of Portland Golf Club's course, and introducing 5,300 cubic yards of silt material within the golf course will damage the golf course design and maintenance. Please let me know if you have any further questions related to the sediment-removal project.

Sincerely,

Dan Hixson

Dan Hixson

DAN HIXSON
PRINCIPAL
HIXSON GOLF DESIGN
13707 Fielding Road
Lake Oswego OR 97034
503-789-7176
danlhix@yahoo.com

Hixson Golf Design was founded in 2000 by PGA Professional Dan Hixson. A life time of growing up within a golf Professional family provided the thorough understanding of the game and its courses. Initially providing master planning and renovation designs for clubs and courses, new course design was added to the portfolio with the opening of Bandon Crossings in 2008.

The company's philosophy is to combine an economical business sense to architecture with sound and artistically designed golf courses that excite and inspire golfers. Smart creative designs result in courses that people want to play over and over.

CORE KNOWLEDGE & FUNCTIONAL SKILL AREAS:

- Strategic team-oriented approach.
- Provides experience and resources to monitor the project from inception through grow-in.
- 23 years of in-field experience working with builders to carry out intent of plans and vision.
- Experienced in Construction Management and shaping of golf features.
- A thorough knowledge of the game of golf, its history, current trends, players and design strategy.
- Experienced in creation of both Master plans and new course routings of any sizes.
- Financial responsibility to clients through creative problem solving.

PROFESSIONAL HISTORY & CREDENTIALS

- Clackamas Community College 1979-81
- Oregon State University 1982-84
- PGA of America Member since 1990
- Head Golf Professional at Columbia Edgewater Country Club 1990-99
- OGCSA Member since 2010

PORTFOLIO – NEW COURSES

- **6 New Courses,** Bandon Crossings, Wine Valley, Crestview, Silvies Valley Ranch (2), Bar Run and Lake Oswego Municipal Golf Course.
- **Architect of Record -** Creating and implementing Long Range Golf Course Improvement Plans and Master Plans at 21 Golf Courses and Country Clubs in Washington and Oregon.
- **Total Courses Worked on,** to date is 48, with multiple and ongoing projects at many of the courses.
- **Four Original Designs** are continually highly ranked and or have won awards on a National level.
- **Currently working** on a dozen projects of various sizes.

October 14, 2023

Mr. Lonnie Lister
General Manager
Portland Golf Club
5900 SW Scholls Ferry Road
Portland, OR 97225

Dear Lonnie,

The purpose of this opinion letter is to address your question concerning the removal of sediment naturally accumulated in one of the lakes on your golf course.

As part of the permitting for that project, I understand that duly authorized government agencies with which you are working have questioned whether the silt dredged from the lake can be incorporated as soil on the golf course. Alternatively, the agencies have also inquired about converting accessory work areas (yard debris area and/or turf farm) to a disposal area for the 5,300 cubic yards of silt you plan to dredge from the lake.

As you know, I am currently a consultant with GGA Partners, a leading advisory services firm which specializes in golf-related matters and, specifically, in the areas of golf course asset development and financing. I was previously the Vice President – Golf for Pulte Homes, which now does business as Pulte Group, the largest developer of golf communities in the US. In that position, I developed 27 golf courses in 10 states, and was responsible for the operation of more than 20 Pulte golf courses. Based on this and other experience, let me answer your questions about best practices when managing golf courses, and the financial implications of certain management decisions.

Silt is a difficult material for golf courses to incorporate, generally speaking. Golf courses require excellent water drainage to support landscaping and surfaces that are suitable for golf play. Silt inhibits drainage because it fills the spaces between the bits of silt between other types of soil. Golf courses typically engage in activities that improve drainage, so I would not advise you to add silt to Portland Golf Club's mixture of soils. Disposing of the silt on the golf course may seem to be a desirable option due to availability and lower expense, but doing so may cause damage to the soil composition and negatively impact turf quality.

The quality of golf course landscaping is of critical importance to the playability of the course itself, and thus the long-term economic health of the business. Golf courses with poor drainage and consequently poor landscaping and playing surfaces offer inferior golf experiences for their golfers. Such golf courses cannot attract or maintain club members. Additionally, event sponsors only select golf courses for tournaments if they exhibit superior design, construction, and maintenance.

Without the ability to attract and retain members and to hold tournaments, a golf course cannot be profitable, and therefore cannot be sustained economically. It is unwise to use silt in the manner being considered as material harm can arise from such an approach.

GGA Partners
2415 East Camelback Road, Suite 700
Phoenix, Arizona 85016

Tel: 1-888-432-9494
Email: info@ggapartners.com
Web: ggapartners.com

Finally, work areas are essential features of all successful golf courses. Those playing the game of golf experience only the golf course itself and other guest areas. However, the work areas are what allow golf course managers to maintain the course and grounds. Golf courses create extensive amounts of yard debris every year and require substantial equipment to complete regular maintenance and repairs. Further, golf course turf requires frequent patching due to wear and infrastructure repairs. If it can be avoided, I would not advise you to convert the yard debris area or turf farm for sediment disposal. Doing so will decrease the function and value of the golf course property and require use of other areas or offsite areas to support the work that goes into managing the golf course.

I stand ready to provide additional insight, if needed. Please advise me if you have any other questions or if I can be of assistance.

Sincerely,

Henry DeLozier

GGA Partners USA LLC

DEACON

901 NE Glisan St. Suite 100
Portland, OR 97232

P: 503.297.8791

deacon.com

OR# 134328 | WA# DEACOC*851BM

November 13, 2023

Mr. Lonnie Lister
General Manager
Portland Golf Club
5900 SW Scholls Ferry Road
Portland, OR 97225

Dear Mr. Lister,

I have been asked to evaluate the costs related to the Alternatives Analysis that has been prepared by Portland Golf Club for the pond dredging project. I feel comfortable weighing in on some of the costs, especially the ones related to construction. Other costs, related to repair of the golf course, rebuilding a golf course, etc. are better reviewed by someone qualified in those fields.

I will provide a short summary of my background. I am a 1971 graduate in Civil Engineering from Purdue University. For the next ten years I worked in construction for two large general contractors: Turner Construction and Continental Heller Construction. In 1981 I moved to Portland to start our company, Deacon Construction, a commercial general contractor, where I served as Project Manager, Estimator, CEO and now Chairman of the Board. Our company completes around $500 mil. of projects each year, with offices in Portland, Seattle, Sacramento, and Pleasanton.

I have read the Alternatives Analysis report and feel comfortable providing my opinion of the following costs in the report. I have the advantage of having worked on preliminary concepts for this project, in 2021, and analyzing the options for removing silt from the lake via dredging and excavation.

1. Replacement Bridge: the estimated cost of $250,000 is reasonable, assuming the cost includes engineering, demolition of the existing bridge and upgrading of the existing abutments.

2. Dredging or Excavation Cost: in 2021 our cost estimate for excavation and moving the silt to the Pinger property was approximately $400,000 and the estimate for dredging was around $650,000. This is relatively close to the $550,000 used in the current analysis.

3. Sediment Bag Cost & Grading: the estimated cost of $250,000 is very close to our previous estimate.

4. Partial Dredging or Excavation & Infrastructure Cost: the costs in the report are reasonable, based on what percentage of the overall project is assumed.

5. Temporary Access via SW 82nd Avenue: the $50,000 estimate for this work is reasonable.

6. Sediment Bag Cost & Haul Off of Silt: the estimated cost of $650,000 is reasonable as it would include the $250,000 noted above in Item #3, plus the haul off and dump fees for 5300 CY of silt. This balance of $400,000 equates to a cost of around $75/CY, which is realistic. It will be expensive to haul the silt, after one year of draining, and find a dump site for this material that is mixed with golf balls. It might even require separating the golf balls out of the fill before it can be placed offsite.

Hopefully this information is helpful. Feel free to let me know if there are questions or additional areas you would like feedback about.

Steve Deacon
Chairman
Deacon Construction, LLC

ELLEN F. ROSENBLUM
Attorney General

FREDERICK M. BOSS
Deputy Attorney General

DEPARTMENT OF JUSTICE
GENERAL COUNSEL DIVISION

DATE: August 31, 2018

TO: Racquel Rancier, Senior Policy Coordinator
Oregon Water Resources Department

FROM: Renée Moulun, Assistant Attorney in Charge
Natural Resources Section

SUBJECT: Transferring primary reservoir rights

QUESTIONS PRESENTED AND SHORT ANSWERS

First Question Presented: Do Oregon Revised Statutes (ORS 540.510 and 540.520) allow for transfers of the primary storage right[1] to change the purpose or character for which water is stored?

Second Question Presented: Do ORS 540.510 and 540.520 allow for transfers of the primary storage right that would change the location of the reservoir, or all or a portion of the location of stored water?

Third Question Presented: Do ORS 540.510 and ORS 540.520 allow for transfers of the primary storage right that change the point of diversion? Is the answer different if the point of diversion is a pipe/ditch (reservoir is off channel) or the point of diversion is the dam (on channel)?

Fourth Question Presented: Does ORS 540.523 allow for temporary transfers of the primary storage right that change the location of the reservoir, or all or a portion of the location of stored water?

Short Answer: Under current statutes, no to all questions, because a primary storage right is not a "water use subject to transfer." Primary storage rights are rights to store water rather than rights to make use of the water stored, and the definition of "water use subject to transfer" refers only to water rights for a beneficial use of water. We suggest that if current water policies require the transfer of stored water, then legislation should be pursued.

1 A primary storage right refers to a primary water right issued pursuant to ORS 537.400(1). A primary storage right is sometimes also referred to as a primary reservoir right. For the purposes of this memo our reference to primary storage rights is synonymous with primary reservoir rights.

ANALYSIS

It is well settled law in Oregon that "[b]eneficial use shall be the basis, the measure and the limit of all rights to the use of water in this state."[2] Once water is put to use, and the right perfected, it becomes appurtenant to the land and travels with the land, unless the seller specifically withholds those rights on sale.[3] However, any person seeking to sever the water from the land may, without losing the priority date, change the place of use, the type of use, or the point of diversion, consistent with the statutory provisions governing transfers.

Any person who holds a "water use subject to transfer" may make an application to the Water Resources Department for a permanent or temporary transfer.[4] Answering all of the questions presented requires interpreting the term "water use subject to transfer" to discern whether the legislature intended a "water use subject to transfer" to include a primary storage right.[5] Determining the intent of the legislature, in turn, requires an examination of the text and context of the statutes as well as consideration of pertinent legislative history.[6]

A. A water use subject to transfer must be a water right for a beneficial use of water

We begin our analysis with the text of ORS 540.510(1), and ORS 540.523(1) which both state that the holder of "a water use subject to transfer" may seek a transfer from the Water Resources Department. For the purposes of both statutes, ORS 540.505(4) defines "water use subject to transfer":[7]

> (4) "Water use subject to transfer" means a water use established by:
> (a) An adjudication under ORS chapter 539 as evidenced by a court decree;
> (b) A water right certificate;
> (c) A water use permit for which a request for issuance of a water right certificate under ORS 537.250 has been received and approved by the Water Resources Commission under ORS 537.250; or
> (d) A transfer application for which an order approving the change has been issued under ORS 540.530 and for which proper proof of completion of the change has been filed with the Water Resources Commission.

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2 ORS 540.610; Beneficial use without waste is a tenet that is foundational in Oregon water law. *Bennett v. City of Salem*, 192 Or 531, 544 (1951)(In the context of water law in Oregon, "water use" means "beneficial use without waste" meaning that "what water an appropriator appropriates must be devoted to a beneficial use, and he is never entitled to divert more water than is actually put to such use, reasonable transmission losses excepted").

3 ORS 540.510(1*); Klamath Irrigation Dist. v. U.S.*, 348 Or 15, 26 – 27 (2010); *Teel Irrigation Dist. v. Water Resources Department*, 135 Or App 16, 18 (1995), *affirmed in part and vacated in part* 323 Or 663 (1996); *Wilber v. Wheeler*, 273, Or 855, 862 (1975)(Water rights are appurtenant to land, and not to ownership of land); *Cookinham v. Lewis*, 58 Or 484, 491 (1911)(Beneficial use of water acquired under a permit must contemplate use on specific land which when completed shall become appurtenant to the land to which it is applied).

4 ORS 540.510(1); ORS 540.523(1).

5 *PGE v. BOLI*, 317 Or 606, 610-12 (1993).

6 ORS 174.020; *State v. Gaines*, 346 Or 160, 171 -72 (2009).

7 The definitions in ORS 540.505 apply to both permanent and temporary transfers. ORS 540.505(1).

The text of the definition states that a "[w]ater use subject to transfer means a *water use*" established by any of the following types of water rights listed in subsections 4(a) – (d).[8] As the Oregon Supreme Court clarified in *Ft. Vannoy Irrigation District v. Water Resources Commission*, the term "water use subject to transfer" refers to the water right itself, "not merely [to] the use of water provided under the [right].[9] That is, "water use subject to transfer" refers not just to the use element of a water right, but to all of the terms of the appropriation as represented in the water right such as the quantity of water appropriated, time period or season of use, point of diversion, the type of use, the place of use, the priority date, and the identity of the holder who is authorized to change the elements of the right.[10] In other words, the water right itself (including the terms of appropriation) is subject to transfer.

Not every water right is a "water use subject to transfer" however. The text specifies that a water use subject to transfer "means a water use" that is "established by" one of the four types of water rights listed, meaning, that only water rights for a "water use" may be transferred. To read the statute as allowing the transfer of any water right (whether it is for a water use or not) would be to impermissibly omit the phrase "water use" as it qualifies the word "established by [the four types of water rights]" from the definition of "water use subject to transfer."[11] The question then becomes what the legislature intended by the term "water use" as a water use may be established by one of the four types of water rights listed in ORS 540.505(4)(a)-(d).

The term "water use" in the context of Oregon water law, means "beneficial use without waste."[12] Other provisions of ORS Chapter 540 which are the context of ORS 540.510, confirm that the legislature intended to allow the transfer process only for water rights for a beneficial use. For example, ORS 540.520(1), which governs the transfer application process, clarifies the types of water uses that may be transferred, and allows for the transfer of other water "uses" not specified in the text.

> Except when the application is made under ORS 541.327 or when an application for a temporary transfer is made under ORS 540.523*, if the holder of a water use*

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[8] Emphasis added. The water uses in ORS 540.505(4)(a)-(d) are water rights that are sufficiently vested or choate to allow transfer of the right. The word "established" means to "settle or fix after consideration or by enactment or agreement." *PGE v. BOLI,* 317 Or at 611 ("Words of common usage typically should be given their plain, natural, and ordinary meaning."); *Webster's Third New International Dictionary* (3rd edition).

[9] Because "water use subject to transfer" may be considered a "term of art" judicial construction of the term is considered context. *State v. Dickerson* 356 Or 822, 829 (2015)(referring to terms of art used in the legal profession); *Ft. Vannoy Irrigation Dist. v. Water Resources Commission*, 345 Or 56, 78 (2008)(interpreting "water use subject to transfer").

[10] *Id., citing Tudor v. Jaca et al.*, 178 Or 126, 152- 43 (1945).

[11] ORS 174.010(Office of the judge is to ascertain and declare what is contained in the statute and not to insert what has been omitted, or to omit what has been inserted.); *PGE v. BOLI*, 317 Or at 611(In ascertaining the meaning of a statute, the court considers the rules of construction of statutory construction including the "statutory enjoinder 'not to insert what has been omitted, or to omit what has been inserted.'").

[12] ORS 537.120(water may be appropriated for a beneficial use and not otherwise); ORS 540.610 provides in relevant part that "[b]eneficial use shall be the basis, the measure and the limit of all rights to the use of water in this state." Beneficial use without waste is a tenet that is foundational in Oregon water law. *Bennett v. City of Salem*, 192 Or at 544.

> *subject to transfer for irrigation, domestic use, manufacturing purposes, or other use*, for any reason desires to change the place of use, the point of diversion, or the use made of the water, an application to make such change, as the case may be, shall be filed with the Water Resources Department.

(Emphasis added.)

In addition, the contents of a transfer application focus on previous water use and only authorize transfer of a water right that is not subject to forfeiture (i.e., loss of the water right because of non-use) and for which there is evidence of use under the right within the past five years:

> (2) The application required under subsection (1) of this section shall include:
> (a) The name of the owner;
> (b) The previous use of the water;
> (c) A description of the premises upon which the water is used;
> (d) A description of the premises upon which it is proposed to use the water;
> (e) The use that is proposed to be made of the water;
> (f) The reasons for making the proposed change; and
> (g) Evidence that the water has been used over the past five years according to the terms and conditions of the owner's water right certificate or that the water right is not subject to forfeiture under ORS 540.610. [13]

Other provisions of ORS 540.510 address transfers of water rights for a beneficial use of water. For example, ORS 540.510(1) directs that supplemental water rights must be transferred along with primary water rights in order to assure that a transfer will not result in enlargement.[14] Other subsections of ORS 540.510 allow for changes in the point of diversion,[15] address the use of conserved water on lands,[16] provide an exception to the rule of appurtenance to municipalities, ports, and water supply districts,[17] authorize any district water right "to be applied to beneficial

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[13] ORS 540.520(2).

[14] ORS 540.505(2) and (3) define "primary" and "supplemental water rights" and ORS 540.510(1) provides the regulatory mechanisms that prevent transfers from resulting in enlargement of rights that could occur if one exercised primary and supplemental rights simultaneously on separate parcels of land. "Enlargement" means:

> "an expansion of a water right and includes, but is not limited to:
> (a) Using a greater rate or duty of water per acre than currently allowed under a right;
> (b) Increasing the acreage irrigated under a right;
> (c) Failing to keep the original place of use from receiving water from the same source; or
> (d) Diverting more water at the new point of diversion or appropriation than is legally available to that right at the original point of diversion or appropriation."

OAR 690-380-0100(2).

[15] ORS 540.510(5)(allowing relocation of a point of diversion without going through the transfer process to follow the movements of a naturally changing stream); ORS 540.510(6)(authorizing a change in the point of diversion in the event government action results in or creates a reasonable expectation of a change in the surface level of a surface water source that impairs an existing point of diversion).

[16] ORS 540.510(2)(stating that the use of conserved water may be severed from the land and transferred and sold); ORS 540.510(7)(clarifying that the lease of the right to the use of conserved water does not constitute a change of use or a change in the place of use).

[17] ORS 540.510(3)(allowing "any water used" under a permit or certificate issued to a municipality to "be applied to beneficial use on lands to which the right is not appurtenant" according to certain conditions).

use on lands within the district to which the right is not appurtenant,"[18] and allow the application of exempt groundwater to land for irrigation purposes without going through the transfer process.[19] In sum, ORS 540.510 governs water rights for a beneficial use and affords flexibility that allows the continued beneficial use of water under changing circumstances. None of the provisions in ORS 540.510 address water rights for the storage of water or the transfer of stored water, though the legislature has clearly articulated such intent in other statutes governing transfers.

> Provided that the proposed transfer complies with all of the provisions of this subsection and will not result in injury to any existing water right, a district with a manager may, for one irrigation season, temporarily transfer the place of use of water appurtenant to any land within the legal boundaries of the district to an equal acreage elsewhere within the legal boundaries of that district *or temporarily transfer the type of use identified in a right to store water*. * * *[20]

In conclusion, the text and context of ORS 540.505(4) illustrate that the legislature intended that a "water use subject to transfer" must be a water right for a beneficial use of water. Because the definition of "water use subject to transfer" provided in ORS 540.505(4) applies to the statutes governing permanent and temporary transfers, we may conclude that only holders of water rights for a beneficial use of water may either permanently or temporarily transfer their water rights.

B. A primary storage right is not a "water use subject to transfer"

Having resolved what types of water rights are subject to transfer, our analysis now focuses on whether a primary storage right issued pursuant to ORS 537.400 is a "water use subject to transfer." Our conclusion is that it is not, because, generally, storage of water is not in and of itself a beneficial use of water, and a primary storage right is not a water right established by a "water use".

Except for certain ponds and "alternate reservoirs", appropriations of water for storage in a reservoir are governed by ORS 537.400. [21] Primary storage rights and secondary use rights are issued pursuant to ORS 537.400(1) which reads as follows:

> All applications for reservoir permits shall be subject to the provisions of ORS 537.130, 537.140, 537.142 and 537.145 to 537.240, *except that an enumeration of any lands proposed to be irrigated under the Water Rights Act shall not be required in the primary permit*. But the party *proposing to apply to a beneficial*

18 ORS 540.510(4).

19 ORS 540.510(8).

20 ORS 540.570(1)(governing temporary transfers within districts).

21 ORS 537.405 addresses "exempt reservoirs." ORS 537.405 governs reservoirs existing before January 1, 1993. ORS 537.409 governs "alternate reservoirs". ORS 537.248 allows municipalities or districts 10 years to complete construction of diversion or storage works and to perfect the water right and specifies that applications for reservoir permits are subject to the provisions of ORS 537.140 to 537.211. This advice, therefore, is pertinent to reservoirs authorized by ORS 537.248.

> *use the water stored in any such reservoir* shall file an application for permit, to be known as the secondary permit, in compliance with the provisions of ORS 537.130, 537.140, 537.142 and 537.145 to 537.240. The application *shall refer to the reservoir for a supply of water* and shall show by documentary evidence that an agreement has been entered into with the owners of the reservoir for a sufficient interest in the reservoir *to impound enough water for the purposes set forth in the application*, that the applicant has provided notice of the application to the operator of the reservoir and, if applicable, that an agreement has been entered into with the entity delivering the stored water. *When beneficial use has been completed and perfected under the secondary permit*, the Water Resources Department shall take the proof of the water user under the permit. The final certificate of appropriation shall refer to both the ditch described in the secondary permit and the reservoir described in the primary permit.

(Emphasis added.)

The first sentence of the statute states that all applications for "reservoir" permits shall be subject to the same provisions governing the application for any other permit, except that an enumeration of any lands proposed to be irrigated shall not be required in the primary permit. ORS 537.130, which is referenced in the first sentence of ORS 537.400(1), provides that a "person may not use, *store* or divert any waters until after the department issues a permit to appropriate the waters" (emphasis added). That is, the word "use" is distinguished from the word "store", demonstrating that the legislature intended that a permit may be obtained for the storage of water, as apart from a permit to use water. [22] ORS 537.140, which is also referenced in the first sentence of ORS 537.400(1), specifies that an application for a permit to construct a reservoir "shall give the height of the dam, the capacity of the reservoir, *and the uses to be made of the impounded waters*" (emphasis added).[23] In sum, the text of ORS 537.400(1) authorizes the appropriation of water for storage under a primary permit, and the statutes referenced in the first sentence, in turn, distinguish the right to store water from the right to use water, and require that applications for reservoir rights include the use to be made of the waters impounded.

The second sentence of ORS 537.400(1) distinguishes storage of water from the use of the water stored by stating "*[b]ut the party proposing to apply to a beneficial use the water stored*" in the reservoir must file an application for a permit "to be known as the secondary permit" (emphasis added).[24] The application for the secondary permit "shall refer to the reservoir for a supply of water" and shall show "by documentary evidence" that the applicant has entered into an agreement with the owner of the reservoir "for a sufficient interest in the reservoir to impound enough water for the purposes set forth in the [secondary] application." In other words, an applicant seeking to apply to beneficial use the water that is stored must identify

22 ORS 537.120(2); *Dept. of Transportation v. Stallcup*, 341 Or 93, 101 (2006)(Use of different words suggests that each was intended to have a different meaning).

23 ORS 537.140(1)(d).

24 Letter of Advice to Senator Timms from Donald C. Arnold, Chief Counsel (OP-6423)(September 14, 1992)(stating that the Bureau of Reclamation may not release stored water for beneficial purposes other than the purposes specified in its water right certificate and clarifying that if the bureau seeks to use water stored for a different purpose that it must obtain a new water right).

the reservoir that is the source of supply and show that they have a sufficient interest in the reservoir to impound the amount of water that will be used under the secondary permit. In short, the primary storage right is the source of the water to be put to beneficial use under the secondary permit.

"When beneficial use has been completed and perfected under the secondary permit," the department must take the proof of the "water user" under the secondary permit. The final certificate of appropriation, then, must refer to both the appropriation described in the secondary permit (the taking of water from the reservoir for use) and the reservoir described in the primary permit (the source of the water used). With the exception of in-reservoir use of water for stock watering, all uses of stored water must be pursuant to a secondary right.[25]

The context of ORS 537.400 confirms that a primary water right is a storage right rather than a water right that is established by water use.[26] For example, ORS 537.147 provides an expedited process for obtaining a secondary permit "*to use stored water*" from an existing reservoir and specifies that an applicant for an expedited permit must submit "evidence that the proposed use of the stored water is one of the authorized uses under the water right permit, certificate, or decree that allows the storage of water."

ORS 537.409 governs the "alternate permit application process" for reservoirs that have a storage capacity of less than 9.2 acre feet or a dam or impoundment structure less than 10 feet high. Under the "alternate" process the owner of the reservoir submits an application for a permit to appropriate and store water. However, "any person applying for a secondary permit for the use of stored water" from the reservoir must use a certified water right examiner to make the final proof survey which "shall apply to the storage reservoir and to the secondary use of the water in the reservoir."[27]

ORS 537.346 refers specifically to conversion of minimum perennial streamflows that *use* stored water.[28] In addition, ORS 537.385 authorizes the extension of an irrigation season where the supply of water is storage and sufficient storage exists to support the use under an extended season. In other words, storage is a source of water that is apart from natural flows, which source may supply water for subsequent beneficial uses.

Finally, it is worth noting that where the legislature intended the storage of water in a reservoir to in and of itself constitute a beneficial use of water, it has stated as such in the statutory text.

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25 ORS 537.400(2) states that where the beneficial use of water is the retention of water in the pond for watering livestock, a secondary permit is not required, though a water right is required to maintain water in the pond.

26 Other statutes addressing the storage and use of stored water are context for ORS 537.400. *See State v. Klein,* 352 Or 302, 309 (2012)(a statute's context includes related statutes).

27 It is not entirely clear whether the legislature intended also to make the storage of water in an alternate reservoir a beneficial use as indicated by reference to filing a "claim for beneficial use" in aid of certificating a storage right. It is clear, however, that the water in an alternate reservoir is a source and supply for use of water *outside* of the reservoir.

28 ORS 537.346(2).

> Reservoirs in existence on or before January 1, 1995, that store less than 9.2 acre-feet of water or with a dam or impoundment structure less than 10 feet in height, *are found to be a beneficial use of the water resources of this state*.[29]

In conclusion, the text and context of ORS 537.400(1) make clear that a primary storage right is the supply of water for the secondary water right which makes use of the water impounded.[30] A water right authorizing appropriation of storage, therefore, is not a water right that is established by water use, and so is not a "water use subject to transfer".

CONCLUSION

Both ORS 540.510 and ORS 540.523 allow the holder of a "water use subject to transfer" to either permanently or temporarily transfer their rights. A "'[w]ater use subject to transfer' means a *water use* established" by one of the four types of water rights listed in ORS 540.505(4)(a)-(d). Because the right subject to transfer must be established by a "water use," a "water use subject to transfer" means a water right for a beneficial use of water. A primary storage right allows appropriation and impoundment of water for a subsequent use and is not in and of itself a water right that is established by a "water use." Because a primary storage right is not a water right for beneficial use of water, it is not a "water use subject to transfer."

We understand that the current practices of the Water Resources Department do not conform to this advice, and in light of this, suggest the department seek legislation that facilitates current water management policies and needs.

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[29] ORS 537.405(1)(emphasis added).

[30] This advice concerning the character of a right to store water is consistent with previous advice. *See e.g.* 25 Op Atty Gen 206 (1951)("Storage in and of itself is not a use." Storage must be for a future purpose); *see also* 38 Op Atty Gen 956 (1977)(Describing the primary permit as applying to storage of water in a reservoir and the secondary permit as applying to the beneficial use such water).

Raleigh
Water
District

October 13, 2023

Lonnie Lister
Portland Golf Club
5900 SW Scholls Ferry Road
Portland, OR 97225

Dear Lonnie,

As you know, Portland Golf Club ("PGC") is within the boundaries of the Raleigh Water District (the "District"), which is a domestic water supply district formed under ORS, chapter 264, in the Portland metropolitan area. You inquired about whether the District might be able to supply large volumes of water to PGC on a temporary or permanent basis for its irrigation needs.

In order to supply water to PGC for irrigation, there are a couple hurdles that will need to be figured out. First, the District purchases water from the City of Portland under contract. PGC's large water demand will increase the District's peak water use in the summer, which will increase rates throughout the District and therefore may be expensive for PGC and all District customers. Second, the District receives water through a water line shared with other utilities. In the summer months, the District often reaches capacity for its share of use from the water line. As such, water deliveries to PGC may be restricted to available capacity, PGC may need to restrict its usage to particular times, or infrastructure upgrades may be required. Third, summer interruptible water is an option that is available from the City of Portland. This option would require the District to apply to the City of Portland for a specific amount of water to be purchased during a specified time frame above the contracted amount. This water is billed at a specified rate and is payable to Portland whether it is used or not. This amount would be passed on to PGC. However, the summer interruptible water is not guaranteed and is totally at the discretion of the City of Portland.

The District is willing to further discuss options for water deliveries to PGC. Please note that the District's standard terms for water delivery include the ability to curtail water use when supplies are insufficient for all users, and domestic needs may be prioritized over irrigation. The District is not able to offer guaranteed irrigation water service in large volumes to PGC throughout the year.

Sincerely,

Matt Steidler
District Manager
Raleigh Water District

APPENDIX E – WETLAND DELINEATION

Oregon
Kate Brown, Governor

Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
(503) 986-5200
FAX (503) 378-4844
www.oregon.gov/dsl

January 12, 2022

Portland Golf Club
Attn: Lonnie Lister, General Manager
5900 SW Scholls Ferry Road
Portland, OR 97225

Re: WD # 2021-0646 **Approved**
Wetland Delineation Report for Irrigation Pond Maintenance
Washington County; T1S R1W S24B TL1700 (Portion)
City of Beaverton Local Wetlands Inventory Wetland WO-3

Dear Lonnie Lister:

The Department of State Lands has reviewed the wetland delineation report prepared by Terra Science, Inc. for the site referenced above. Please note that the study area includes only a portion of the tax lot described above (see the attached maps). Based upon the information presented in the report, we concur with the wetland and waterway boundaries as mapped in Figure 6, 6A, 6B and 6C of the report. Please replace all copies of the preliminary wetland maps with these final Department-approved maps.

Within the study area, 3 wetlands (Wetland A, B and C, totaling approximately 2.19 acres), Woods Creek, and a pond (Irrigation Pond) were identified. The wetlands, creek and pond are subject to the permit requirements of the state Removal-Fill Law. Under current regulations, a state permit is required for cumulative fill or annual excavation of 50 cubic yards or more in wetlands or below the ordinary high-water line (OHWL) of the waterway (or the 2-year recurrence interval flood elevation if OHWL cannot be determined). In addition, Fanno Creek, an essential salmonid stream with a managed connection to the irrigation pond, is located just outside the study area boundary. Fill or removal of any amount of material below Fanno Creek's OHWL may require a state permit.

This concurrence is for purposes of the state Removal-Fill Law only. We recommend that you attach a copy of this concurrence letter to any subsequent state permit application to speed application review. Federal, other state agencies or local permit requirements may apply as well. The U.S. Army Corps of Engineers will determine jurisdiction under the Clean Water Act, which may require submittal of a complete Wetland Delineation Report.

Please be advised that state law establishes a preference for avoidance of wetland impacts. Because measures to avoid and minimize wetland impacts may include reconfiguring parcel layout and size or development design, we recommend that you work with Department staff on appropriate site design before completing the city or county land use approval process.

This concurrence is based on information provided to the agency. The jurisdictional determination is valid for five years from the date of this letter unless new information necessitates a revision. Circumstances under which the Department may change a determination are found in OAR 141-090-0045 (available on our web site or upon request). In addition, laws enacted by the legislature and/or rules adopted by the Department may result in a change in jurisdiction; individuals and applicants are subject to the regulations that are in effect at the time of the removal-fill activity or complete permit application. The applicant, landowner, or agent may submit a request for reconsideration of this determination in writing within six months of the date of this letter.

Thank you for having the site evaluated. If you have any questions, please contact Chris Stevenson, PWS, the Jurisdiction Coordinator for Washington County at (503) 986-5246.

Sincerely,

Pete Ryan

Peter Ryan, SPWS
Aquatic Resource Specialist

Enclosures

ec: Jason Clinch, Terra Science, Inc.
Washington County Planning Department
Danielle Erb, Corps of Engineers
Michael De Blasi, DSL

WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

Fully completed and signed report cover forms and applicable fees are required before report review timelines are initiated by the Department of State Lands. Make checks payable to the Oregon Department of State Lands. To pay fees by credit card, go online at: https://apps.oregon.gov/DSL/EPS/program?key=4.

Attach this completed and signed form to the front of an unbound report or include a hard copy with a digital version (single PDF file of the report cover form and report, minimum 300 dpi resolution) and submit to:

Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279.

A single PDF of the completed cover from and report may be e-mailed to: Wetland_Delineation@dsl.state.or.us.
For submittal of PDF files larger than 10 MB, e-mail DSL instructions on how to access the file from your ftp or other file sharing website.

Contact and Authorization Information

☒ Applicant ☒ Owner Name, Firm and Address: **Portland Golf Club** **Attn: Lonnie Lister, General Manager** **5900 S.W. Scholls Ferry Road** **Portland, OR 97225**	Business phone # **(503) 292-2651** Mobile phone # (optional) **N/A** E-mail: **N/A**
☐ Authorized Legal Agent, Name and Address (if different): **N/A**	Business phone # **N/A** Mobile phone # (optional) **N/A** E-mail: **N/A**

I either own the property described below or I have legal authority to allow access to the property. I authorize the Department to access the property for the purpose of confirming the information in the report, after prior notification to the primary contact.
Typed/Printed Name: Lonnie Lister Signature: [signature]
Date: 11/17/2021 Special instructions regarding site access: **Please contact wetland consultant prior to entering site.**

Project and Site Information

Project Name: **Portland Golf Club**	Latitude: **45.471435°N**	Longitude: **-122.760355°W**
Proposed Use: **Irrigation Pond Maintenance**	Tax Map # **1S 1W 24**	Tax Lot(s) **Portion of 1700**
	Tax Map #	Tax Lot(s)
Project Street Address (or other descriptive location): **5900 S.W. Scholls Ferry Rd**	Township **1S** Range **1W**	Section **24** QQ **B**
	Township Range	Section QQ
	Waterway: **Fanno Creek**	River Mile: **Unknown**
City: **Portland** County: **Washington**	USGS / NWI Quad(s): **Beaverton, OR**	

Wetland Delineation Information

Wetland Consultant Name, Firm and Address: **Terra Science, Inc., Attn: Jason Clinch** **4710 S.W. Kelly Avenue, Suite 100** **Portland, Oregon 97239**	Phone # **(503) 274-2100** Mobile phone # **N/A** E-mail: **jason@terrascience.com**

The information and conclusions on this form and in the attached report are true and correct to the best of my knowledge.
Consultant Signature: [signature] Date: 11-19-2021

Primary Contact for report review and site access is ☒ Consultant ☐ Applicant/Owner ☐ Authorized Agent

Wetland/Waters Present? ☒ Yes ☐ No | Study Area size: **±17.43 acres** | Total Wetland Acreage: **2.19 acres**

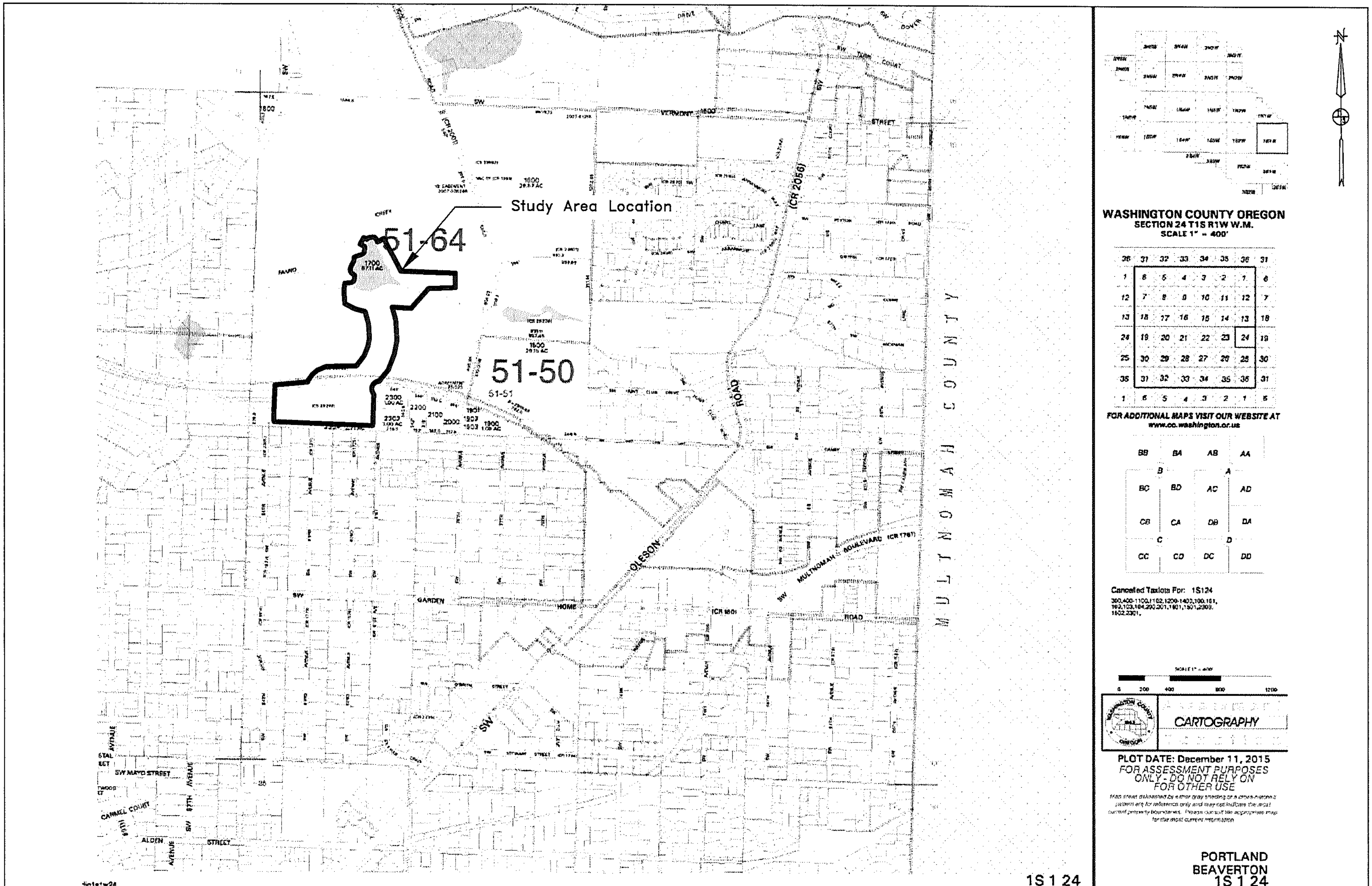
Check Box Applicable Boxes Below

☐ R-F permit application submitted	☒ Fee payment submitted $ 475
☐ Mitigation bank site	☐ Fee ($100) for resubmittal of rejected report
☐ EFSC/ODOE Proj. Mgr:	☐ Request for Reissuance. See eligibility criteria. (no fee)
☐ Wetland restoration/enhancement project (not mitigation)	DSL #: Expiration date:
☐ Previous delineation/application on parcel	☒ LWI shows wetlands or waters on parcel
If known, previous DSL #:	Wetland ID code: **Multiple ID codes**

For Office Use Only

DSL Reviewer: CS Fee Paid Date: ___/___/___ DSL WD #: 2021-0646

Date Delineation Received: 11 / 19 / 2021 Scanned: ☐ Electronic: ☒ DSL App. #: ______



SOURCE: ORMAP website, Washington County Assessor's Map 1S 1 24, 2021. Available at: <https://ormap.net/gis/index.html>

Terra Science, Inc.
Soil, Water, & Wetland Consultants

GRAPHIC SCALE
500' 0' 500' 1000' 2000'

WETLAND DELINEATION REPORT FOR
PORTION OF TAX LOT 1700
(T.1S R. 1W SEC. 24)
Washington County, Oregon

November 2021

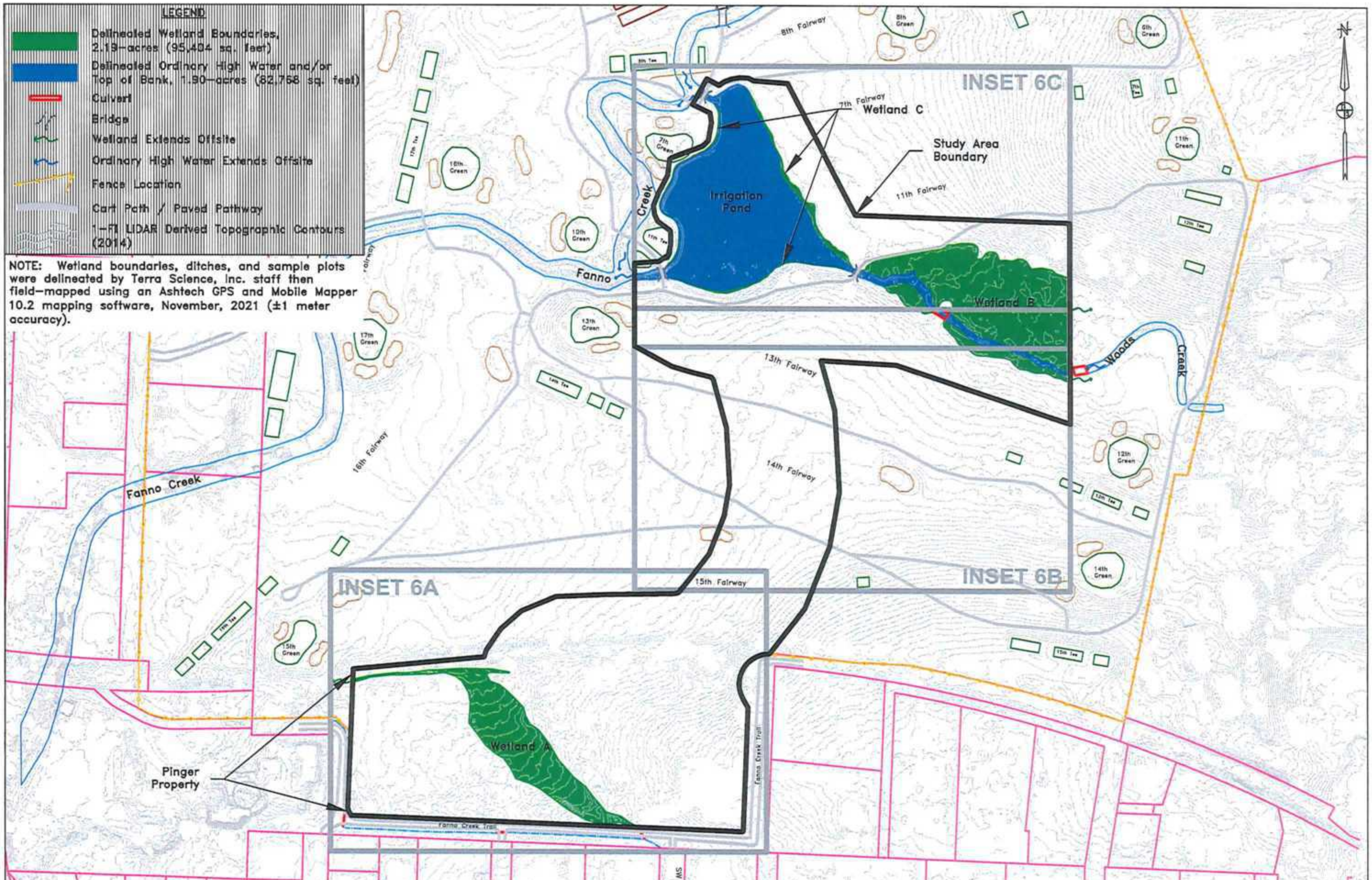
TAX LOT MAP
1S 1 24

FIGURE 2

LEGEND

- Delineated Wetland Boundaries, 2.19-acres (95,404 sq. feet)
- Delineated Ordinary High Water and/or Top of Bank, 1.90-acres (82,768 sq. feet)
- Culvert
- Bridge
- Wetland Extends Offsite
- Ordinary High Water Extends Offsite
- Fence Location
- Cart Path / Paved Pathway
- 1-Ft LIDAR Derived Topographic Contours (2014)

NOTE: Wetland boundaries, ditches, and sample plots were delineated by Terra Science, Inc. staff then field-mapped using an Ashtech GPS and Mobile Mapper 10.2 mapping software, November, 2021 (±1 meter accuracy).



SOURCES: LIDAR: Dept. of Geology and Mineral Industries. OLC Metro 2014: Final Delivery. Watershed Sciences, Inc.
Tax Lot Boundaries: Washington County GIS, 2021.

Terra Science, Inc.
Soil, Water, & Wetland Consultants

GRAPHIC SCALE
125' 0' 125' 250' 500'

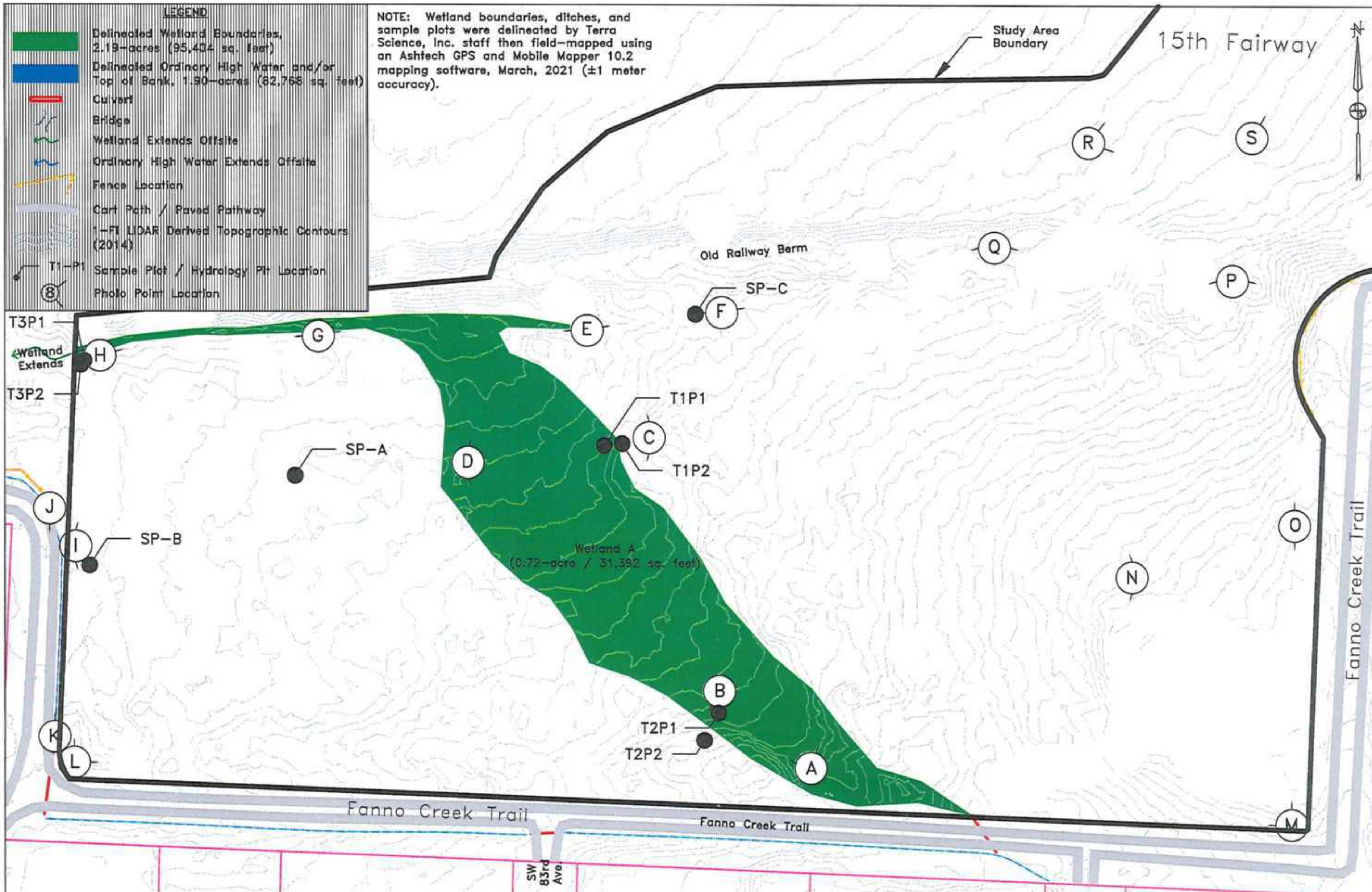
WETLAND DELINEATION REPORT FOR PORTION OF TAX LOT 1700 (T.1S R. 1W SEC. 24) Washington County, Oregon

November 2021

DSL WD # 2021-0646
Approval Issued 1/12/2022
Approval Expires 1/12/2027

WETLAND DELINEATION INDEX MAP

FIGURE 6



SOURCES: LIDAR: Dept. of Geology and Mineral Industries. OLC Metro 2014: Final Delivery. Watershed Sciences, Inc.
Tax Lot Boundaries: Washington County GIS, 2021.

Terra Science, Inc.
Soil, Water, & Wetland Consultants

GRAPHIC SCALE
40' 0' 40' 80' 150'

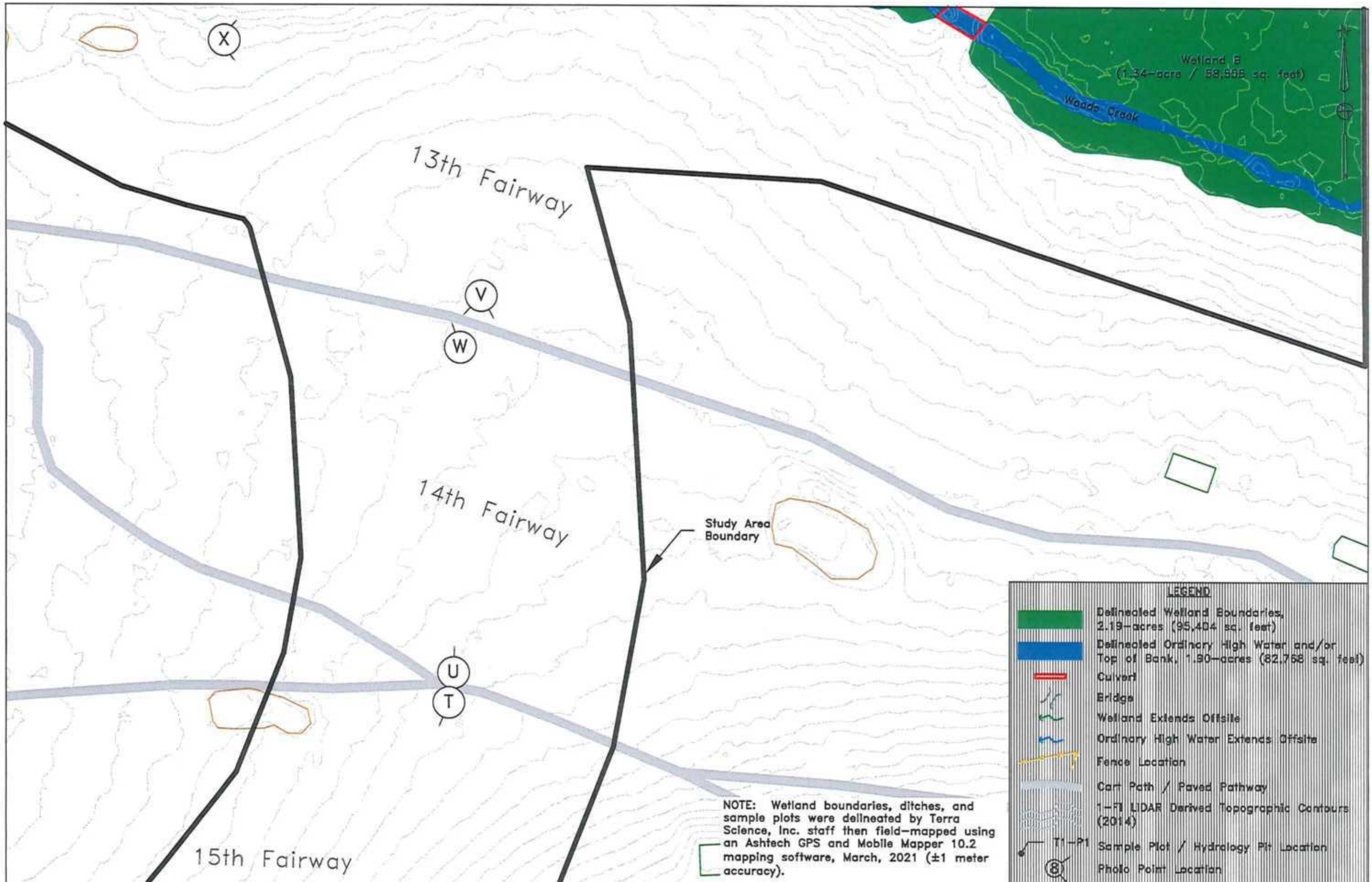
WETLAND DELINEATION REPORT FOR PORTION OF TAX LOT 1700 (T.1S R. 1W SEC. 24) Washington County, Oregon

November 2021

DSL WD # 2021-0646
Approval Issued 1/12/2022
Approval Expires 1/12/2027

WETLAND DELINEATION MAP (PINGER PROPERTY)

INSET 6A



SOURCES: LIDAR: Dept. of Geology and Mineral Industries. OLC Metro 2014: Final Delivery. Watershed Sciences, Inc.
Tax Lot Boundaries: Washington County GIS, 2021.

Terra Science, Inc.
Soil, Water, & Wetland Consultants

GRAPHIC SCALE
40' 0' 40' 80' 150'

WETLAND DELINEATION REPORT FOR
PORTION OF TAX LOT 1700
(T.1S R. 1W SEC. 24)
Washington County, Oregon

November 2021

DSL WD # 2021-0646
Approval Issued 1/12/2022
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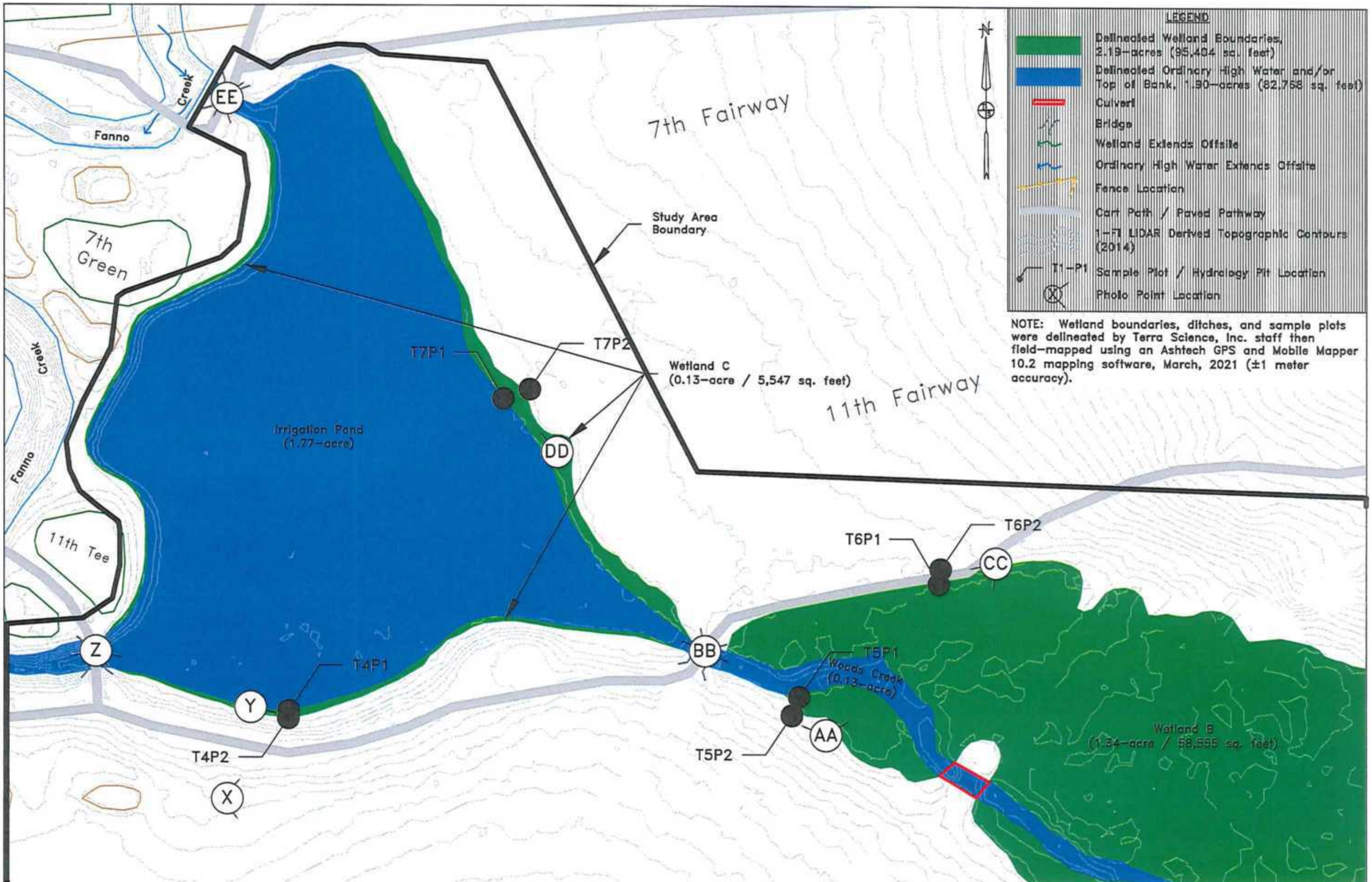
WETLAND DELINEATION MAP

INSET 6B



NOTE: Wetland boundaries, ditches, and sample plots were delineated by Terra Science, Inc. staff then field-mapped using an Ashtech GPS and Mobile Mapper 10.2 mapping software, March, 2021 (±1 meter accuracy).

SOURCES: LIDAR: Dept. of Geology and Mineral Industries. OLC Metro 2014: Final Delivery. Watershed Sciences, Inc.
Tax Lot Boundaries: Washington County GIS, 2021.

Terra Science, Inc.
Soil, Water, & Wetland Consultants

WETLAND DELINEATION REPORT FOR
PORTION OF TAX LOT 1700
(T.1S R. 1W SEC. 24)
Washington County, Oregon

November 2021

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Approval Expires 1/12/2027

WETLAND DELINEATION MAP

INSET 6C

APPENDIX F – OREGON RAPID WETLAND ASSESSMENT PROTOCOL (ORWAP) FUNCTIONAL ASSESSMENT REPORT

Oregon Rapid Wetland Assessment (ORWAP) V.3.2.*	Cover Page: Basic Description of Assessment
Site Name:	Portland Golf Club-Sediment Placement
Investigator Name:	P.Scoles
Date of Field Assessment:	Nov. 16, 2021
County:	Washington
Nearest Town:	Tigard
Latitude (decimal degrees):	45.47
Longitude (decimal degrees):	-122.7623
TRS, quarter/quarter section and tax lot(s):	T,01S, R. 01W, Sec. 24 (BC)
Approximate size of the Assessment Area (AA, in acres):	0.72
AA as percent of entire wetland (approx.). Attach sketch map if AA is smaller than the entire contiguous wetland.	100%
If delineated, DSL file number (WD #) if known:	Pending
Cowardin Systems & Classes (indicate all present, based on field visit and/or aerial imagery): Systems: Palustrine =P, Riverine =R, Lacustrine =L, Estuarine =E Classes: Emergent =EM, Scrub-Shrub =SS, Forested =FO, Aquatic Bed (incl. SAV) =AB, Open Water =OW, Unconsolidated Bottom =UB, Unconsolidated Shore =US	PEME
Predominant HGM Class: Estuarine=E, Lacustrine=L, Riverine=R, S= Slope, F= Flats, D= Depressional	Slope
Soil Unit Mapped in Most of the AA:	Aloha silt loam (mapping unit 1)
If tidal, the tidal phase during most of visit:	N/A
What percent (approximate) of the **wetland** were you able to visit?	100
What percent (approximate) of the **AA** were you able to visit?	100
Have you attended an ORWAP training session? If so, indicate approximate month & year.	Aug, 2010
How many wetlands have you assessed previously using ORWAP (approximate)?	16
Comments about the site or this ORWAP assessment (attach extra page if desired):	Subject PEM wetland formerly cleared, now dominated by non-native and invasive grasses. Adjacent ped/bike path is upper limit of contributing watershed. Lower end of wetland impounded by former RR berm. Golf course situated to north, older residential to south.

ORWAP V.3.2 Site Name:	Portland Golf Club-Sediment Placement
Investigator Name:	P.Scoles
Date of Field Assessment:	Nov. 16, 2021

Scores will appear below after data are entered in worksheets OF, F, T, and S. See Manual for definitions and descriptions of how scores were computed and ratings assigned.

	Normalized Scores & Ratings for this Assessment Area (AA):							
Specific Functions or Values:	**Function** Score	Function Rating	Rating Break Proximity	**Values** Score	Values Rating	Rating Break Proximity	Function Score (raw)	Values Score (raw)
Water Storage & Delay (WS)	4.74	Moderate	LM	0.00	Lower		4.74	0.00
Sediment Retention & Stabilization (SR)	4.85	Moderate		5.44	Moderate	MH	5.08	4.14
Phosphorus Retention (PR)	4.05	Moderate		2.10	Lower		4.28	1.74
Nitrate Removal & Retention (NR)	4.51	Moderate	LM	1.69	Lower		5.56	1.74
Anadromous Fish Habitat (FA)	5.68	Moderate		10.00	Higher		4.99	10.00
Resident Fish Habitat (FR)	0.00	Lower		0.00	Lower		0.00	0.00
Amphibian & Reptile Habitat (AM)	5.95	Moderate		6.67	Moderate	MH	5.40	6.67
Waterbird Nesting Habitat (WBN)	6.70	Moderate	MH	2.56	Moderate		5.56	2.56
Waterbird Feeding Habitat (WBF)	7.65	Higher		3.33	Moderate		6.90	3.33
Aquatic Invertebrate Habitat (INV)	2.18	Lower		2.33	Lower		4.25	2.83
Songbird, Raptor, Mammal Habitat (SBM)	2.33	Lower		3.33	Lower		4.34	3.33
Water Cooling (WC)	2.67	Moderate	LM	9.33	Higher		2.33	8.90
Native Plant Diversity (PD)	0.00	Lower		0.00	Lower		0.00	0.00
Pollinator Habitat (POL)	4.51	Moderate		3.92	Moderate		3.94	3.17
Organic Nutrient Export (OE)	5.94	Moderate					5.26	
Carbon Sequestration (CS)	3.51	Lower	LM				3.58	
Public Use & Recognition (PU)				3.50	Lower	LM		4.10

Other Attributes:	Score	Rating	Rating Break Proximity		
Wetland Sensitivity (SEN)	0.82	Lower			3.53
Wetland Ecological Condition (EC)	1.59	Lower			3.33
Wetland Stressors (STR)	5.07	Moderate	MH		4.67

GROUPS	Selected Function	Function Rating	Rating Break Proximity	Values Rating	Rating Break Proximity
Hydrologic Function (WS)	Water Storage & Delay (WS)	Moderate	LM	Lower	
Water Quality Support (SR, PR, or NR)	Sediment Retention & Stabilization (SR)	Moderate		Moderate	MH
Fish Habitat (FA or FR)	Anadromous Fish Habitat (FA)	Moderate		Higher	
Aquatic Habitat (AM, WBF, or WBN)	Waterbird Feeding Habitat (WBF)	Higher		Moderate	
Ecosystem Support (WC, INV, PD, POL, SBM, or OE)	Water Cooling (WC)	Moderate	LM	Higher	

NOTE: A score of 0 does not always mean the function or value is absent from the wetland. It usually means that this wetland has equal or less capacity than the lowest-scoring one, for that function or value, from among the 200 calibration wetlands that were assessed previously by Oregon Department of State Lands.

Date: Nov. 16, 2021	Name: P. Scoles		Site: Portland Golf Club-Sediment Placement		

Form OF Office Data ORWAP V. 3.2	Conduct an assessment only after reading the accompanying Manual and explanations in column E below. Answering many of the following questions requires viewing aerial imagery and maps, covering an area up to within 2 miles of the AA. **For each affirmative answer, change the 0 in the "Data" column to a "1".** Answer all items except where directed to skip to others. Questions whose cells in "Data" column have a **"W" MUST be answered for the ENTIRE wetland and bordering waters.**	For a list of functions to which each question pertains, see bracketed codes in column E. Codes for functions and their benefits are: WS= Water Storage, WC= Water Cooling, SR= Sediment Retention, PR= Phosphorus Retention, NR= Nitrate Removal, CS= Carbon Sequestration, OE= Organic Nutrient Export, INV= Aquatic Invertebrate Habitat, FA= Anadromous Fish Habitat, FR= Resident Fish Habitat, AM= Amphibians & Reptile Habitat, WBF= Feeding Waterbird Habitat, WBN= Nesting Waterbird Habitat, SBM= Songbird, Raptor, & Mammal Habitat, POL= Pollinator Habitat, PD= Native Plant Diversity, PU= Public Use & Recognition, EC= Ecological Condition, Sens= Sensitivity, STR= Stressors.	For guidance and detailed descriptions of how Excel calculates the numbers in the Scores worksheet, see the Technical Supplement and Appendix C of the Manual. For a documented rationale for each indicator, open each of the worksheet tabs at the bottom (one for each function or value) and see column H.		

#	Indicators	Condition Choices	Data	Explanations, Definitions (Column E)	Cell Name	Comments
OF1	Distance to Extensive Perennial Cover (DistPerCov)	The distance from the AA edge to the edge of the closest patch or **corridor** of **perennial cover** (see definition in column E) larger than 100 acres is:		**Corridor** - is simply an elongated patch of perennial cover that is not narrower than 150 ft at any point. **Perennial cover** - is vegetation that includes wooded areas, native prairies, sagebrush, vegetated wetlands, as well as relatively unmanaged commercial lands in which the ground is disturbed less than annually, such as hayfields, lightly grazed pastures, timber harvest areas, and rangeland. It does not include water, row crops (e.g., vegetable, orchards, Christmas tree farms), lawns, residential areas, golf courses, recreational fields, pavement, bare soil, rock, bare sand, or gravel or dirt roads. [AM, WBN, PD, PDv, POL, SBM, Sens, STR]		
		<100 ft.	0			
		100 to <300 ft.	0			
		300 to <1000 ft.	0			
		1000 ft. to <0.5 mile.	0			
		0.5 mile to 2 miles.	0			
		> 2 miles.	1			
OF2	Distance to Tidal Waters (DistTidal)	The distance from the AA edge to the closest body of **tidal water** is:		**Tidal water** - If unclear whether a water body is tidal, check the ORWAP Map Viewer's Headtide layer (expand Hydrology), or check with local sources. Assume Columbia River is tidal east to Bonneville Dam and the Willamette River south to the Oregon City Falls. [WBF]		
		<1 mile.	0			
		1-5 miles.	0			
		>5 miles.	1			
OF3	Distance to Ponded Water (DistPond)	The distance from the AA edge to the closest (but separate) body of nontidal fresh water (wetland, pond, or lake) that is ponded all or most of the year is:		Use field observations, aerial imagery, and/or the ORWAP Map Viewer's Persistent Nontidal layer (expand Wetlands/National Wetlands Inventory). [AM,WBF,WBN,SBM,PD,Sens]		
		<100 ft.	0			
		100 to <300 ft.	0			
		300 to <1000 ft.	0			
		1000 ft. to < 0.5 mile.	1			
		0.5 mile to 2 miles.	0			
		>2 miles.	0			
OF4	Distance to Lake (DistLake)	The distance from the AA edge to the closest (but separate) body of nontidal fresh water (wetland, pond, or lake) that is ponded during most of the year and is larger than 20 acres (about 1000 ft on a side) is:		Use field observations, aerial imagery, and/or the ORWAP Map Viewer's Persistent Nontidal layer (expand Wetlands/National Wetlands Inventory). [WBF,WBN]		
		<1 mile.	0			
		1-5 miles.	0			
		>5 miles.	1			
OF5	Distance to Herbaceous Open Land (DistOpenL)	The distance from the AA edge to the closest patch of **herbaceous openland** larger than 10 acres and in **flat terrain** is:		**Herbaceous openland** - includes both perennial and non-perennial cover. For example, it can include pasture, herbaceous wetland, meadow, prairie, ryegrass fields, row crops, herbaceous rangeland, golf courses, grassed airports, and hayfields. Do not include open water of lakes, ponds, or rivers; or unvegetated surfaces; or areas with woody vegetation. In dry parts of the state, croplands in flat areas are often irrigated and are distinctly greener in aerial images. **Flat terrain** - means slope of less than 5%. [WBF,WBN,POL]		
		<100 ft.	1			
		100 to <300 ft.	0			
		300 to <1000 ft.	0			
		1000 ft. to < 0.5 mile.	0			
		0.5 mile to 2 miles.	0			
		>2 miles.	0			

OF6	Distance to Nearest Busy Road (DistRd)	The distance from the <u>AA center</u> to the nearest road with an average daytime traffic rate of at least 1 vehicle/ minute is:		Estimate this traffic rate threshold using your judgment and considering the road width, local population, distance to densely settled areas, alternate routes, and other factors. [AM,SBM,PD,PUv,STR]		
		<100 ft.	0			
		100 to <300 ft.	0			
		300 to < 0.5 mile.	1			
		0.5 to <1 miles.	0			
		1 to 2 miles.	0			
		>2 miles.	0			
OF7	Size of Largest Nearby Patch of Perennial Cover (SizePerenn)	Including the AA's vegetated area, the largest patch or corridor that is **perennial cover** and is contiguous with vegetation in the AA (i.e., not separated by roads or channels that create gaps wider than 150 ft), occupies:		**Contiguous** -Abutting, with no major physical separation that prohibits free exchange or flow of surface water (i.e., not separated by roads or channels that create gaps wider than 150 ft) **Perennial cover** - See OF1. Disqualify any patch or corridor of perennial cover where it becomes separated from the AA by a gap of >150 ft, if the gap is comprised of unvegetated land or if the corridor narrows to less than 150 ft. [AM,SBM,PD,POL,Sens,STR]		
		<.01 acre.	0			
		.01 to < 1 acre.	0			
		1 to <10 acres.	1			
		10 to <100 acres.	0			
		100 to <1000 acres.	0			
		1000 to 10,000 acres.	0			
		>10,000 acres.	0			
OF8	Wetland Type Local Uniqueness (UniqPatch)	**Select EACH** of the vegetation types below that comprise more than 10% of the AA <u>AND</u> less than 10% of a <u>0.5 mile</u> radius around the AA. (See Column E).		<u>This is a 2-part question</u>: (1) if no vegetation class comprises more than 10% of the AA, answer "none of the above." (2) If a vegetation class does comprise more than 10%, determine if that vegetation class also comprises less than 10% of a 0.5 mile circle (~50 acres). [INVv,AMv,WBFv,WBNv,SBMv,PDv,POLv,Sens]		
		Herbaceous vegetation (perennial grasses, sedges, forbs; not under a woody canopy; not crops).	0			
		Unshaded shrubland (woody plants shorter than 20 ft).	0			
		Trees (woody plants taller than 20 ft).	0			
		None of above.	1			
OF9	Perennial Cover Percentage (PerCovPct)	Within a <u>2-mile</u> radius of the AA center, the percentage of <u>land</u> that has **perennial cover** is:		**Perennial cover** - is vegetation that includes wooded areas, native prairies, sagebrush, vegetated wetlands, as well as relatively unmanaged commercial lands in which the ground is disturbed less than annually, such as hayfields, lightly grazed pastures, timber harvest areas, and rangeland. It <u>does not include</u> water, row crops (e.g., vegetable, orchards, Christmas tree farms), lawns, residential areas, golf courses, recreational fields, pavement, bare soil, rock, bare sand, or gravel or dirt roads. [FA,AM,SBM,POL,Sens,STR]		
		<5% of the land.	0			
		5 to <20% of the land.	0			
		20 to <60% of the land.	1			
		60 to 90% of the land.	0			
		>90% of the land.	0		PerennAll	
OF10	Forest Percentage (ForestPct)	Within a <u>2-mile</u> radius of the AA center, the cumulative amount of <u>forest</u> (regardless of **forest patch** sizes, and including <u>any in the AA)</u> is:		**Forested patch -** is a land cover patch that currently has >70% cover of woody plants taller than 20 ft. May be in a plantation. [FA,SBM,STR]		
		<5% of the circle.	0			
		5 to <20%.	1			
		20 to <50%.	0			
		50 to 80%.	0			
		>80%.	0			
OF11	Herbaceous Open Land Percentage (OpenLpct)	Within a <u>2-mile</u> radius of the AA center, the amount of **herbaceous openland** in **flat terrain** is:		**Herbaceous openland** - can include both perennial and non-perennial cover. For example, it can include pasture, herbaceous wetland, meadow, prairie, ryegrass fields, row crops, herbaceous rangeland, golf courses, grassed airports, and hayfields. <u>Do not include</u> open water of lakes, ponds, or rivers; or unvegetated surfaces; or areas with woody vegetation. **Flat terrain** - means slope of less than 5%. [WBF,WBN,POL]		
		<5% of the land.	0			
		5 to <20%.	1			
		20 to <50%.	0			
		50 to 80%.	0			
		>80%.	0			

OF12	Landscape Wetland Connectivity (ConnScapeW)	Within a <u>2-mile</u> radius of the AA center:		**Corridor** - is simply an elongated patch of perennial cover that is not narrower than 150 ft at any point. **Regular traffic** - is at least 1 vehicle per hour during the daytime throughout most of the growing season. Assess this based on local knowledge, type of road, and proximity to developed areas. **Perennial** - see OF9 for definition. [WBN,SBM,Sens,STR]		
		There are NO other wetlands.	0			
		There are other wetlands (or a wetland), but NONE are connected to the AA by a **corridor** of **perennial** vegetation. The corridor must be at least 150 ft wide along its entire length and not interrupted by roads with **regular traffic**.	0			
		There are other wetlands (or a wetland), and <u>ALL</u> are connected to the AA by the type of corridor described.	1			
		There are other wetlands (or a wetland), and <u>ONE or MORE</u> (but not all) are connected to the AA by the type of corridor described.	0			
OF13	Local Wetland Connectivity (ConnLocalW)	Within a <u>0.5 mile</u> radius of the AA center:		**Regular traffic** - is at least 1 vehicle per hour during the daytime throughout most of the growing season. Assess this based on local knowledge, type of road, and proximity to developed areas. **Perennial** - see OF9 for definition. IF possible, field verify [AM,WBN,SBM,PD,Sens,STR]		
		There are NO other wetlands.	0			
		There are other wetlands (or a wetland), but NONE are connected to the AA by a **corridor** of **perennial** vegetation. The corridor must be at least 150 ft wide along its entire length and not interrupted by roads with **regular traffic**.	0			
		There are other wetlands (or a wetland), and ALL are connected to the AA by the type of corridor described.	1			
		There are other wetlands (or a wetland), and ONE or MORE (but not all) are connected to the AA by the type of corridor described.	0			
OF14	Wetland Number & Diversity Uniqueness (HUCbest)	According to the ORWAP Report, this AA is located in one of the HUCs that are listed as having a large diversity, area, or number of wetlands relative to the area of the HUC. **Select <u>All</u> of the following that are true:**		In the <u>ORWAP Report</u>, under the Watershed Information section and the HUC Best table, look at the columns "Is HUC Best?" and "Greatest Criteria Met." [AM,WBF,WBN,SBM,Sens]		
		Yes, for the HUC8 watershed	0			
		Yes, for the HUC10 watershed	0			
		Yes, for the HUC12 watershed	0			
		None of above.	1			
		Data are inadequate (NWI mapping not completed in HUC).	0			
OF15	Landscape Functional Deficit (GISscore)	In the ORWAP Report, find the HUC 12 Functional Deficit table. **Select <u>All</u> functions below that have a notation for that HUC.**		In the <u>ORWAP Report</u>, under the Watershed Information section, look at the Functional Deficit table. Enter 1 for each of the listed functions that are noted. These are HUCs in which a relatively small number, or proportional area, of the wetlands are likely to be performing the named function, thus adding value to those that are. See ORWAP's <u>Technical Supplement</u> for explanation of how the FuncDeficit was calculated. [WSv,WCv,SRv,PRv,INVv,FAv,AMv,WBNv]		
		Water storage (WS)	0			
		Sediment retention (SR)	0			
		Nutrient transformation (NT)	0			
		Thermoregulation (WC)	0			
		Aquatic invertebrate habitat (INV)	0			
		Amphibian habitat (AM)	0			
		Fish habitat (FH)	0			
		Waterbird habitat (WB)	1			
		None of above.	0			
		No data.	0			
OF16	Conservation Designations of the AA or Local Area (ConDesig)	On the ORWAP Map Viewer, use the layers indicated below to answer. **Select <u>All</u> of the following that are true**:		In the <u>ORWAP Map Viewer</u>, use the applicable layers.		
		(a)The AA is within or connected to a stream or other water body and this stream or water body has been designated as ESH within <u>0.5 miles</u> of the AA, according to the **Essential Salmonid Habitat (ESH)** layer.	1	Include areas not shown as ESH, if ODFW has confirmed they qualify as ESH. [WCv, FA, FAv]		
		(b)The AA is within or contiguous to a designated **Oregon's Greatest Wetlands,** according to the map layer of that name.	0	Oregon's Greatest Wetlands identifies the most biologically and ecologically significant wetlands in the State of Oregon. [PU]		
		(c)The AA is within an **Important Bird Area (IBA)**, as officially designated, according to the map layer of that name.	0	[WBFv, WBNv]		
		None of above.	0			

OF17	Non-anadromous Fish Species of Conservation Concern (RareFR)	According to the ORWAP Report, the score for occurrences of rare non-anadromous fish species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. Species include Miller Lake lamprey, Goose Lake lamprey, Pit sculpin, Lahontan cutthroat trout, Inland Columbia Basin redband trout, Steelhead (Snake River Basin ESU), Alvord chub, Goose Lake tui chub, Borax Lake chub, Lahontan redside, Oregon chub, Goose Lake sucker, Tahoe sucker, Warner sucker, Shortnose sucker, Lost River sucker. Note that for some of these species, only specific geographic populations are designated. [FRv] This question may need to revised after the field visit.		
		High (≥ 0.75 for maximum score, or ≥ 0.90 for this group's sum score), or there is a recent (within 5 years) onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.33 for both the maximum score this group's sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF18	Amphibian or Reptile of Conservation Concern (AmphRare)	According to the ORWAP Report, the score for occurrences of rare amphibian or reptile species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. Species include: Black salamander, California slender salamander, Cope's giant salamander, Rocky Mountain tailed frog, Woodhouse's toad, Foothill yellow-legged frog, Northern leopard frog, Oregon spotted frog, Columbia spotted frog. [AMv] This question may need to revised after the field visit.		
		High (≥ 0.60 for maximum score, or >0.90 for sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	1			
		Low (≤ 0.21 for maximum score AND <0.15 for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	0			
OF19	Feeding (Non-breeding) Waterbird Species of Conservation Concern (RareWBF)	According to the ORWAP Report, the score for occurrences of rare **non-breeding** (feeding) waterbird species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. **Non-breeding** - mainly refers to waterbird feeding during migration and winter. California brown pelican, Aleutian cackling goose, Dusky Canada goose [WBFv] This question may need to revised after the field visit.		
		High (≥ 0.33 for maximum score, or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Low (< 0.33 for maximum score and for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF20	Nesting Waterbird Species of Conservation Concern (RareWBN)	According to the ORWAP Report, the score for occurrences of rare nesting waterbird species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. Species include: Horned grebe, Red-necked grebe, Western grebe, Clark's grebe, American white pelican, Least bittern, Snowy egret, Trumpeter swan, White-faced ibis, Harlequin duck, Bufflehead, Yellow rail, Western snowy plover, Upland sandpiper, Franklin's gull, Marbled murrelet. [WBNv] This question may need to revised after the field visit.		
		High (≥ 0.60 for maximum score, or ≥1.00 for this group's sum score), or there is a recent breeding-season observation of any of these species onsite by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.09 for maximum score and for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species during breeding season by a qualified observer under conditions similar to what now occur.	1			
OF21	Songbird, Raptor, Mammal Species of Conservation Concern (RareSBM)	According to the ORWAP Report, the score for occurrences of rare songbird, raptor, or mammal species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. Species include: Bald eagle, American peregrine falcon, Arctic peregrine falcon, Greater sage-grouse, Columbian sharp-tailed grouse, Yellow-billed cuckoo, Northern spotted owl, Short-eared owl, Black swift, Lewis's woodpecker, Purple martin, Northern waterthrush, Bobolink, Tricolored blackbird, Fringed myotis, Spotted bat, Townsend's big-eared bat, Pallid bat, Northern sea lion, Fisher, Sea otter, Canada lynx, Columbian white-tailed deer. [SBMv] This question may need to revised after the field visit.		
		High (≥ 0.60 for maximum score, or >1.13 for sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.09 for maximum score AND <0.13 for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF22	Invertebrate Species of Conservation Concern (RareInvert)	According to the ORWAP Report, the score for occurrences of rare invertebrate species in the vicinity of this AA is:		Use ORWAP Report 's Rare Species Scores max and sum scores. See Supp_Info file for a list of species. See the Supp_Info file's RareAnimals worksheet for list of species addressed by this question. [INVv] This question may need to revised after the field visit.		
		High (≥ 0.75 for maximum score, or for this group's sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Low (< 0.75 for maximum score AND for this group's sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			

OF23	Plant Species of Conservation Concern (RarePspp)	According to the ORWAP Report, the score for occurrences of rare wetland-indicator plant species in the vicinity of this AA is:		Use ORWAP Report's Rare Species Scores max and sum scores. See the Supp_Info's RareWetPlants worksheet for list of species addressed by this question. [PDv,POLv] This question may need to revised after the field visit.		
		High (≥ 0.75 for maximum score, or > 4.00 for sum score), or there is a recent onsite observation of any of these species by a qualified observer under conditions similar to what now occur.	0			
		Intermediate (i.e., not as described above or below).	0			
		Low (≤ 0.12 for maximum score AND < 0.20 for sum score, but not 0 for both).	0			
		Zero for both this group's maximum and its sum score, and no recent onsite observation of these species by a qualified observer under conditions similar to what now occur.	1			
OF24	River Proximity (RiverProx)	There is a nontidal river within 1 mile and it is adjacent to, OR downslope from, the AA (connected or not). **Enter 1, if true. If not, SKIP to OF27.**	0	**River** - as used here is a channel wider than 50 ft between its banks. In the ORWAP Map Viewer, use the National Hydrography Dataset - Flowline layer (expand Hydrology).[WSv]	NearRiver	
OF25	Floodable Property (FloodProp)	**Select ONE** of the below:		**Row crops** - do not include pasture or other perennial cover. In the ORWAP Map Viewer, use the Floodplain layers. Also, the Seasonal Nontidal Wetland layer (expand Wetlands/National Wetlands Inventory) may indicate some floodplain areas. [WSv] Supplement with field observations at multiple seasons, if possible.		
		Floodplain boundaries within 1 mile downslope or downriver from the AA have not been mapped. **Enter 1 and SKIP TO OF27.**	0			
		Floodplain boundaries within 1 mile downslope from the AA have been mapped BUT there is neither infrastructure nor **row crops** vulnerable to river flooding located within the floodplain and within that distance. **Enter 1 and SKIP TO OF27.**	0			
		Floodplain boundaries have been mapped AND infrastructure or **row crops** are present within 1 mile downslope or downriver and those are not protected from 100-year floods, but actual damage has not been documented.	0			
		Damage to infrastructure or row crops from river flooding has been documented within that distance.	0			
OF26	Type of Flood Damage (DamageType)	The greatest financial damage in the floodplain is (or would be) to:		**Row crops** - do not include pasture or other perennial cover. On the ORWAP Map Viewer, use the Floodplain layers [WSv]		
		Buildings, roads, bridges.	0			
		Row crops (during some years).	0			
OF27	Hydrologic Landscape (Arid)	According to the ORWAP Report, the wetland is in a hydrologic landscape unit classified as:		In the ORWAP Report, under the Location Information table, find the Hydrologic Landscape Class. [AM, AMv, WBNv, SBMv, OE, Sens]		
		Arid.	0			
		Semi-arid.	0			
		Dry.	0			
		Moist.	0			
		Wet.	1			
		Very Wet.	0			
OF28	Input Water - Recognized Quality Issues (WQin)	According to ORWAP Map Viewer's Water Quality Streams layer and Water Quality Lakes layers, ALL of the following are true: **(a)** within 1 mile upstream from the AA edge, a water body or stream reach is labeled as being 303d, Water Quality Limited (categories 3B-5); Potential Concer; or TMDL Approved AND **(b)** the problem concerns one or more of the parameters listed below. **Select All that apply**.		Use the ORWAP Map Viewer's Water Quality Streams layer and the Water Quality Lakes layer (expand Water Quality and Quanity) and the Distance tool. Use the Identy tool to determine the reason for the listings. If the AA receives both inflow and outflow from river flooding, consider the polluted water to be both "upstream" and "downstream". [SRv,PRv,INV,FA,FR,AM,WBF,WBN,STR] This may need to be verified in the field.		
		Total suspended solids (TSS), sedimentation, or turbidity.	0			
		Phosphorus, chlorophyll-a, or algae.	0			
		Nitrates, ammonia, chlorophyll-a, or algae.	0			
		Petrochemicals, heavy metals (iron, manganese, lead, zinc, etc.), other toxins.	0			
		Temperature or dissolved oxygen.	0			
		None of above, or no data. **If true, enter 1 and SKIP to OF30.**	1		NoDataWQup	
OF29	Duration of Connection Beween Problem Area & the AA (ConnecUp)	The upstream problem area mentioned above (OF28) has a surface water connection to the AA:		In the ORWAP Map Viewer, use the National Hydography Dataset (expand Hydrology) and the Persistent, Seasonal, or Saturated nontidal layers (expand Wetlands/National Wetlands Inventory) to determine duration of surface water connection. [SRv,PRv,INV,FA,FR,AM,WBF,WBN,STR] This may need to be determined or verified in the field.		
		For 9 or more continuous months annually.	0			
		Intermittently (at least once annually, but for less than 9 months continually).	0			
		Never (or less than annually).	0			
OF30	Downslope Water Quality Issues (ContamDown)	According to ORWAP Map Viewer's Water Quality Streams layer and Water Quality Lakes layer, ALL of the following are true: **(a)** within 1 mile downhill or downstream from the AA's edge, a water body is labeled as being 303d, Water Quality Limited (categories 3B-5); Potential Concern; or TMDL Approved AND **(b)** the problem concerns one or more of the parameters listed below. **Select All that apply**.		Use the ORWAP Map Viewer's Water Quality Streams layer and the Water Quality Lakes layer (expand Water Quality and Quanity) and the Distance tool. Use the Identy tool to determine the reason for the listings. [WCv,SRv,PRv,FA]		
		Total suspended solids (TSS), sedimentation, or turbidity.	0			
		Phosphorus, chlorophyll-a, or algae.	0			
		Nitrates, ammonia, chlorophyll-a, or algae.	0			
		Petrochemicals, heavy metals (iron, manganese, lead, zinc, etc.), other toxins.	0			
		Temperature or dissolved oxygen.	0			
		None of above, or no data. **Enter 1 and SKIP to OF32.**	1		NoDataWQdo	
OF31	Duration of Connection Beween AA & Water Quality Problem Area (ConnDown)	The connection between the downstream problem area mentioned above (OF30) and the AA:		In the ORWAP Map Viewer, use the National Hydography Dataset (expand Hydrology) and the Persistent, Seasonal, or Saturated nontidal layers (expand Wetlands/National Wetlands Inventory) to determine duration of surface water connection. [WCv,SRv,PRv,FA]		
		Is a stream or water body that connects these areas for 9 or more continuous months annually.	0			
		Is a stream or water body that connects these areas intermittently (at least once annually, but for less than 9 months continually).	0			

		Is a probable groundwater connection, or connection via direct runoff only (no channel connection).	0	This may need to be determined or verified in the field.		
		Never exists (a topographic ridge probably prevents all the AA's runoff and groundwater from reaching the problem area).	0			
OF32	Drinking Water Source (DEQ) (DWsource)	According to ORWAP Map Viewer's Surface Water Drinking Water Source Areas layer and the Ground Water Drinking Water Source Areas layer, the AA is within:		In the ORWAP Map Viewer, use the water source layers (expand Water Quality and Quantity). [NRv]		
		The source area for a surface-water drinking water (DW) source.	0			
		The source area for a groundwater drinking water source.	0			
		Neither of above.	1			
OF33	Groundwater Risk Designations (GWrisk)	According to ORWAP Map Viewer's Groundwater Management Areas layer and the Sole Source Aquifer layer, the AA is: **Select All that apply**		In the ORWAP Map Viewer, use the DEQ Groundwater Management Areas layer and the Sole source Aquifer layer (expand Water Quality and Quantity). [NRv]		
		Within a designated Groundwater Management Area (ODEQ).	0			
		Within a designated Sole Source Aquifer area (EPA): the North Florence Dunal Aquifer.	0			
		Neither of above.	1			
OF34	Relative Elevation in Watershed (Elev)	In the ORWAP Map Viewer, based on the Hydrologic Boundaries 4th Level (HUC 8) layer (expand Hydrology), determine if the AA is: (See Column E)		1) Consider which end of the HUC is the bottom. Where streams join, the "V" that they form on the map points towards the bottom of the HUC. 2) If the AA is closer to the HUC's outlet than to its upper end, and is closer to the river or large stream that exits at the bottom of the HUC than it is to the boundary (margin) of the HUC, then check "lower 1/3" If not near that river, check "middle 1/3". 3) If the AA is not in a 100-yr floodplain, is closer to the HUC upper end than to its outlet, and is closer to the boundary (margin) of the HUC than to the river or large stream that exits at the bottom of the HUC, then check "upper 1/3" 4) For all other conditions, check "middle 1/3". [WSv, PRv, FA, FR, WCv, OE, Sens, SRv]		
		In the upper one-third of its watershed.	0			
		In the middle one-third of its watershed.	0			
		In the lower one-third of its watershed.	1		LowerShed	
OF35	Runoff Contributing Area (RCA) - Wetland as % of (WetPctRCA)	Delimit the wetland's Runoff Contributing Area (RCA) using a topographic base map. The area of the AA's wetland is:	W	See the ORWAP Manual for specific protocol for delimiting the RCA (Section 4.1 Step 5). The RCA includes only the areas that potentially drain directly to the AA's wetland rather than to channels that flow or flood into that wetland. Exact precision in drawing the boundary is not required. [WS, WSv, SR, SRv, PR, PRv, WCv]		
		<1% of its RCA.	0			
		1 to <10% of its RCA.	0			
		10 to 100% of its RCA.	1			
		Larger than the area of its RCA. **Enter 1 and SKIP TO OF39.**	0		NoRCA	

OF36	Unvegetated % in the RCA (ImpervRCA)	The proportion of the RCA comprised of buildings, roads, parking lots, exposed bedrock, and other surface that is usually unvegetated at the time of peak annual runoff is about:	W	In the ORWAP Map Viewer, use an Aerial layer to determine the proportion of the RCA comprised of buildings, roads, parking lots, exposed bedrock, and other surfaces that are usually unvegetated at the time of peak annual runoff. [WSv,WCv,SRv,PRv,INV,FA,Sens,STR]		
		<10%.	1			
		10 to 25%.	0			
		>25%.	0			
OF37	Transport From Upslope (TransRCA)	A relatively large proportion of the precipitation that falls farther upslope in the RCA reaches this wetland quickly as indicated by the following: **(a)** RCA slopes are steep, and/or **(b)** upslope wetlands historically present have been filled or drained extensively, and/or **(c)** land cover is mostly non-forest, and/or **(d)** most RCA soils are shallow. This statement is:	W	Refer to aerial imagery and/or consult local sources. See the ORWAP Manual for instructions. [WSv,SRv,PRv,STR]		
		Mostly true.	0			
		Somewhat true.	0			
		Mostly untrue.	1			
OF38	Upslope Soil Erodibility Risk (ErodeUp)	Use the ORWAP Report or the Map Viewer to determine if the erosion hazard rating of the soil within 200 ft away and upslope of the AA is:		If the soil unit is the same as the AA, the Erosion Hazard can be obtained from the ORWAP Report's Soil Information section. If the soil unit is different than the AA, use ORWAP Map Viewer's Oregon Soil layer and see the ORWAP Manual for instructions on how to determine the erosion hazard rating. [SRv,PRv,STR]		
		Slight.	0			
		Moderate.	0			
		Severe.	0			
		Very severe.	0			
		Could not determine.	0			
OF39	Streamflow Contributing Area (SCA) - Wetland as % of (WetPctSCA)	Delimit (or visualize, for large river basins) the wetland's Streamflow Contributing Area (SCA) using a topographic base map. The area of the AA's wetland is:	W	See the ORWP Manual for specific protocol for delimiting the SCA (section 4.1, Step 6). The SCA is all upland areas that drain into streams, rivers, and lakes that feed the AA's wetland either directly or during semi-annual floods. In addition, for wetlands intercepted by a mapped stream, the SCA can be delineated automatically and its area reported at this USGS web site: https://streamstats.usgs.gov/ss/. Enter the coordinates, select Oregon, select Delineate, zoom to level 15 or finer, and click on a stream.		
		<1% of its SCA, or wetland is in the floodplain of a major river.	0			
		1 to <10% of its SCA.	0			
		10 to 100% of its SCA.	0			
		Larger than the area of its SCA. **Enter 1 and SKIP TO OF41.**	0		NoSCA1	
		Wetland lacks tributaries and receives no overbank water. **Enter 1 and SKIP to OF41.**	1		NoSCA	
OF40	Unvegetated % in the SCA (ImpervSCA)	The proportion of the SCA comprised of buildings, roads, parking lots, exposed bedrock, and other surface that is usually unvegetated at the time of peak annual runoff is about :	W	See the ORWAP Manual for instructions. [WCv,SRv,PRv,FA,STR]		
		<10%.	0			
		10 to 25%.	0			
		>25%.	0			
OF41	Upland Edge Shape Complexity (EdgeShape)	Most of the edge between the AA's wetland and upland is **(select one)**:	W	See ORWAP Manual for instructions and illustrations. [NR, SBM, Sens]		
		Linear: a significant proportion of the wetland's upland edge is straight, as in wetlands bounded partly or wholly by dikes or roads, or the AA is entirely surrounded by water or other wetlands.	0			
		Intermediate: Wetland's shape is (a) ovoid, or (b) mildly ragged edge, and/or (c) contains a lesser amount of artificially straight edge.	1			
		Convoluted: Wetland perimeter is many times longer than maximum width of the wetland, with many alcoves and indentations ("fingers").	0			
OF42	Zoning (Zoning)	According to ORWAP Map Viewer's Zoning layer, the dominant zoned land use designation for currently undeveloped parcels upslope from the AA and within 300 ft. of its upland edge is:		See the ORWAP Manual for instructions on how to determine the zoning designation. If information is not provided, check local zoning maps. [WSv,WCv,SRv,PRv,INVv,FAv,FRv,AMv,WBFv,WBNv,SBMv,PDv,POLv,PUv]		
		Development (Commercial, Industrial, Urban Residential, etc.), or no undeveloped parcels exist upslope from the AA.	1			
		Agriculture or Rural Residential.	0			
		Forest or Open Space, or entirely public lands.	0			
		Not zoned, or no information.	0			

OF43	Growing Degree Days (GDD)	According to ORWAP Map Viewer's Growing Degree Days layer, the long term normal Growing Degree Days category at the approximate location of the AA is:		See the ORWAP Manual for instructions on how to determine the growing degree days category. [NR, FR, AM, WBN, SBM, WCv, OE, CS, Sens]		
		<256.	0			
		256 - 1020.	0			
		1021-1785.	0			
		1786 - 2550.	0			
		2551 - 3315.	1			
		3316 - 4079.	0			
		> 4079.	0			

Date: Nov. 16, 2021	Name: P.Scoles		Site: Portland Golf Club-Sediment Placement			
Form F Field Data (nontidal Wetlands) ORWAP V 3.2	Conduct an assessment only after reading the accompanying Manual and explanations in column E below. **For each affirmative answer, change the 0 in the "Data" column to a "1".** Answer all items except where directed to skip to others. Questions whose cells in "Data" column have a **"W" MUST be answered for the ENTIRE wetland and bordering waters.**		For a list of functions to which each question pertains, see bracketed codes in column E. Codes for functions and their benefits are: WS= Water Storage, WC= Water Cooling, SR= Sediment Retention, PR= Phosphorus Retention, NR= Nitrate Removal, CS= Carbon Sequestration, OE= Organic Export, INV= Invertebrates, FA= Anadromous Fish, FR= Resident Fish, AM= Amphibians, WBF= Feeding Waterbirds, WBN= Nesting Waterbirds, SBM= Songbirds, Mammals, & Raptors, POL= Pollinators, PH= Plant Habitat, PU= Public Use & Recognition, EC= Ecological Condition, Sens= Sensitivity, STR= Stressors.			For guidance and detailed descriptions of how Excel calculates the numbers in the Scores worksheet, see the Technical Supplement and Appendix C of the accompanying Manual. For a documented rationale for each indicator, open each of the worksheet tabs at the bottom (one for each function or value) and see column H.

#	Indicators	Condition Choices	Data	Explanations, Definitions (Column E)	Cell Name	Comments
F1	Tidal Wetland (Tidal)	This is a tidal wetland (either freshwater or saltwater). **If yes, GO TO worksheet " T ".** Do not enter any data here. **If nontidal, continue with F2.**		**Tidal wetland -** a wetland that receives tidal water at least once during a normal year, regardless of salinity, and dominated by emergent or woody vegetation. Tidal flooding occurs on a 6-hour cycle DURING THE TIME it is flooded by tide, which may be as infreuent as once per year. If NWI map shows the wetland with a code beginning with E (for estuarine), assume the wetland to be tidal. However, some wetlands lacking that code are also tidal.		
F2	Ponded Condition (Lentic)	At least once every 2 years, some part of the AA contains a cumulative total of >900 sq.ft. of surface water that is ponded. The water persists for >6 days and may be hidden beneath emergent vegetation or scattered in small pools. **Enter 1, if true.**	1	**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). [AM,WBF,WBN]	Lentic	
Reminder: For all questions, the AA should include all persistent waters in ponds smaller than 20 acres that are **adjacent** to the AA. The AA should also include part of the water area of adjacent lakes or rivers larger than 20 acres -- specifically, the open water part adjacent to wetland vegetation and equal in width to the average width of that vegetated zone.				**Adjacent** - is used synonymously with abutting, adjoining, bordering, contiguous -- and means no upland (manmade or natural) completely separates the described features along their directly shared edge. Features joined only by a channel are not necessarily considered to be adjacent -- a large portion of their edges must match. The features do not have to be hydrologically connected in order to be considered adjacent.		
F3	Water Regime (Hydropd)	The water regime (hydroperiod) of the most permanent (usually deepest) part of the AA is: **Select only ONE.** [To meet any of the definitions other than Ephemeral, there must be >100 sq ft of surface water for the duration described, otherwise mark the type listed above it.]		In the NRCS county soil survey, the Water Features table provides information about periods of flooding, ponding, and highwater table depths. Descriptions of the soil units may include information on saturation persistence. Also consider the hydroperiod label on NWI wetland polygons. [WS, FA, FR, WBN, WBF, WC]		
		Ephemeral. Surface water in the wettest part of the AA is present for fewer than 7 consecutive days during an average growing season. Includes some of the areas mapped as Saturated Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F25.**	0		NeverWater	
		Temporary. Surface water present for 1-4 weeks consecutively during an average growing season, OR if persists for longer, it is almost entirely in scattered pools, each smaller than 1 sq.m. Dries up completely during part of most average years. Includes some of the areas mapped as Saturated Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F25.**	0		TempWet	
		Seasonal. Surface water present for 5-17 weeks (1-4 months) consecutively during an average growing season, but dries up completely during part of most average years. Includes some of the areas mapped as Seasonal Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F5.**	1		ShallowType	
		Semi-Persistent. Surface water present for more than 17 weeks (4 months) consecutively during an average growing season, but dries up completely during part of most average years. Includes some of the areas mapped as Seasonal Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and SKIP to F5.**	0		DeepType	
		Permanent. Does not dry up completely during most average years. Includes some of the areas mapped as Persistent Nontidal in the ORWAP Map Viewer (which is not comprehensive). **Enter 1 and continue.**	0	**Permanent** - usually has significant groundwater input, higher conductivity, less annual water level fluctuation. No woody vegetation in most persistently flooded parts. Often with extensive open water and subsurface aquatic plants.	PermType	

F4	Flooded Persistently - % of AA (PermW)	Identify the parts of the AA that still contain surface water even during the **driest times of a normal year** . At that time, the percentage of the AA that still contains surface water is:		**driest times of a normal year -** i.e., when the AA's surface water is at its lowest annual level. Sites fed by unregulated streams that descend on north-facing slopes, tend to remain wet longer into the summer. Indicators of persistence may include fish, some dragonflies, beaver, and muskrat. [WS,PR,NR,CS,INV,FR,AM,WBF,WBN]		
		1 to <25% of the AA.	1			
		25 to <50% of the AA.	0			
		50 to 95% of the AA.	0			
		>95% of the AA.	0		AllPermWater	
F5	Depth Class (Predominant) (DepthDom)	When water is present in the AA, the depth most of the time in most of inundated area is: [Note: NOT necessarily the maximum spatial or annual depth]		This question is asking about the spatial median depth that occurs during most of that time, even if inundation is only seasonal or temporary. If inundation in most but not all of the AA is brief, the answer will be based on the depth of the most persistently inundated part of the AA. Include surface water in channels and ditches as well as ponded areas. In the <u>ORWAP Manual</u>, se the diagram in Appendix B. [WC,SR,PR,CS,OE,INV,FA,FR,WBF,WBN,PD,Sens]		
		>0 to <0.5 ft.	1			
		0.5 to < 1 ft deep.	0			
		1 to <3 ft deep.	0			
		3 to 6 ft deep.	0			
		>6 ft deep.	0			
F6	Depth Class Distribution (DepthEven)	Within the area described above, and during most of the time when surface water is present, the water area has: **Select only one.**		Estimate these proportions by considering the gradient and microtopography of the site. In the <u>ORWAP Manual</u>, see the diagram in Appendix B. [INV,FR,WBF,WBN,PD]		
		One depth class covering >90% of the AA's inundated area (use the classes in the question above).	0			
		One depth class covering 51-90% of the AA's inundated area (use the classes in the question above).	0			
		Neither of above. There are 3 or more depth classes and none occupy >50%.	1			
F7	Emergent Plants -- Area (EmArea)	Consider just the area that has surface water for >1 week during the growing season. Herbaceous plants (not moss, not woody) whose foliage extends above a water surface in this area (i.e., emergents) cumulatively occupy an annual maximum of:	W	If multiple small patches are separated by less than 150 ft, they may be combined when evaluating this question. [SR,PR,OE,INV,FR,WBF,WBN,SBM,PD]		
		<0.01 acre (< 400 sq.ft). **Enter 1 and SKIP TO F10,** unless only part of a wetland is being assessed.	0		NoEm	
		0.01 to < 0.10 acres (3,920 sq. ft).	1			
		0.10 to <0.50 acres (21,340 sq. ft).	0			
		0.50 to <5 acres.	0			
		5 to 50 acres.	0			
		>50 acres.	0			
F8	% Emergent Plants (EmPct)	Emergent plants occupy an annual maximum of:		[WC,SR,PR,NR,CS,OE,INV,PD,FA,FR,AM,WBF,WBN,SBM]		
		<5% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
		5 to <30% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
		30 to <60% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
		60 to 95% of the parts of the AA that are inundated for >7 days at some time of the year.	0			
		>95% of the parts of the AA that are inundated for >7 days at some time of the year.	1			
F9	Cattail or Tall Bulrush Cover (Cttail)	The percentage of the emergent vegetation cover in the AA that is cattail (*Typha* spp.) or tall bulrush is:		[WBN, SBM]		
		<1% of the emergent vegetation, or cattail and bulrush are absent.	1			
		1 to <25% of the emergent vegetation.	0			
		25 to 75% of the emergent vegetation.	0			
		>75%, of the emergent vegetation.	0			

F10	Water Shading by AA's Woody Vegetation - Driest (WoodyDryShade)	During an average growing season, when water levels are lowest (but surface water still occupies >400 sq ft or >1% of the AA), the percentage of the remaining surface water within the AA that is shaded by trees and/or shrubs located within the AA is:		[WC,FA,WBN,SBM]		
		<5% of the water, and fewer than 10 woody plants taller than 3 ft shade it, or all surface water is flowing.	1			
		<5% of the water, but more than 10 woody plants taller than 3 ft shade it.	0			
		5 to <25% of the water.	0			
		25 to <50% of the water.	0			
		50 to 95% of the water.	0			
		>95% of the water.	0			
F11	Open Water - Extent	During most of the growing season, the largest patch of **open water** that is in or adjacent to the AA is >1 acre and mostly deeper than 1 ft. **Enter 1, if true.**	0	**Open Water** - is surface water of any depth that contains no emergent herbaceous or woody vegetation (may contain floating-leaved or completely submersed plants). It may be partially	OpenW	
F12	All **Ponded** Water as Percentage - Wettest (PondWpctWet)	When water levels are <u>highest</u>, during a normal year, the surface water that is **ponded** continually for >6 days occupies:		**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). [WS,WC,CS,OE,INV,AM,WBF,WBN]		
		<1% or none of the AA. Surface water is completely or nearly absent then, or is entirely flowing. **Enter 1 and SKIP TO F22.**	0		NoPond	
		1 to <5% of the AA.	1			
		5 to <30% of the AA.	0			
		30 to <70% of the AA.	0			
		70 to 95% of the AA.	0			
		>95% of the AA.	0			
F13	Ponded Open Water Area - Wettest (OWareaWet)	When water levels are <u>highest</u>, during a normal year, the AA's **ponded open water** occupies a cumulative area of:	W	**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). **Open water -** is surface water of any depth that contains no emergent herbaceous or wood vegetation (may contain floating-leaved or completely submersed species). It may be partially shaded by a tree canopy. [WS,WBF]		
		<0.10 acre (< 4356 sq. ft) of the AA and adjacent ponded waters. **Enter 1 and SKIP TO F16.**	1		NoPondOW	
		0.10 to <0.50 acres (21,340 sq. ft) of the AA and adjacent ponded waters.	0			
		0.50 to <1 acres of the AA and adjacent ponded waters.	0			
		1 to <5 acres of the AA and adjacent ponded waters.	0			
		5 to <50 acres of the AA and adjacent ponded waters.	0			
		50 to <640 acres (1 sq. mi) of the AA and adjacent ponded waters.	0			
		640 to <1000 acres of the AA and adjacent ponded waters.	0			
		1000 to <2500 acres of the AA and adjacent ponded waters.	0			
		>2500 acres (>4 sq.mi) of the AA and adjacent ponded waters.	0			
F14	Ponded Open Water **Distribution** - Wettest (WaterMixWet)	When water levels are <u>highest</u>, during a normal year, the distribution (in aerial view) of ponded open water patches larger than 0.01 acre (400 sq. ft) within the AA is (must meet both a and b criteria):		[NR,AM,WBF,WBN,PD,SBM]		
		(a) Vegetation <u>and</u> **open water** <u>EACH comprise 30-70%</u> of the AA (including its bordering waters if any) **AND (b)** There are <u>many</u> small patches of open water scattered widely within vegetation or <u>many</u> small vegetation clump "islands" scattered widely within open water. Typical (for example) of some extensive bulrush and cattail marshes.	0			
		(a) Vegetation <u>and</u> **open water** <u>EACH comprise 30-70%</u> of the AA (including its bordering waters if any) **AND (b)** There are only **a** <u>few (or no)</u> small patches of open water scattered widely within vegetation or a <u>few</u> small vegetation clump "islands" scattered widely within open water.	0			
		(a) Vegetation <u>or</u> **open water** <u>comprise >70%</u> of the AA (and its bordering waters) **AND (b)** There are <u>several small patches</u> of open water scattered within vegetation or <u>several</u> small vegetation clump "islands" scattered within open	0			
		(a) Vegetation <u>or</u> **open water** <u>comprise >70%</u> of the AA (and its bordering waters) **AND (b)** Open water is <u>mostly in a single area</u> (e.g., center of the wetland) and vegetation is in the rest (e.g., periphery), with almost no intermixing. (Typical of many ponds excavated for livestock watering, stormwater treatment, mineral extraction as well as many wetlands that are inundated only temporarily each year).	0			
F15	Width of Vegetated Zone - Wettest (WidthWet)	When water levels are <u>highest</u>, during a normal year, the width of the **vegetated wetland** that separates the largest patch of open water within or bordering the AA from the closest adjacent uplands, is predominantly: [Note: This is not asking for the maximum width.]		**Vegetated wetland** - in this case does not include underwater or floating-leaved plants, i.e., aquatic bed. In farmed wetlands that have different crops from year to year, consider vegetation condition as it probably existed during most of the past 5 years. If open water exists as many patches, use the distance between the majority of those patches and uplands. [WC,SR,PR,NR,CS,OE,AM,WBF,WBN,SBM,PD,Sens,EC]		
		<5 ft, or no vegetation between upland and open water.	0			
		5 to <30 ft.	0			
		30 to <50 ft.	0			
		50 to <100 ft.	0			
		100 to 300 ft.	0			
		> 300 ft.	0			

F16	All Ponded Water as a Percentage (Driest) (PondWpctDry)	When water levels are <u>lowest</u>, during a normal year, but surface water still occupies <u>>1,076 sq feet (100 sq meter) OR >1% of the AA</u> (whichever is more), the water that is **ponded** (either visible or concealed by vegetation) in the AA		**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). [WC,FA,FR,AM,WBN,Sens]		
		<1% or none. Surface water is completely or nearly absent then, or is entirely flowing. **Enter 1 and SKIP TO F22.**	1		NoPond2	
		1 to <5% of the AA.	0			
		5 to <30% of the AA.	0			
		30 to <70% of the AA.	0			
		70 to 95% of the AA.	0			
		>95% of the AA.	0			
F17	Ponded Open Water **Area** (Driest) (OWareaDry)	When water levels are <u>lowest</u>, during a normal year, the AA's **ponded open water** occupies a cumulative area, including adjacent ponded waters, of:	W	**Ponded** - Most surface water is not visibly flowing. Flow, if any, is not sufficient to suspend fine sediment. These include pools in floodplains and may be either large (e.g., an off-channel pond) or small (size of a puddle). **Open water -** is surface water of any depth that contains no emergent herbaceous or wood vegetation (may contain floating-leaved or completely submersed species). It may be partially shaded by a tree canopy. [WBN,PUv]		
		<0.10 acre (< 4356 sq. ft). **Enter 1 and SKIP TO F24.**	0		NoPondOW2	
		0.10 to <0.50 acres (21,340 sq. ft).	0			
		0.50 to <1 acres.	0			
		1- 4 acres.	0			
		5 to <50 acres.	0			
		50 to <640 acres (1 sq. mi).	0			
		640 to <1000 acres.	0			
		1000 to 2500 acres.	0			
		>2500 acres (>4 sq.mi).	0			
F18	Ponded Open Water Distribution - (Driest) (WaterMixDry)	When water levels are lowest, during a normal year, the distribution of ponded open water patches larger than 0.01 acre (400 sq. ft) within the AA is:		[NR,INV,AM,WBN]		
		(a) Vegetation <u>and</u> **open water** <u>EACH comprise 30-70%</u> of the AA (including its bordering waters if any) AND **(b)** There are <u>many small patches</u> of open water scattered widely within vegetation or many small vegetation clump "islands" scattered widely within open water. Typical (for example) of some extensive bulrush and cattail marshes.	0			
		(a) Vegetation <u>and</u> **open water** <u>EACH comprise 30-70%</u> of the AA (including its bordering waters if any) AND **(b)** There are only a <u>few (or no) small patches</u> of open water scattered widely within vegetation or a few small vegetation clump "islands" scattered widely within open water.	0			
		(a) Vegetation <u>or</u> **open water** <u>comprise >70%</u> of the AA (and its bordering waters) AND **(b)** There are <u>several small patches</u> of open water scattered within vegetation or several small vegetation clump "islands" scattered within open water.	0			
		(a) Vegetation <u>or</u> **open water** <u>comprise >70%</u> of the AA (and its bordering waters) AND **(b)** Open water is <u>mostly in a single area</u> (e.g., center of the wetland) and vegetation is in the rest (e.g., periphery), with almost no intermixing. Typical of many ponds excavated for livestock watering, stormwater treatment, mineral extraction as well as many wetlands that are inundated only temporarily each year.	0			
F19	Floating Algae & Duckweed (Algae)	At some time of the year, <u>most</u> of the AA's otherwise-unshaded water surface is covered by floating mats of algae, or small (<1 inch) floating plants such as duckweed, *Azolla*, *Wolffia*, or *Riccia*. **Enter 1, if true.**	0	This includes most nontidal wetlands labeled as Aquatic Bed (AB) on NWI maps. If wetland can be visited only during winter, it may not be possible to answer this question with much certainty unless local sources are contacted or indicators (e.g., dried remains of algae) are		
F20	Floating-leaved & Submerged Aquatic Vegetation (SAV)	**SAV** (submerged & floating-leaved aquatic vegetation, excluding the species listed above) occupies an annual maximum of:		**SAV** - are herbaceous plants that characteristically grow at or below the water surface, i.e., whose leaves are primarily and characteristically under or on the water surface during most of the part of the growing season when surface water is present. Some species are rooted in the sediment whereas others are not. If pond lily (*Nuphar*) is the predominant species, consider its maximum extent only during the period when surface water is present beneath the leaves. [PR,OE,INV,FR,AM,WBF,WBN]		
		none, or <5% of the water area.	0		NoSAV	
		5 to <25% of the water area.	0			
		25 to <50% of the water area.	0			
		50 to 95% of the water area.	0			
		>95% of the water area.	0			
		many SAV plants present, but impossible to select from the above categories.	0			
F21	Width of Vegetated Zone (Driest) (WidthDry)	When water levels are lowest, during a normal year, but surface water still occupies <u>>400 sq feet or >1% of the AA</u> (which ever is more), the width of the **vegetated wetland** that separates the largest patch of open water within or bordering the AA from the closest adjacent uplands, is predominantly:		Measure the width perpendicular to the open water part. **Vegetated wetland -** in this case does not include underwater or floating-leaved plants, i.e., aquatic bed. In farmed wetlands that have different crops from year to year, consider vegetation condition as it probably existed during most of the past 5 years. Note: For most sites larger than 1 acre and with persistent water, measure the width using aerial imagery rather than estimating in the field. [WBN]		
		<5 ft, or no vegetation between upland and open water.	0			
		5 to <30 ft.	0			
		30 to <50 ft.	0			
		50 to <100 ft.	0			
		100 to 300 ft.	0			
		> 300 ft.	0			

F22	Beaver (Beaver)	Use of the AA by beaver during the past 5 years is: **Select most applicable ONE.**		**Valley width** - is delimited by an abrupt increase in slope on both sides of the channel.		
		Evident from direct observation or presence of gnawed limbs, dams, tracks, dens, or lodges.	0	[AM,WBN,SBM,PD,Sens]		
		Very likely based on known occurrence in this part of the region and proximity to ALL of the following **(a)** a persistent freshwater wetland, pond, or lake, or a perennial low-gradient (<5%) channel, and **(b)** average valley width is > 150 ft and **(c)** >20% cumulative cover of aspen, cottonwood, alder, and willow in vegetated areas within 150 ft of the AA's edge. Or there is evidence of beaver just outside the AA.	0			
		Somewhat likely based on known occurrence in this part of the region and proximity to ALL of the following **(a)** a persistent freshwater wetland, pond, or lake, or a perennial low or mid-gradient (<10%) channel, and **(b)** average valley width is >50 ft, and **(c)** >20% cumulative cover of hardwood trees and shrubs in vegetated areas within 150 ft of the AA's	0			
		Unlikely because site characteristics above are deficient, and/or this is an area where beaver are routinely removed. But beaver occur within 2 miles.	0			
		None. Beaver are absent from this part of the region.	0			
F23	Isolated Island (Island)	During June, the wetland contains (or is part of) an island that is isolated from the shore by water depths >3 ft. The island may be solid, or it may be a floating vegetation mat suitable for nesting waterbirds. The island must be larger than 400 sq.ft and without inhabited buildings. **Enter 1, if true.**	0	[WBF,WBN]		
F24	Ice-free (IceDura)	During most years, most of the AA's surface water (if any) does **not** freeze, or freezes for fewer than 4 continuous weeks. **Enter 1, if true.**	1	[PR,FR,WBF]		

F25	Water Fluctuation Range - Maximum (Fluctu)	The **maximum vertical fluctuation** in surface water within the AA, during a normal year is:		**maximum vertical fluctuation** - is the difference between the highest annual and lowest annual water level during an average year. Use field indicators to assess this indicator. [WS,SR,PR,NR,CS,OE,INV,AM,WBN,PD]		
		<0.5 ft or stable.	1			
		0.5 to < 1 ft.	0			
		1 to <3 ft.	0			
		3 to 6 ft.	0			
		>6 ft.	0			
F26	% Only Saturated or Seasonally Flooded (SeasPct)	Identify the parts (if any) of the AA that never contain surface water (only saturated soil) or where the water (either ponded or flowing) usually remains on the land surface <u>for less than the entire growing season</u>. The percentage of the AA containing such areas is:		If you can identify plants, use their wetland indicator status to infer the possible extent of seasonal-only inundation within a wetland. Vegetation may be patterned in concentric or parallel zones, as one moves outward & away from the deepest part of the wetland or channel. Flood marks (algal mats, adventitious roots, debris lines, ice scour, etc.) may be evident when not fully inundated. In riverine systems, the extent of this zone can be estimated by multiplying by 2 the bankful height and visualizing where that would intercept the land along the river. Also, such areas often have a larger proportion of upland and annual (vs. perennial) plant species. Although useful only as a general guide, the NRCS county soil survey descriptions of the soil units and water feature table usually includes information on flooding frequency and saturation persistence. [SR,NR,CS,OE,INV,FA,WBF,WBN,POL,SBM,PD,Sens,EC]		
		<5% of the AA, or none (i.e., all water persists for >4 months).	0		NoSeasonal	
		5 to <25% of the AA.	0			
		25 to <50% of the AA.	0			
		50 to 75% of the AA.	0			
		>75% of the AA.	1			
F27	Salinity, Alkalinity, Conductance (Salin)	The AA's surface water is mostly:		Saline or brackish conditions are commonly indicated by a prevalence of particular plant species. Consult the <u>ORWAP SuppInfo</u> file's P_Salt worksheetfor a list of these. **Brackish or saline** - conductance of >5000 µS/cm, or >3200 ppm TDS **Slightly brackish** - conductance of 500- 5000 µS/cm, or 320 - 3200 ppm TDS **Fresh** - conductance of < 500 µS/cm, or <320 ppm TDS [PR,CS,AM]		
		Brackish or saline. Plants that indicate saline conditions dominate the vegetation. Salt crust may be obvious around the perimeter and on flats.	0			
		Slightly brackish. Plants that indicate saline conditions are common. Salt crust may or may not be present along	0			
		Fresh. [<u>Note</u>: *Assume this to be the condition unless wetland is known to be a playa or there is other contradicting evidence*].	1		FreshW	
		Unknown.	0			
F28	Fish & Waterborne Pests (FishAcc)	**Select All that apply**:		[INV,FA,FR,AM,WBF]		
		A regularly-used boat dock is present within or contiguous to the AA.	0			
		A regularly-used boat dock is not within the AA, but there is one within 300 ft. of the AA and there is a persistent surface connection between the dock and the AA.	0			
		Fish (native or stocked) are known to be present in the AA, or can access it during at least one day annually.	0			
		None of the above, and could not estimate fish presence/absence.	1			
F29	Non-native Aquatic Animals (PestAnim)	The following are known or likely to have reproducing populations in this AA, its wetland, or in water bodies within 300 ft that connect to the AA at least seasonally. **Select All that apply:**		Assume non-native fish to be present if wetland is associated with a nearby reservoir, fish pond, or perennial stream flowing through an agricultural or residential area. Assume bullfrog, nutria, and/or carp to be present if (a) the AA contains persistent water or is flooded seasonally by an adjoining body of permanent water, and (b) not a forested wetland, and (c) in western Oregon, elevation is lower than about 3000 ft. In the ORWAP_SuppInfo file, see Inverts_Exo worksheet for more complete list of non-native invertebratesf or Oregon, and WetVerts worksheet for more complete list of fish that are not native to Oregon. You may also consult: http://nas.er.usgs.gov/queries/default.aspx http://www.dfw.state.or.us/conservationstrategy/invasive_species.asp [FA,FR,AM,EC]		
		Non-native amphibians (e.g., bullfrog) or reptiles (e.g., red-ear slider).	0			
		Carp.	0			
		Non-native fish that prey on tadpoles or turtles (e.g., bass, walleye, crappie, brook trout).	0			
		Non-native invertebrates (e.g., New Zealand mudsnail, mitten crab, rusty crayfish).	0			
		Nutria.	0			
		None of above.	1			

F30	Shorebird Feeding Habitats (Shorebd)	The extent of <u>mudflats</u>, v<u>ery shallow water</u>s, or <u>shortgrass meadows,</u> within the AA, that meet the definition of **shorebird habitat** for at least 3 months during the period of late summer through the following May is:		**Shorebird habitat** - areas must have **(a)** grasses shorter than 6", or a mudflat, during any part of this period, **AND (b)** soils that either are saturated or covered with <2 inches of water during any part of this period, **AND (c)** no detectable surrounding slope (e.g., not the bottom of an incised dry channel), **AND (d)** not shaded by shrubs or trees. See photograph in Appendix A of manual. This addresses needs of most migratory sandpipers, plovers, curlews, and godwits. [WBF]		
		None, or <100 sq. ft.	1			
		100 to <1000 sq. ft. within AA.	0			
		1000 to 10,000 sq. ft. within AA.	0			
		>10,000 sq. ft. within AA.	0			
F31	Outflow Duration (OutDura)	The <u>most persistent</u> surface water connection (outlet channel, pipe, ditch, or overbank water exchange) between the AA and the closest stream or lake located downslope is: [Note: If the AA represents only part of a wetland, answer this according to whichever is the least permanent surface connection: the one between the AA and the rest of its wetland, OR the surface connection between the AA's wetland and a mapped stream or lake located within 300 ft downslope	W	The emphasis is on the connection to a mapped stream network. A larger difference in elevation between the wetland-upland boundary and the bottom of the wetland outlet (if any) indicates shorter outflow duration. Do not rely only on topographic maps or NWI maps to show this; inspect while in field if possible, and ask landowner. The durations given are only approximate and are for a "normal" year. The connection need not occur during the growing season. Assume that depressions with effective nearby ditches or tile drains will connect for shorter periods. [WS,WCv,SR,PR,NR,CS,OE,FA,FR,Sens]		
		Persistent (>9 months/year).	0			
		Seasonal (14 days to 9 months/year, not necessarily consecutive).	1			
		Temporary (<14 days, not necessarily consecutive).	0			
		None -- no surface water flows out of the wetland except possibly during extreme events (<once per 10 years). Or, water flows only into a wetland, ditch, or lake that lacks an outlet. **Enter 1 and SKIP TO F33.**	0		NoOutlet	
F32	Outflow Confinement (Constric)	During **major runoff events**, in the places described above where surface water exits the AA, it:	W	**Major runoff events -** would include biennial high water caused by storms and/or rapid snowmelt. **Impeded** - means causing a delay or reduction in water velocity or volume. [WS,SR,PR,NR,CS,OE,Sens,STR]		
		Is **impeded** as it mostly passes through a pipe, culvert, tidegate, narrowly breached dike, berm, beaver dam, or other partial obstruction (other than natural topography).	1			
		Leaves mainly through natural surface exits, not largely through artificial or temporary features which **impede** or accelerate outflow.	0			
		Is exported more quickly than usual as it mostly passes through ditches or pipes intended to accelerate drainage. They may be within the AA or connected to its outlet or within 30 ft of the AA's edge.	0			
F33	Tributary or Overbank Inflow (Inflow)	At least once annually, surface water from upstream or another water body moves into the AA. It may enter directly, or as unconfined overflow from a contiguous river or lake. If it enters only via a pipe, that pipe must be fed by a mapped stream or lake further upslope. **Enter 1, if true. If false, SKIP TO F36.**	0	[SRv,PRv, PD]	Inflow	
F34	Input Channel Gradient (SlopeInChan)	The gradient of the tributary with the largest inflow, averaged over the 150 ft. before it enters the AA (but excluding any portion of the distance where water travels through a pipe) is:		[SRv, PRv]		
		<1%.	0			
		1 to <3%.	0			
		3 to 6%.	0			
		>6%.	0			
F35	Throughflow Complexity (ThruFlo)	**[Skip this question if the AA lacks both an inlet and outlet.]** During peak annual flow, water entering the AA in channels encounters which of the following conditions as it travels through the AA: **Select the ONE encountered most.**		This mainly refers to surface water that moves between the inlet and outlet. Some judgment is required in assessing straight vs. indirect flow path. See <u>ORWAP Manual</u> Appendix B diagram. [WS,SR,PR,NR,OE,INV,FA,FR,WBF,WBN,PD]		
		Does not bump into many plant stems as it travels through the AA. Nearly all the water continues to travel within unvegetated (often incised) channels and has minimal contact with wetland vegetation, or through a zone of open water such as an instream pond or lake.	0			
		Bumps into **h**<u>erbaceous vegetation</u> but mostly remains in fairly <u>straight channels</u>.	0			
		Bumps into <u>herbaceous vegetation</u> and mostly <u>spreads throughout</u>, or follows a fairly <u>indirect path</u> (in widely meandering, multi-branched, or braided channels).	0			
		Bumps into **t**<u>ree trunks and/or shrub stems</u> but mostly remains in fairly **s**<u>traight channels</u>.	0			
		Bumps into <u>tree trunks and/or shrub stems</u> and follows a fairly <u>indirect path</u> (meandering, multi-branched, or braided) from entrance to exit.	0			

F36	Internal Gradient (Gradient)	The gradient from the lowest to highest point of land <u>within the AA</u> (**or** from outlet to inlet) is:		Wetlands with no outlet, and wetlands where most surface water is impounded on site, should be considered flat (<2%). For other wetlands, estimate gradient as the elevation difference between the inlet and outlet (if any) divided by the distance between them, or the difference between the highest and lowest points in the wetland divided by the distance between them. [WS,SR,PR,NR,CS,OE,AM,WBF,WBN]		
		<2% (internal flow is absent or barely detectable; basically flat).	0			
		2 to <6%.	1			
		6 to 10%.	0		TooSteep1	
		>10%.	0		TooSteep2	
F37	Groundwater Strength of Evidence (Groundw)	**Select first one that applies:**		[WS,WC,NR,CS,OE,INV,FA,FR,PD]		
		In the AA or its wetland: **(a)** Springs are observed, OR **(b)** Water is markedly cooler in summer and warmer in winter (e.g., later ice formation) than in other local wetlands, OR **(c)** Measurements from shallow wells indicate groundwater is discharging to the wetland, OR **(d)** Water visibly seeps into pits dug within the AA during the driest time of the year and located >30 ft from the closest surface water.	0			
		The AA's wetland: **(a)** Is very close to the base of a natural slope steeper than 15% and longer than 300 ft or is located at a geologic fault, OR **(b)** Has no persistently flowing tributary AND one or more is true: (b1) Is on a natural slope of >5%, OR (b2) Has rust deposits ("iron floc"), colored precipitates, or dispersible natural oil sheen, OR	0			
		The AA is <u>not</u> in an **Arid or Semi-arid hydrologic unit**, but has persistent ponded water, no tributary, and is not fed by wastewater, concentrated stormwater, or irrigation water, or by an adjacent river or lake.	0	**Arid or Semi-arid hydrologic unit** - See the ORWAP Report's Hydrologic Landscape Class (under Location Information).		
		None of above is true, OR AA contains a hot spring. Some groundwater may nonetheless discharge to or flow through the wetland.	1			
F38	Unshaded Herbaceous Vegetation (Extent) (HerbExpos)	The annual maximum areal cover of herbaceous vegetation (excluding SAV, ferns, and mosses, but including forbs & graminoids) that is not beneath a woody canopy reaches:		<u>Do not include</u> submersed and floating-leaved aquatics (SAV) in the category of "herbaceous vegetation", or when defining the "vegetated part" of the site. For sites larger than 10 acres, this should be determined from aerial imagery rather than estimated in the field. [WBF,WBN]		
		<5% of the vegetated part of the AA. **Enter 1 and SKIP to F42.**	0		NoHerb	
		5 to <25% of the vegetated part of the AA.	0			
		25 to <50% of the vegetated part of the AA.	0			
		50-95% of the vegetated part of the AA.	0			
		>95% of the vegetated part of the AA.	1			
F39	Forb Cover (Forb)	Within parts of the AA having herbaceous cover (excluding SAV), the areal cover of **forbs** reaches an annual maximum of:		**Forbs -** are flowering non-woody vascular plants (excludes grasses, sedges, ferns, mosses). [POL]		
		<5% of the herbaceous part of the AA.	0			
		5 to <25% of the herbaceous part of the AA.	1			
		25 to <50% of the herbaceous part of the AA.	0			
		50 to 95% of the herbaceous part of the AA.	0			
		>95% of the herbaceous part of the AA.	0			
F40	Species Dominance - Herbaceous (HerbDom)	Determine which <u>two native</u> herbaceous (forb, fern, and graminoid) species comprise the greatest portion of the herbaceous cover that is unshaded by a woody canopy. **Then select one:**		[INV,WBF,SBM,PD,POL,Sens,EC]		
		Those species together comprise <u>more than half</u> of the areal cover of <u>native</u> herbaceous plants at any time during the year, i.e., one dominant species or two co-dominants. **Also mark this if <20% of the vegetated cover is native**	1			
		Those species together comprise <u>less than half</u> of the areal cover of <u>native</u> herbaceous plants at any time during the	0			

F41	Invasive or Non-native - % of Vegetative Cover (Invas)	Vegetative cover (annual maximum) is:		In the ORWAP_SuppInfo, see P_Invas worksheet for list of invasives and P_Exo for non-native species list. Examples of woody invasives are Himalayan blackberry, English ivy, scotch broom, and gorse. For known distributions of invasive plants in your area see: http://inr.oregonstate.edu/orbic/invasive-species and http://www.weedmapper.org/maps.html but do not limit your answer based only on that information. Consider most crops to be non-native. [WBF,PD,POL,Sens,EC]		
		Overwhelmingly (>80% cover) non-native species AND >10% of the herbaceous cover is invasive species. (See ORWAP SuppInfo file for species designations).	1		InvasDom	
		Overwhelmingly (>80% cover) non-native species AND <10% of the herbaceous cover is invasive species; OR 50-80% of cover is non-native species regardless of invasiveness.	0			
		Mostly (50-80%) native species.	0			
		Overwhelmingly (>80%) native species.	0			
F42	Mowing, Grazing, Fire (VegCut)	There is evidence that grazing by domestic or wild animals -- or mowing (multiple times per year), plowing, herbicides, harvesting, or fire -- has **repeatedly** reduced the AA's vegetation cover (plants that normally grows taller than 4") to less than 4 inches, or has created an obvious browse line, over the following extent:		**Repeatedly** - means the condition occurred in at least half of the last 10 years. [SR,AM,WBN,SBM,PD,EC]		
		0% (No evidence of such activities).	1		NoMowGraze	
		Trace to 5% of the normally vegetated AA (grazing, mowing, or fire have occurred but vegetation height effects are mostly unnoticeable).	0			
		5 to <50% of the normally vegetated AA.	0			
		50 to 95% of the normally vegetated AA.	0			
		>95% of the normally vegetated AA.	0			
F43	Historically Lacking Trees (HistVeg)	According to the ORWAP Report, the presettlement vegetation class in the vicinity of the AA was prairie, sagebrush, or other open lands not dominated by trees. In addition, the AA is not within the biennial floodplain of a river where trees and shrubs typically dominate when conditions are unaltered. **Enter 1, if true.**	0	In the ORWAP Report's Location Information table. This question is used as a classification variable mainly to set appropriate expectations for the extent of forest cover.	HistOpenland	
F44	Moss Wetland (Moss)	The AA's ground cover is primarily a deep layer of moss, and/or soils are mainly peat or organic muck. Also, the soil remains water-saturated to within 3 inches of the surface during most of a normal year. Surface water within the AA often is absent or confined to small scattered pools or ditches. **Enter 1, if true.**	0	Includes most bogs and fens. May be a floating island. [NR,CS,OE,WBF,WBN,Sens]		
F45	Woody Extent (WoodyPct)	Within the vegetated part of the AA, woody vegetation (trees, shrubs, **robust vines**) taller than 3 ft occupies:		**Robust vines** - include Himalayan blackberry and others that are generally erect and taller than 1 ft. **Vegetated part** - should not include floating-leaved or submersed aquatics. For sites larger than 1 acre, this should be determined from aerial imagery rather than estimated only in the field. [NR,WC,CS,SBM,PD,Sens]		
		<5% of the vegetated AA, and fewer than 10 trees are present. **Enter 1 and SKIP to F51.**	1		NoWoody	
		<5% of the vegetated AA, but more than 10 trees are present.	0			
		5 to <25% of the vegetated AA.	0			
		25 to <50% of the vegetated AA.	0			
		50 to 95% of the vegetated AA.	0			
		>95% of the **vegetated part** of the AA.	0			
F46	Woody Diameter Classes (TreeDiams)	**Select All the types** that comprise >5% of the woody canopy cover in the AA or >5% of its **wooded upland edge** if any:		**Wooded upland edge**- includes woody plants located within one tree-height of the wetland-upland boundary. **DBH** is the diameter of the tree measured at 4.5 ft above the ground. [CS,SBM,POL,Sens]		
		Deciduous 1-4" diameter (DBH) and >3 ft tall.	0			
		Evergreen 1-4" diameter and >3 ft tall.	0			
		Deciduous 4-9" diameter.	0			
		Evergreen 4-9" diameter.	0			
		Deciduous 9-21" diameter.	0			
		Evergreen 9-21" diameter.	0			
		Deciduous >21" diameter.	0			
		Evergreen >21" diameter.	0			

F47	Snags (Snags)	The number of large **snags** (diameter >12 inches) in the AA plus 100 ft uphill of its edge is:		**Snags -** are standing trees at least 20 ft tall that are mainly without bark or foliage. [SBM,POL]		
		Few or none.	0			
		Several.	0			
F48	Abovewater Wood (WoodOver)	The number of horizontal wood pieces thicker than 4 inches that are partly submerged during most of the spring or early summer, thus potentially serving as basking sites for turtles, birds, or frogs and cover for fish is:		Only the wood that is at or above the water surface is assessed because of the impracticality of assessing underwater wood accurately when using a rapid assessment method. [FA,FR,AM]		
		None.	0			
		Few.	0			
		Several (e.g., >3 per 300 ft of channel or shoreline).	0			
F49	Downed Wood (WoodDown)	The number of downed wood pieces longer than 6 ft and with diameter >4 inches that are not submerged during most of the growing season, is:		Exclude temporary "burn piles." [INV,AM,SBM,POL]		
		Few or none.	0			
		Several.	0			
F50	Exposed Shrub Canopy (ShrExpos)	Within the **vegetated part** of the AA, shrubs shorter than 20 ft that are not overtopped by trees occupy: Select first statement that is true.		**Vegetated part** - should not include floating-leaved or submersed aquatics. [SBM,PD]		
		<5% of the vegetated AA and <0.01 acre (400 sq ft).	0			
		5 to <25% of the vegetated AA or the water edge (whichever is greater in early summer).	0			
		25 to <50% of the vegetated AA or the water edge (whichever is greater in early summer).	0			
		50 to 95% of the vegetated AA or the water edge (whichever is greater in early summer).	0			
		>95% of the vegetated part of the AA or the water edge (whichever is greater in early summer).	0			
F51	N Fixers (Nfix)	The percentage of the vegetated area in the AA or along its water edge (whichever has more) that contains nitrogen-fixing plants (e.g., alder, baltic rush, scotch broom, lupine, clover, alfalfa, other legumes) is:		For a more complete list, see ORWAP_SuppInfo, worksheet NFIX (includes native and non-native species). Do not include algae. [OE,INV,Sens]		
		<1% or none.	1			
		1 to <25%.	0			
		25 to <50%.	0			
		50 to 75%.	0			
		>75%.	0			
Note for the next four questions: If the AA lacks an upland edge, evaluate based on the AA's entire perimeter and outward into whatever areas are adjacent. In many situations, these questions are best answered by measuring from aerial images.						
F52	Upland Perennial Cover - % of Perimeter (PerimPctPer)	The percentage of the AA's edge (perimeter) that is comprised of a band of upland **perennial cover** wider than 10 ft and taller than 6 inches, during most of the growing season is:		**Perennial cover** - vegetation that includes wooded areas, native prairies, sagebrush, as well as relatively unmanaged commercial lands in which the ground is disturbed less frequently than annually such as perennial ryegrass fields, hayfields, lightly grazed pastures, timber harvest areas, and rangeland. It does not include water, row crops (vegetable, orchards, Christmas tree farms), residential areas, golf courses, recreational fields, pavement, bare soil, rock, bare sand, or gravel or dirt roads. [WCv,SRv,PRv,INV,FA,AM,WBF,WBN,SBM,PD,POL,POLv,Sens,STR]		
		<5%.	0			
		5 to <25%.	0			
		25 to <50%.	1			
		50 to <75%.	0			
		75 to 95%.	0			
		>95%.	0			

F53	Upland Perennial Cover - Width (Buffer) (BuffWidth)	Along the greatest extent of the AA's **upland edge**, the width of **perennial cover** taller than 6 inches that extends upslope from the AA until mostly shorter or non-perennial cover is reached is: [NOTE: the width is not necessarily the maximum width. Base on vegetation that occurs most of the growing season.]		**Upland edge** - is the land within 3 ft of the wetland's perimeter that is not wetland. [WCv,SRv,PRv,INV,FA,AM,WBN,SBM,PD,POL,Sens,STR]		
		< 5 ft, or none.	0		NoUpPerCov	
		5 to <30 ft.	0			
		30 to <50 ft.	0			
		50 to <100 ft.	1			
		100 to 300 ft.	0			
		> 300 ft.	0		AllUpPerren	
F54	Upland Trees as % of All Perennial Cover (UpTreePctPer)	Within 100 f.t landward from the AA's edge (perimeter), the percentage of the upland perennial cover that is woody plants taller than 20 ft is:		Base this on the cumulative canopy width of the trees. [WSv,FA,WBF,WBN,SBM]		
		<5%, or there is no upland perennial cover along the upland edge.	0			
		5 to <25% of perennial cover.	1			
		25 to <50% of perennial cover.	0			
		50 to <75% of perennial cover.	0			
		75 to 95% of perennial cover.	0			
		>95% of perennial cover.	0			
F55	Weeds - % of Upland Edge (UpWeed)	Along the AA's edge (perimeter), the cover of invasive woody or herbaceous plants occupies: [If vegetation is so senesced that apparently-dominant edge species cannot be identified even to genus, answer "none"]		See ORWAP_SuppInfo file, worksheet P_Invas. Some of the most common invaders along upland edges of Oregon wetlands are Himalayan blackberry, knotweed, sweetbrier rose, Russian olive, English ivy, nightshade, pepperweed, medusahead, white clover, ryegrass, quackgrass, false brome, bentgrass, dandelion, oxeye daisy, pennyroyal, bull and creeping thistles, tansy ragwort, poison hemlock, and teasel. If a plant cannot be identified to species (e.g., winter conditions) but its genus contains an invasive species, assume the unidentified plant to also be invasive. [PD,STR]		
		<5%, or none.	0			
		5 to <25%.	0			
		25 to <50%.	1			
		50 to <75%.	0			
		75 to 95%.	0			
		>95%.	0			
F56	Bare Ground & Accumulated Plant Litter (Gcover)	Consider the parts of the AA that go dry during a normal year. Viewed from 6 inches above the soil surface, the condition in most of that area just before the year's longest inundation period begins is:		**Bare ground-** includes unvegetated soil, rock, sand, or mud between stems if any. Bare ground under a tree or shrub canopy should be counted. Wetlands that are dominated by annual plant species tend to have more extensive areas that are bare during the early growing season. [WS,WC,SR,PR,NR,CS,OE,INV,AM,SBM,POL,Sens,EC]		
		Little or no (<5%) **bare ground** is visible between erect stems or under canopy and there is little or no dead detached plant tisuse (thatch) remaining on top of the ground surface and ground surface is extensively blanketed by moss, lichens, graminoids with great stem densities, or plants with ground-hugging foliage.	1			
		Some (5-20%) bare ground or remaining thatch is visible. Herbaceous plants have moderate stem densities and do not closely hug the ground.	0			
		Much (20-50%) bare ground or thatch is visible. Low stem density and/or tall plants with little living ground cover during early growing season.	0			
		Mostly (>50%) bare ground or thatch.	0			
		Not applicable. All of the AA is inundated throughout most years.	0			
F57	Ground Irregularity (Girreg)	In parts of the AA that lack persistent water, the number of small pits, raised mounds, hummocks, boulders, upturned trees, animal burrows, islands, natural levees, wide soil cracks, and microdepressions is:		**Microtopography** - refers mainly to vertical relief of <3 ft and is represented only by inorganic features, except where plants have created depressions or mounds of soil. Consider the microtopography to be "few or none" if one could walk easily through most of the AA once any slash and logs are removed. Consider it to be "several" if one has to constantly look down and check balance. [WS,SR,PR,NR,INV,AM,SBM,PD,POL,EC]		
		Few or none, or the entire AA is always water-covered. Minimal **microtopography**; <1% of the AA, e.g., many flat sites having a single hydroperiod.	1			
		Intermediate.	0			
		Several (extensive micro-topography).	0			
F58	Soil Composition (SoilTex)	Based on digging into the substrate and examining the surface layer of the soil (2 inch depth) that was mapped as being predominant, its composition (excluding **duff** and living roots) is mostly:		Do not base the texture on soil maps unless the AA is inaccessible. See ORWAP Manual's protocol (Step 2 of section 5.3 and the soil chart in Appendix B). Judge which soil type is predominant only in the part of the AA that is not inundated at the time of your visit. **Duff** - is loose organic surface material, e.g., dead plant leaves and stems). Organic soils are much less common in floodplains. [WS,PR,NR,CS,OE,PD,Sens]		
		Loamy: includes silt, silt loam, loam, sandy loam.	1			
		Clayey: includes clay, clay loam, silty clay, silty clay loam, sandy clay, sandy clay loam.	0			
		Organic: includes muck, mucky peat, peat, and mucky mineral soils (blackish or grayish). Exclude live roots unless they are moss.	0			
		Coarse: includes sand, loamy sand, gravel, cobble, stones, boulders, fluvents, fluvaquents, riverwash.	0			
F59	Cliffs or Banks (Cliff)	Within 300 ft of the AA, there are elevated terrestrial features such as cliffs, bluffs, talus slopes, or unarmored stream banks that extend at least 6 ft nearly vertically, are unvegetated, and potentially contain crevices or other substrate suitable for nesting or den areas. **Enter 1, if true.**	0	[SBM,POL]		

F60	Restored or Created Wetland (NewWet)	The AA is (or is within, or contains) a "new" wetland resulting from human actions (e.g., excavation, impoundment) or other factors affecting what was upland (non-hydric) soil. Or, some part of the AA was originally a wetland, was artificially drained for many years, and has since had its water regime partly or wholly restored or rehabilitated (e.g., by ditch plugs, berms, tile breakage, non-maintenance).		Include wetlands whose area was likely expanded by road berms which impeded runoff, but do not include wetlands created by beaver dams except for the part where flooding affected uplands (not just existing wetlands and streams). Determine this using historical aerial photography, old maps, soil maps, consultation with landowners, and/or permit files as available. See ORWAP Map Viewer's Hydric Soil layer (expend Soils). Also, locations of some restoration wetlands can be found in the ORWAP Map Viewer under Restoration. Another potential source is the Conservation Registry: https://oregonexplorer.info/content/conservation-registry?topic&ptopic.		
		Yes, and constructed or restored mostly within last 3 years.	0			
		Yes, and constructed or restored mostly 3-7 years ago.	0			
		Yes, and constructed or restored mostly >7 years ago.	0			
		Yes, but time of origin or restoration unknown.	0			
		No.	1		NotNewWet	
		Unknown if wetland is constructed, restored, or natural.	0			
F61	Ownership (Ownership)	Most of the AA is:		An initial indication of ownership can be found on the ORWAP Map Viewer under the Land Ownership layer (expand Land Classification). However, it is advisable to ask local sources or use local maps with higher precision. [PUv]		
		Publicly owned (municipal, county, state, federal).	0			
		Owned by non-profit conservation organization or easement holder who allows public access to this AA.	0			
		Other private ownership, including tribal. **Enter 1 and SKIP to F63.**	1		PrivateOwn	
F62	Special Protected Area Designation (Desig)	The AA is part of an area designated as a Special Protected Area according to the USGS Protected Areas Database of the U.S. **Enter 1, if true.**	0	See the ORWAP Map Viewer Report under the Location Information section for "In Special Protected Area?" [PUv]		
F63	Conservation Investment (ConsInvest)	The AA is not a mitigation wetland, but public funds or community volunteer efforts have been applied to preserve, create, restore, or enhance the condition or functions of the wetland. (e.g. CRP or WRP wetlands, community projects). **Enter 1, if true. (If unknown, leave 0).**	0	Locations of some restoration wetlands can be found in the ORWAP Map Viewer under Restoration. Another potential source is the Conservation Registry: https://oregonexplorer.info/content/conservation-registry?topic&ptopic [PUv]		
F64	Compensation Wetland (MitWet)	The AA is all or part of a compensation site used explicitly to offset impacts elsewhere. **Enter 1, if true. (If unknown, leave 0).**	0	Answer to the best of your knowledge. Sources for information include the property owner, DSL, and/or the ACOE. [PUv]		
F65	Sustained Scientific Use (SciUse)	Plants, animals, or water in the AA have been monitored for >2 years, unrelated to any regulatory requirements, and data are available to the public. Or the AA is part of an area that has been designated by an agency or institution as a benchmark, reference, or status-trends monitoring area. **Enter 1, if true. (If unknown, leave 0)**	0	[PUv]		
F66	Visibility (Visibil)	The maximum percentage of the wetland that is visible from the best vantage point on public roads, public parking lots, public buildings, or public maintained trails that intersect, adjoin, or are within 300 ft of the AA is **(Select ONE):**		[WBFv,WBNv,SBMv,PUv,STR]		
		<25%.	1			
		25 - 50%.	0			
		>50%.	0			

F67	Non-consumptive Uses - Actual or Potential (RecPoten)	**Select All statements that are true** of this AA as it currently exists:		The question assumes access is allowed. [PUv]		
		Walking is physically possible in >5% of the AA during most of year (e.g., free of deep water and dense shrub thickets).	1			
		All or part of the AA (or an area within sight of the AA and within 100 ft) would be physically accessible to people in wheelchairs (e.g., paved and flat).	1			
		Maintained roads, parking areas, or foot-trails are within 30 ft of the AA, or the AA can be accessed most of the year by boat.	1			
		Within or near the AA, there is an interpretive center, trails with interpretive signs or brochures, and/or regular guided interpretive tours.	0			
F68	Core Area 1 (VisitNo)	The percentage of the AA almost never walked or driven by humans during an average growing season probably comprises: [Note: If more than half the wetland is visible from areas within 100 ft of the AA, include visits by people to those areas that are actually walked or driven (not simply viewed from].		Judge this based on proximity to population centers, roads, trails, accessibility of the AA to the public, wetland size, usual water depth, and physical evidence of human visitation. Exclude visits that are not likely to continue and/or that are not an annual occurrence (e.g., by construction, maintenance, or monitoring crews). [AM,WBF,WBN,SBM,PD,PUv,STR]		
		<5% and no inhabited building is within 300 ft of the AA.	0			
		<5% and inhabited building is within 300 ft of the AA.	0			
		5 to <50% and no inhabited building is within 300 ft of the AA.	0			
		5 to <50% and inhabited building is within 300 ft of the AA.	0			
		50 to 95% with or without inhabited building nearby.	1			
		>95% of the AA with or without inhabited building nearby.	0			
F69	Core Area 2 (VisitOften)	The part of the AA visited by humans almost daily for several weeks during an average growing season probably comprises: [The Note in the preceding question applies here as well].		See note above. [AM,WBF,WBN,SBM,PD,PUv,STR]		
		<5%.	1			
		5 to <50%.	0			
		50 to 95%.	0			
		>95% of the AA.	0			
F70	Consumptive Uses (Provisioning Services) (Hunt)	Recent evidence was found within the AA of the following potentially-sustainable consumptive uses. **Select All that apply.**		Evidence of these consumptive uses may consist of direct observation, or presence of physical evidence (e.g., recently cut stumps, fishing lures, shell cases), or might be obtained from communication with the land owner or manager. [FRv,WBFv,PUv]		
		Low-impact commercial timber harvest (e.g., selective thinning).	0			
		Commercial or traditional-use harvesting of native plants, their fruits, or mushrooms.	0			
		Waterfowl hunting.	0			
		Fishing.	0			
		Trapping of furbearers.	0			
		None of the above.	1			
F71	Domestic Wells (Wells)	Wells or water bodies that currently provide drinking water are:		If unknow, assume this is true if there is an inhabited structure within the specified distance and the neighborhood is known to not be connected to a municipal drinking water system (e.g., is outside an urban growth boundary or other densely settled area). [NRv]		
		<300 ft and downslope from the AA or at same elevation.	0			
		300 to 1500 ft and downslope or at same elevation.	0			
		>1500 ft downslope, or none downslope, or no information.	1			

F72	Wetland Type of Conservation Concern (RareType)	Does the AA contain, or is it part of, any of these wetland types? **Select All that apply.**	W	Consult the <u>ORWAP Report</u> under the Location Information table for "Rare Wetland Types." But be aware that it may not apply to the exact AA you have delimited. [PDv, Sens]		
		<u>Mature forested wetland</u> (anywhere): a wetland in which mean diameter of trees (d.b.h., FACW and FAC species only) exceeds 18 inches, <u>and/or</u> the average age of trees exceeds 80 years, <u>or</u> there are >5 trees/acre with diameter >32	0	To qualify, the diameter of >18 inches must be the mean measured from at least 10 trees.		
		<u>Bog or Fen:</u> contains a sponge-like organic soil layer which covers most of the AA and often has extensive cover of sedges <u>and/or</u> broad-leaved evergreen shrubs (e.g., Ledum). Often lacks tributaries, being fed mainly by groundwater and/or direct precipitation.	0			
		<u>Playa, Salt Flat, or Alkaline Lake</u>**:** a nontidal ponded water body usually having saline (salinity >1 ppt or conductivity >1000 µS) or alkaline (conductivity >2000 µS and pH >9) conditions and large seasonal water level fluctuations (if inputs-outputs unregulated). If a playa or salt flat, vegetation cover is sparse and plants typical of saline or alkaline conditions (e.g., Distichlis, Atriplex) are common.	0	See <u>ORWAP_SuppInfo</u> file, worksheet P_Salt for species typically occurring in tidal or saline conditions.	Playa	
		<u>Hot spring</u> (anywhere): a wetland where discharging groundwater in summer is >10 degrees (F) warmer than the expected water temperature.	0			
		<u>Native wet prairie</u> (west of the Cascade crest): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, and dominated primarily by native graminoids often including species in column E.	0	Deschampsia caespitosa, Danthonia californica, Camassia quamash, Triteleia hyacinthina, Carex densa, C. aperta, and/or C. unilateralis		
		<u>Vernal pool (Willamette Valley)</u>: a seasonally inundated wetland, underlain by hardpan or claypan, with hummocky micro-relief, usually without a naturally-occurring inlet or outlet, and with native plant species distinctly different from those in slightly higher areas, and often including species in column E.	0	Downingia elegans, Isoetes nuttallii, Triteleia hyacinthina, Eleocharis spp., Eryngium petiolatum, Plagiobothrys figuratus, Plagiobothrys scouleri, Grindelia nana, Veronica peregrina, Lasthenia glaberrima , Cicendia quadrangularis, Kickxia elatine, Gnaphalium palustre, and/or Callitriche spp.		
		<u>Vernal pool (Medford area)</u>: a seasonally inundated acidic wetland, underlain by hardpan, with hummocky micro-relief, usually without a naturally-occurring inlet or outlet, and having concentric rings of similar native vegetation, often including species in column E.	0	Downingia vina, Isoetes nuttalli, Pilularia americana, Triteleia hyacinthina, Eleocharis spp., Eryngium petiolatum, Plagiobothrys brachteatus, Plagiobothrys scouleri, Grindelia nana, Veronica peregrina, Alopecurus saccatus, Lasthenia californica, Deschampsia		
		<u>Vernal pool (Modoc basalt & Columbia Plateau)</u>: a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, located on shallow basalt bedrock and often having species in column E.	0	Blennosperma nanum, Camassia quamash, Epilobium densiflorum, Callitriche marginata, Cicendia quadrangularis, Eryngium vaseyi, Psilocarphus brevissimus, and/or Sedella pumila.		
		Interdunal wetland (Coastal ecoregion): a seasonally inundated wetland, usually without a naturally-occurring inlet or outlet, located between sand dunes where wind has scoured the sand down to the water table (deflation plain, blowout pond), and often with significant cover of the native species in column E.	0	Carex obnupta, Argentina egedii, Juncus lesueurii, J. nevadensis, J. falcatus, Sisyrinchium californicum, and/or Salix hookeriana		
		<u>Ultramafic soil wetland (mainly southwestern Oregon)</u>: a low-elevation wetland, usually with a sponge-like organic soil layer, occurring in an area with exposed serpentine or peridotite rock, and/or in soils with very low Ca:Mg ratios.	0			
		None of above.	1			

Site: Portland Golf Club-Sediment Placement	Name: P.Scoles	Date: Nov. 16, 2021

Form S
Stresser Data
ORWAP V 3.2

					Data	Comments
S1	**Aberrant Timing of Water Inputs (AltTiming)**					No hydrology alterations since contributing watershed is small and stops at ped./ bike path immediiately to south.
	*In the "Data" column, **place an X** next to any item that is likely to have caused the **timing** of water inputs (but not necessarily their volume) to shift by hours, days, or weeks, becoming either **more muted** (smaller or less frequent peaks spread over longer times, more temporal homogeneity of flow or water levels) **or more flashy** (larger or more frequent spikes but over shorter times).*					
	Control structure that regulates inflow to the AA (including tide gates), or flow regulation in tributaries, or water level in adjoining water body is regulated.					
	Irrigation runoff or seepage.					
	Snow storage areas that drain directly to the wetland.					
	Increased pavement and other impervious surface in the CA.					
	Straightening, ditching, dredging, and/or lining of tributary channels in the CA.					
	*If **any** items were checked above, then for each row of the table below, you may assign points (3, 2, or 1). However, if you believe the checked items had no measurable effect on the timing of water conditions in any part of the AA, then leave the "0's" for the scores in the following rows. To estimate effects, contrast the current condition with the condition, if the checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Spatial extent within the AA of timing shift.	>95% of AA.	5-95% of AA.	<5% of AA.	0	
	When most of the timing shift began.	<3 yrs ago.	3-9 yrs ago.	10-100 yrs ago.	0	
	Score the following 2 rows only if the altered inputs began within past 10 years, and only for the part of the AA that experiences those.					
	Input timing now vs. previously.	Shift of weeks.	Shift of days.	Shift of hours or minutes.	0	
	Flashiness or muting.	Became very flashy or controlled.	Intermediate.	Became mildly flashy or controlled.	0	
				Sum=	0	
				Final score=	0.00	
S2	**Accelerated Inputs of Nutrients (NutrLoad)**					No increase of nutrients or stormwater within RCA.
	*In the "Data" column, **place an X** next to any item -- occurring in either the AA or its RCA -- that is likely to have accelerated the inputs of nutrients (nitrogen, phosphorus) to the AA.*					
	Stormwater or wastewater effluent (including failing septic systems), landfills.					
	Fertilizers applied to lawns, ag lands, or other areas in the RCA.					
	Livestock, dogs.					
	Artificial drainage of upslope lands.					
	Other waterborne human-related nutrient sources within the RCA.					
	*If **any** items were checked above, then for each row of the table below, you may assign points. However, if you believe the checked items did not cumulatively expose the AA to significantly more nutrients, then leave the "0's" for the scores in the following rows. To estimate effects, contrast the current condition with the condition if the checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Usual load of nutrients.	Large (e.g., feedlots, extensive residential on septic) or or 303d* for nutrients.	Moderate (e.g., grazing, light residential on septic, light agriculture).	Limited (e.g., a few animals, lawns, sewered residential).	0	
	Frequency & duration of input.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & during high runoff events mainly.	0	
	AA proximity to main sources (actual or potential).	0 - <50 ft.	50-300 ft. or in groundwater.	In other part of contributing area.	0	
				Sum=	0	
				Final score=	0.00	
S3	**Accelerated Inputs of Contaminants and/or Salts (ContamIn).**					No increase of contaminants or stormwater within RCA.
	*In the "Data" column, **place an X** next to any item -- occurring in either the AA or its RCA -- that is likely to have accelerated the inputs of contaminants or salts to the AA.*					
	Stormwater or wastewater effluent (including failing septic systems), landfills, snow storage areas.					
	Metals & chemical wastes from mining, shooting ranges, oil/ gas extraction, other sources.					
	Irrigation of lands, especially those with saline soils.					
	Oil or chemical spills (not just chronic inputs) from nearby roads.					
	Road salt.					
	Pesticides applied to lawns, ag lands, roadsides, or other areas in the RCA, but excluding spot applications for controlling non-natives in the AA.					
	Artificial drainage of contaminated or saline soils.					
	Erosion of contaminated soils.					
	Other contaminant sources within the RCA.					
	*If **any** items were checked above, then for each row of the table below, you may assign points. However, if you believe the checked items did not cumulatively expose the AA to significantly higher levels of contaminants and/or salts, then leave the "0's" for the scores in the following rows. To estimate effects, contrast the current condition with the condition if the checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Usual toxicity of most toxic contaminants.	Industrial effluent or 303d* for toxics.	Wastewater treatment plant, cropland, fossil fuel extraction, pipeline, power station, managed landfill.	Low density residential or commercial.	0	
	Frequency & duration of input.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & during high runoff events mainly.	0	
	AA proximity to main sources (actual or potential).	0 - <50 ft.	50-300 ft. or in groundwater.	In other part of contributing area.	0	
	* See ORWAP Map Viewer for waters designated as 303d; see Oregon DEQ web site for reasons.			Sum=	0	
				Final score=	0.00	

S4	**Excessive Sediment Loading from Runoff Contributing Area (SedRCA).**					RCA historically cleared and cropped, but no longer in agricultural production.
	*In the "Data" column, **place an X** next to any item present in the RCA that is likely to have elevated the load of waterborne or windborne sediment reaching the AA from its RCA.*					
	Erosion from plowed fields, fill, timber harvest, dirt roads, vegetation clearing, fires.					
	Erosion from construction, in-channel machinery in the RCA.					
	Erosion from off-road vehicles in the RCA.					
	Erosion from livestock or foot traffic in the RCA.					
	Stormwater or wastewater effluent.					
	Sediment from road sanding, gravel mining, other mining, oil/ gas extraction.					
	Accelerated channel downcutting or headcutting of tributaries due to altered land use.					
	Other human-related disturbances within the RCA.				x	
	*If **any** items were checked above, then for each row of the table below you may assign points (3, 2, or 1) in the last column that describe the combined maximum effect of those items in increasing the amount or transport of sediment into the AA. To estimate that, contrast it with the condition if checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Erosion in RCA.	Extensive evidence, high intensity*.	Potentially (based on high-intensity* land use) or scattered evidence.	Potentially (based on low-intensity* land use) with little or no direct evidence.	2	
	Recentness of significant soil disturbance in the RCA.	Current & ongoing.	1-12 months ago.	>1 yr ago.	1	
	Duration of sediment inputs to the AA.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & mainly during high runoff or severe wind events.	1	
	AA proximity to actual or potential sources.	0 - <50 ft., or farther but on steep erodible slopes.	50-300 ft.	In other part of contributing area.	2	
	* **High**-intensity= plowing, grading, excavation, erosion with or without veg removal; **low**-intensity= veg removal only with little or no apparent erosion or disturbance of soil or sediment.			Sum=	6	
				Final score=	0.50	
S5	**Soil or Sediment Alteration *Within the Assessment Area* (SoilDisturb).**					Assessment Area historically cleared (possibly grazed), but now re-vegetated with non-native grasses and forbs.
	*In the "Data" column, **place an X** next to any item present in the AA that is likely to have compacted, eroded, or otherwise altered the AA's soil.*					
	Compaction from livestock, machinery, off-road vehicles, or mountain bikes, especially during wetter periods.					
	Leveling or other grading not to the natural contour.					
	Tillage, plowing (but excluding disking for enhancement of native plants).				x	
	Fill, riprap, other armoring, excluding small amounts of upland soils containing organic amendments (compost, etc.) or small amounts of topsoil stockpiled or imported from another wetland.					
	Excavation.					
	Dredging in or adjacent to the AA.					
	Boat traffic in or adjacent to the AA and sufficient to cause shore erosion or stir bottom sediments.					
	Artificial water level or flow manipulations sufficient to cause erosion or stir bottom sediments.					
	*If **any** items were checked above, then for each row of the table below you may assign points (3, 2, or 1) in the last column that describe the combined maximum effect of those items in altering the AA's soils. To estimate that, contrast it with the soil condition if checked items never occurred or were no longer present.*					
		Severe (3 pts)	Medium (2 pts)	Mild (1 pt)		
	Spatial extent of altered soil.	>95% of AA or >95% of its upland edge (if any).	5-95% of AA or 5-95% of its upland edge (if any).	<5% of AA and <5% of its upland edge (if any).	3	
	Recentness of significant soil alteration in AA.	Current & ongoing.	1-12 months ago.	>1 yr ago.	1	
	Duration.	Long-lasting, minimal veg recovery.	Long-lasting but mostly revegetated.	Short-term, revegetated, not intense.	1	
	Timing of soil alteration.	Frequent and year-round.	Frequent but mostly seasonal.	Infrequent & mainly during scattered events.	1	
				Sum=	6	
				Final score=	0.50	

Oregon Rapid Wetland Assessment Protocol (ORWAP) Report

Report Generated: November 16, 2021 07:56 AM

Assessment Area: 0.7 Acres

Location Map

Location Information

Latitude	45.4699697417195	Longitude	-122.762331686491
Elevation	219 ft	Annual precipitation	40 in
Watershed (HUC12)		Fanno Creek (170900100502)	
Presettlement Vegetation Class		Douglas fir	
Rare Wetland Type(s)		None	
Hydrologic Landscape Class		Wet	
In Special Protected Area?		No	

View Salinity Maps (pdf)

Soil Information

Soil Name	Aloha silt loam
Soil Symbol	1
Hydric Rating	No
Hydric Percent	1
Percent Area	98.3%
Erosion Hazard	Slight

Dom. Cond. Non-irrigated Capability Class	Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Soil Name	Cornelius and Kinton silt loams, 7 to 12 percent slopes
Soil Symbol	11C
Hydric Rating	No
Hydric Percent	4
Percent Area	1.7%
Erosion Hazard	Severe
Dom. Cond. Non-irrigated Capability Class	Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Watershed Information

HUC Best

HUC Code	HUC Name	Is HUC Best?	Greatest Criteria met	FW, s/f, lg (Acres)	FW, em, lg (Acres)	EST, em, lg (Acres)	EST, s/f, lg (Acres)
HUC8: 17090010	Tualatin	No	n/a	179.6	115.8	0	0
HUC10: 1709001005	Lower Tualatin River	No	n/a	16.1	40.5	0	0
HUC12: 170900100502	Fanno Creek	No	n/a	12.3	10	0	0

[abbreviations: FW- freshwater (wetland); em- Emergent; lg- largest; s/f- Shrub/Forested; EST- Estuarine (wetland)

HUC 12 Functional Deficit

HUC Code	HUC Name	WS	SR	NT	WC	INV	AM	FH	WB
HUC12: 170900100502	Fanno Creek								WB

[abbreviations: WS= Water Storage, SR= Sediment Retention, NT= Nutrient Retention (PR or NR), WC= Water Cooling (Thermoregulation), INV= Invertebrate Habitat, AM= Amphibian Habitat, FH= Fish Habitat (FA or FR), WB= Waterbird Habitat (WBF or WBN)]

Rare Species Scores

Rare Species Type	Maximum score	Sum Score	Rating
Non-anadromous Fish Species	0	0	None
Amphibian & Reptile Species	0.24	0.24	Intermediate
Feeding Waterbirds	0	0	None
Nesting Waterbirds	0	0	None
Songbirds, Raptors, and Mammals	0	0	None
Invertebrate Species	0	0	None
Plant Species	0	0	None

Scores have taken into account several factors for each rare species record contained in the official database of the Oregon Biodiversity Information Center (ORBIC): (a) the regional rarity of the species, (b) their proximity to the point of interest, and (c) the "certainty" that ORBIC assigns to each of those records.

Element of Occurrence (Rare Species)

View wildlife list for Fanno Creek (170900100502)

Within Assessment Area	No EO Records
Within 1 mile	No EO Records
In HUC12 watershed	5 EO Records

Element of Occurrence Record(s) in HUC12

1 Steelhead (Upper Willamette River ESU, winter run)
[2 occurences]
Oncorhynchus mykiss pop. 33
ORBIC State Status: S2
ORBIC Global Status: G5T2Q
ODFW Strategy Species: No

2 Western pond turtle
[3 occurences]
Actinemys marmorata
ORBIC State Status: S2
ORBIC Global Status: G3G4
ODFW Strategy Species: Yes

• HUC Best: Oregon watersheds (HUC8, HUC10, HUC12) with greatest type diversity, proportional area, or density of wetlands according to available National Wetland Inventory maps.

"Type diversity" is the number of unique NWI codes in the watershed (e.g., PEMA, PEMC, PEMCx) and excluded types that have no vegetation component (e.g., PUBH, R3US2).

"Density" is the number of vegetated NWI polygons divided by the acreage of the watershed; many of these polygons may be contiguous with each other, forming a single wetland.

"Proportional Area" is the proportion of the watershed's total area occupied by vegetated wetlands as mapped by NWI.

• The digital maps used to determine this do not show many wetlands or cover the entire state. Data were compiled only from watersheds that have been at least 90% mapped by NWI (see worksheets for HUC8, 10, and 12). Data were received in November 2008 from ORBIC.

• METHODS: The above 3 metrics can be strongly correlated with watershed size and with each other. To minimize that bias, the rankings of the residuals from a regression analysis were used, rather than simply the top-ranking watersheds, to identify the most "important" watersheds for each metric at each scale. That is, the watersheds were identified that were in the top 5% in terms of variety of mapped wetland types for watersheds of that size, the largest area of mapped wetlands as a proportion of the watershed area for watersheds of that size, and/or the greatest number of mapped wetland polygons for watersheds with that much wetland area.

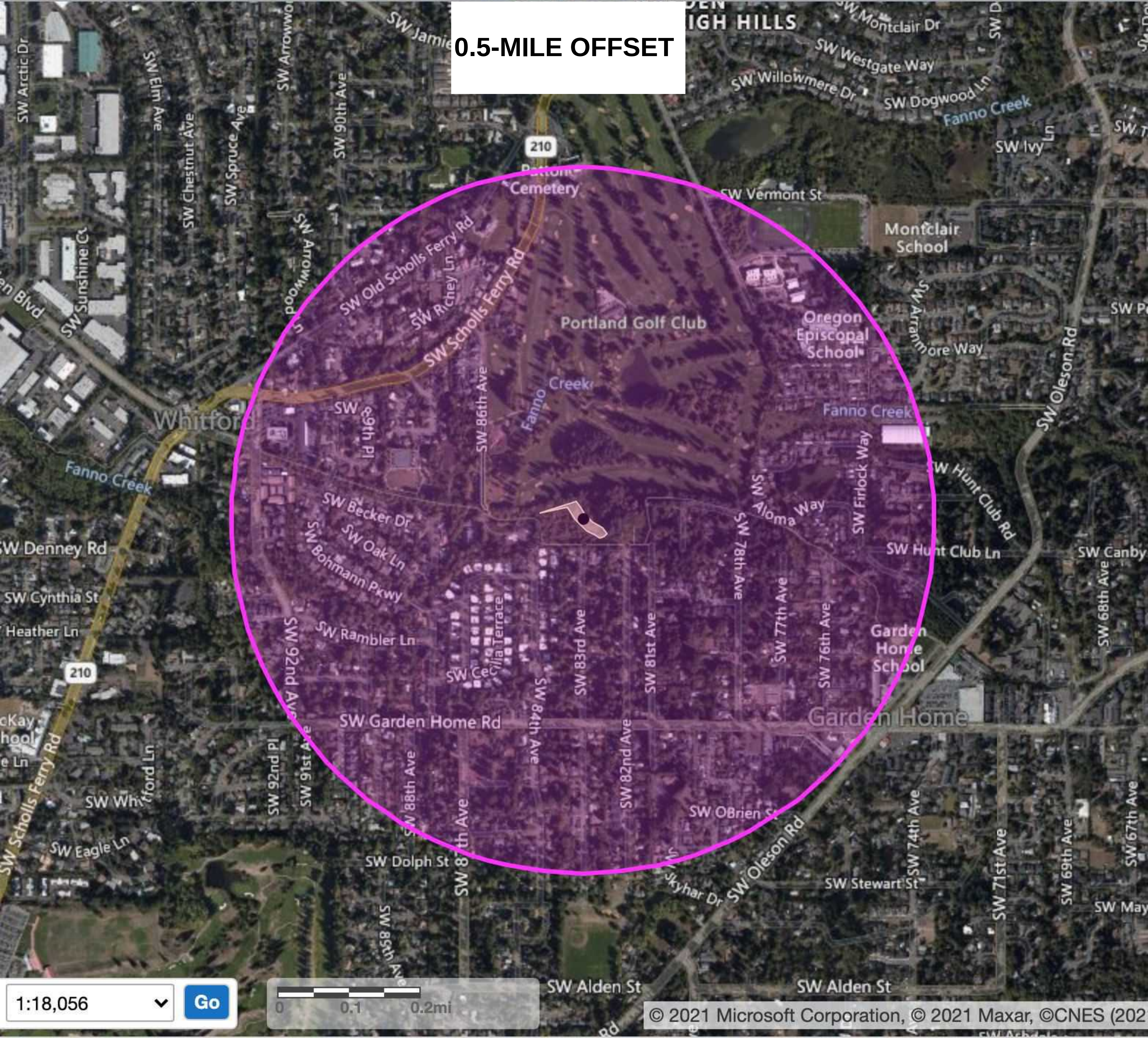
• Global rank. ORBIC participates in an international system for ranking rare, threatened and endangered species throughout the world. The system was developed by The Nature Conservancy and is now maintained by NatureServe in cooperation with Heritage Programs or Conservation Data Centers (CDCs) in all 50 states, in 4 Canadian provinces, and in 13 Latin American countries. The ranking is a 1-5 scale, primarily based on the number of known occurrences, but also including threats, sensitivity, area occupied, and other biological factors. In this book, the ranks occupy two lines. The top line is the Global Rank and begins with a "G". If the taxon has a trinomial (a subspecies, variety or recognized race), this is followed by a "T" rank indicator. A "Q" at the end of this line indicates the taxon has taxonomic questions. The second line is the State Rank and begins with the letter "S". The ranks are summarized as follows: 1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences; 2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences; 3 = Rare, uncommon or threatened, but not immediately imperiled, typically with 21-100 occurrences; 4 = Not rare and apparently secure, but with cause for long-term concern, usually with more than 100 occurrences; 5 = Demonstrably widespread, abundant, and secure; H = Historical Occurrence, formerly part of the native biota with the implied expectation that it may be rediscovered; X = Presumed extirpated or extinct; U = Unknown rank; ? = Not yet ranked, or assigned rank is uncertain.

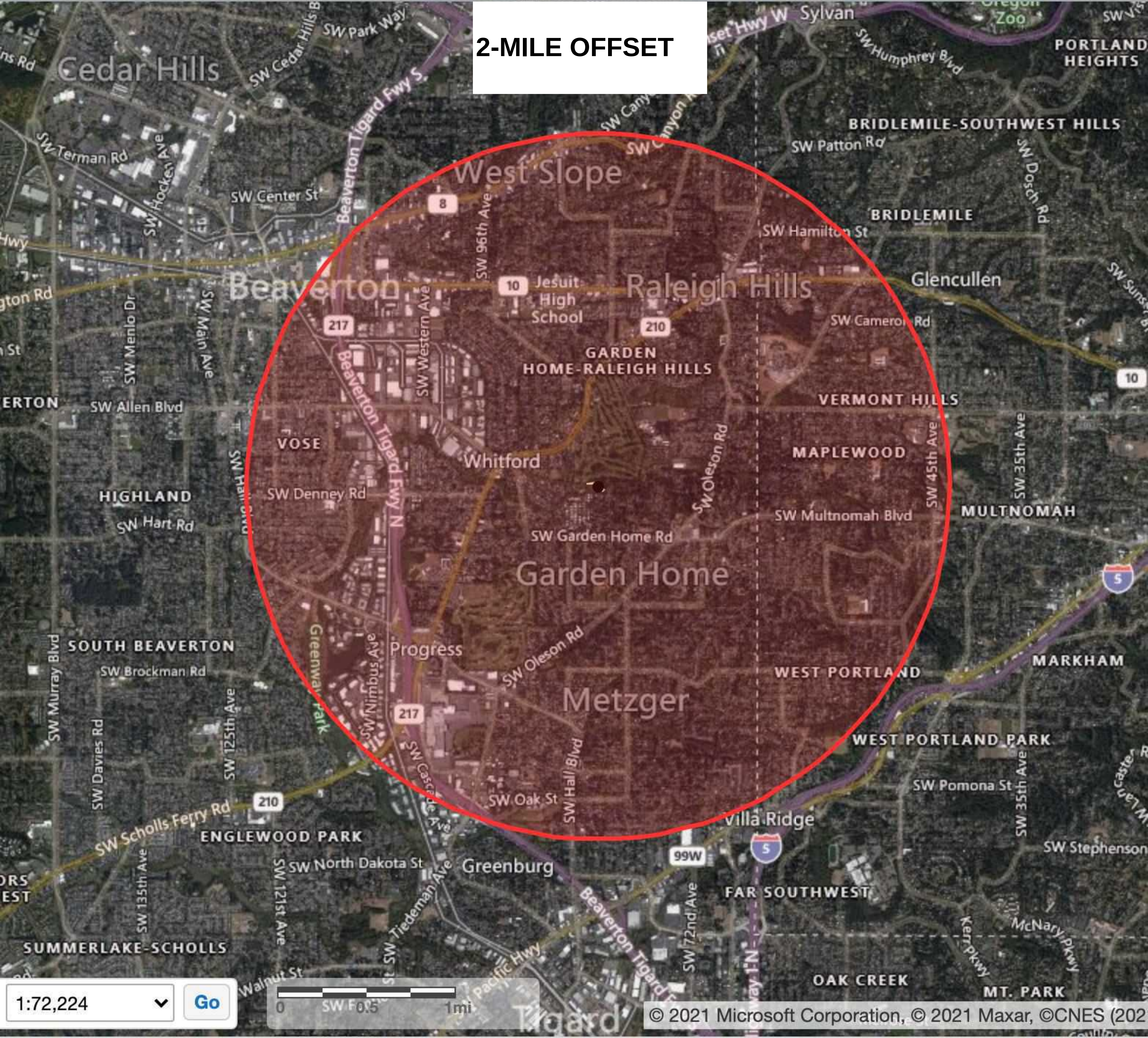
• This report contains both centroid-based and polygon-based data. The Location Information and Watershed Information sections of the report contain centroid based data (determined by the center point of the polygon), while the remaining sections are polygon-based (determined from the entire polygon).

• The rare species results in this report are based on a subset of the ORBIC rare species dataset. The ORWAP tool only reports on rare species that meet the following criteria: wetland habitat species that are tracked by ORBIC, excluding historical or extirpated sites or those with low mapping accuracy. More information about specific sites and additional species can be obtained from ORBIC through data requests, see https://inr.oregonstate.edu/orbic/data-requests for details.


300 FT. OFFSET
Fanno Creek
nno Creek Trail
Fanno Creek Trail
Fanno Creek Trail
SW 83rd Ave
SW 81st Ave
Bohmann Pkwy
1:2,257
Go
0 50 100ft
© 2021 Microsoft Corporation, © 2021 Maxar, ©CNES (202

0.5-MILE OFFSET




2-MILE OFFSET
Cedar Hills
SW Park Way
SW Cedar Hills Blvd
Sylvan
Oregon Zoo
PORTLAND HEIGHTS
SW Humphrey Blvd
Beaverton Tigard Fwy S
SW Canyon Rd
BRIDLEMILE-SOUTHWEST HILLS
SW Patton Rd
SW Terman Rd
SW Hocken Ave
SW Center St
West Slope
SW 96th Ave
BRIDLEMILE
SW Dosch Rd
SW Hamilton St
Beaverton
Jesuit High School
Raleigh Hills
Glencullen
SW Cameron Rd
SW Western Ave
SW Menlo Dr
SW Main Ave
GARDEN HOME-RALEIGH HILLS
VERMONT HILLS
SW Allen Blvd
VOSE
Whitford
MAPLEWOOD
SW 45th Ave
SW 35th Ave
SW Oleson Rd
HIGHLAND
SW Denney Rd
Beaverton Tigard Fwy N
MULTNOMAH
SW Hart Rd
SW Multnomah Blvd
SW Garden Home Rd
Garden Home
SOUTH BEAVERTON
Progress
SW Oleson Rd
MARKHAM
SW Brockman Rd
Greenway Park
SW Nimbus Ave
WEST PORTLAND
SW Murray Blvd
Metzger
SW Davies Rd
SW 125th Ave
WEST PORTLAND PARK
SW Cascade Ave
SW Hall Blvd
SW Pomona St
SW Scholls Ferry Rd
SW Oak St
Villa Ridge
ENGLEWOOD PARK
SW Stephenson
SW North Dakota St
Greenburg
SW Tiedeman Ave
FAR SOUTHWEST
SW 135th Ave
SW 121st Ave
Beaverton Tigard
SW 72nd Ave
McNary Pkwy
Kerr Pkwy
SUMMERLAKE-SCHOLLS
Walnut St
Pacific Hwy
OAK CREEK
MT. PARK
Tigard
8
10
217
210
5
99W
1:72,224
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APPENDIX G – OREGON STREAM FUNCTIONAL ASSESSMENT METHOD (SFAM) REPORT (Best Professional Judgement Approach)

Four functional groups provide the basis for a function-based assessment for streams:

1. **Hydrologic functions:** include movement of water through the watershed and the variable transfer and storage of water along the stream channel, its floodplain, and associated alluvial aquifer.
2. **Geomorphic functions:** encompass hydraulic and sediment transport processes that generate variable forces within the channel and the variable input, transfer and storage of sediment within the channel and adjacent environs that are generally responsible for channel form at multiple scales.
3. **Biological functions:** include processes that result in maintenance and change in biodiversity, trophic structure, and habitat within the stream channel.
4. **Water quality functions:** encompass processes that govern the cycling, transfer, and regulation of energy, nutrients, chemicals and temperature in surface and groundwater, and between the stream channel and associated riparian system.

This table is completed for the removal of accumulated sediment from an irrigation pond at Portland Golf Club. It also includes temporary impacts for placement of a sandbag coffer dam, bypass pipe, and sediment check dams in Woods Creek and the irrigation pond. The post-evaluation column descriptions separately addresses post-dredging conditions, namely: (1), sediment removal from irrigation pond, and (2) installation of temporary sediment trapping features and bypass pipe for Woods Creek (only during dredging period). These are components of the same project and addressed separately in this evaluation table.

Table 2.1 Stream Function Categorization, Definition, and Ecosystem Services Provided

FUNCTIONAL GROUP	SPECIFIC FUNCTIONS	DEFINITION AND SERVICES PROVIDED	PRE- FUNCTION RATING	POST-FUNCTION RATING
Hydrologic functions	Surface water storage (SWS)	Temporary storage of surface water in relatively static state, generally during high flow, as in floodplain inundation, backwater channels, wetland depressions. Providing regulating discharge, replenishes soil moisture, provides pathways for fish and invertebrate movement, low velocity habitat and refuge, and contact time for biogeochemical processes.	Medium. The irrigation pond water levels are controlled by two gate valves situated along the north and southwest edges. During winter months, water levels are maintained at a lower elevation to provide stormwater desynchronization functions. During extreme rainfall periods, water backfloods Woods Creek and may overtop creek banks (near Wetland B). Due to control gate closures, flooding from Fanno Creek is infrequent (greater than 10 year frequency).	1. Medium. Portland Golf Club would continue to manage pond levels in a similar manner. Since the volume of removed sediments gets replaced with water, no appreciable increase in stormwater storage would occur. Backflooding of Woods Creek would also not change. 2. Temporary coffer dam, bypass pipe, and check dams would not change surface water storage, since these features will be removed before autumn rains.
	Sub/surface transfer (SST)	Transfer of water between surface and subsurface environments, often through hyporheic zone. Provides aquifer recharge, base-flow, exchange of nutrients/chemicals through hyporheic, moderates flow, and maintains soil moisture.	Low. Soil conditions surrounding the irrigation pond are mostly silt loam to silty clay loam textures. Clay layers may be present below 5 feet below ground surface. During irrigation season, pond water is removed, so shallow ground water moves toward the pond. During rainy season, groundwater likely flows toward Fanno Creek. Subsurface water transmissivity likely slow due to lack of sand or gravel layers underlying golf course.	1. Low. Portland Golf Club would continue 2. to withdraw irrigation water in a similar manner. No anticipated change to irrigation pumping, so no significant change to groundwater baseflows into pond. That is, sediment removal would neither increase or decrease exchange between surface water and ground water. Temporary coffer dam, bypass pipe, and check dams do not facilitate or interfere with surface to groundwater exchange.

Hydrologic functions (cont.)	**Flow variation (FV)**	Daily, seasonal and inter-annual variation in flow. Provides variability in stream energy driving channel dynamics, provides environmental cues for life history transitions, redistributes sediment, provides habitat variability (temporal), provides sorting of sediment and differential deposition.	Low. The irrigation pond water levels are controlled by two gate valves situated along the north and southwest edges. During winter months, water levels are maintained at a lower elevation to provide stormwater desynchronization functions. During extreme rainfall periods, water backfloods Woods Creek and may overtop creek banks (near Wetland B).	1. Low. Portland Golf Club would continue to manage pond levels in a similar manner. Since the volume of removed sediments gets replaced with water, no appreciable increase in stormwater storage would occur. Backflooding of Woods Creek would also not change. 2. Temporary coffer dam, bypass pipe, and check dams would not change surface water storage, since these features will be removed before autumn rains.

Geomorphic functions	**Sediment continuity (SC)**	The balance between transport and deposition of sediment such that there is no net erosion or deposition (aggradation or degradation) within the channel. Maintains channel character and associated habitat diversity, provides sediment source and storage for riparian and aquatic habitat succession, maintains channel equilibrium.	Low. Irrigation pond edges defined by a retaining wall in all directions; hence no erosion within pond. Pond bottom functions as sediment trap for Woods Creek.	1. Low. Sediment removal from irrigation pond would not accelerate erosion; however, increased sediment capacity is achieved. 2. Temporary coffer dam, bypass pipe, and check dams would provide short-term sediment trapping during dredging period. Any accumulated sediment would be removed with temporary features.
	Substrate mobility (SM)	Regular movement of channel bed substrate. Provides sorting of sediments, mobilizes/flushes fine sediment, creates and maintains hydraulic diversity, creates and maintains habitat.	Low. Irrigation pond effective at trapping sand and silt textures; however, clay particles may export with overflows to Fanno Creek. Pond accumulates sediments but does not sort, flush or remain static.	1. Low. Sediment removal from irrigation pond would not change sand and silt trapping function. No change to export of clay particles. 2. Temporary coffer dam, bypass pipe, and check dams would not interfere or alter substrate mobility of the irrigation pond or Woods Creek.

Biological Functions	**Maintain Biodiversity (MB)**	Maintain the variety of species, life forms of a species, community compositions, and genetics. Biodiversity provides species and community resilience in the face of disturbance and disease, full spectrum trophic resources, balance of resource use (through interspecies competition).	Low. The pond substrate is mostly unvegetated, hence low biodiversity. Additionally, the accumulated sediment in the irrigation pond generally limits biodiversity due to shallow water depth. Existing wildlife use consists of warmwater fish, water fowl, song birds, nocturnal mammals and occasional nutria or beaver. Pond is surrounded by mowed turf on three sides, so adjacent upland provides little ancillary habitat.	1. Low. Surrounding upland would be maintained in a similar condition, but water depth in irrigation pond would increase. It is plausible that deeper water would attract slightly more waterfowl and warmwater fish, but such improvement may be insignificant. 2. Temporary coffer dam and check dams would temporarily displace or discourage wildlife use during dredging period. Warmwater fish would utilize bypass pipe and avoid pond during dredge period.
	Create and maintain habitat (aquatic/ riparian) (CMH)	Create and maintain the suite of physical, chemical, thermal and nutritional resources necessary to sustain organisms. Habitat sustains native organisms. Habitat includes in-channel habitat, as defined largely by depth, velocity, and substrate, and riparian habitat, as defined largely by vegetative structure.	Low. The pond habitat is primarily unvegetated, submerged sediment. The pond has a narrow fringe bounded by a retaining wall on the upper side. Typical emergent plants include smartweed, rush, and cattail. Water movement within pond (except during irrigation pumping) slowly flows to Fanno Creek. Suitable habitat for warmwater fish, songbirds, waterfowl, and insects.	1. Low. Removal of accumulated sediment would deepen water depths in pond; thus, potential warmwater fish habitat would likely increase proportionally. While pond fringe plants would be removed by dredging, such species would naturally revegetate within 2 to 4 years. As such, no significant increase or decrease anticipated for in-pond habitat and associated vegetation. 2. Temporary coffer dam, bypass pipe, and check dams would not change habitat within pond and Woods Creek.
	Sustain trophic structure (STS)	Production of food resources necessary to sustain all trophic levels including primary producers, consumers, prey species and predators. Trophic structure provides basic nutritional resources for aquatic resources, regulates the diversity of species and communities.	Low. The irrigation pond has limited production of food resources due to shallow depth to accumulated sediment and nearly unvegetated condition. Since water is removed daily from pond during irrigation season, invertebrate food sources are low. Limited use by warmwater fish also restricts feeding opportunities for waterbirds and other predators.	1. Low. Removal of accumulated sediment would deepen water depths in pond; thus, potential warmwater fish habitat would likely increase proportionally. Mostly unvegetated condition of substrate not likely to change, so no significant increase or decrease anticipated for trophic structure. 2. Temporary coffer dam, bypass pipe, and check dams would not change food production resources.

Water Quality functions	Nutrient cycling (NC)	Transfer and storage of nutrients from environment to organisms and back to environment. Provides basic resources for primary production, regulates excess nutrients, provides sink and source for nutrients.	Medium. The accumulated sediment in the irrigation pond generally sequesters nutrients, since pond substrate is mostly unvegetated. Some dissolved nutrients are exported as irrigation water in spring, summer and early fall months. Tees, fairways, greens and landscaping benefit from nutrients in irrigation water. New sediment incrementally buries older sediment, which further sequesters nutrients.	1. Medium. Removal of accumulated sediment (via dredging) would export nutrients and sequester them at the sediment bag placement area. Nutrient sequestration will continue as new sediment incremental accumulates. Dissolved nutrients would continue being exported with irrigation water and utilized by turf grasses. No net change in nutrient cycling is anticipated. 2. Temporary coffer dam, bypass pipe, and check dams would not change irrigation pond capacity to sequester nutrient. Further, such features would not increase nutrient delivery to Fanno Creek; however, dissolved nutrients in Woods Creek would temporarily bypass the irrigation pond for 6 to 8 weeks. After project completion, no net change in nutrient cycling is anticipated.
	Chemical regulation (CR)	Moderation of chemicals in the water. Limits the concentration of beneficial and detrimental chemicals in the water.	Low. Chemical composition of irrigation pond water not known. The primary water source is the urbanizing watershed of Woods Creeks. Typical water constituents may include soil and grease from roads and driveways. No onsite impervious surfaces shed runoff into irrigation pond. Other chemical sources could be fertilizers and limited herbicides infrequently applied to turf area. Turf land does not drain directly to irrigation pond. Instead, such applications are absorbed by turf grasses and landscaping. Excess chemicals infiltrate into soil, where root system further utilize and/or degrade chemicals.	1. Low. Removal of accumulated sediment (via dredging) would cycle chemicals to the sediment bags, then drainage water would be pumped back to the irrigation pond. It is unlikely this temporary circulation pattern would either increase or decrease chemicals in the irrigation water. 2. Temporary coffer dam, bypass pipe, and check dams would not change chemical constituents in irrigation pond and Woods Creek. These temporary features are constructed of inert materials and installed for 6 to 10 weeks. After dredging is complete, these features are removed. No net change in chemical regulation is anticipated.

Water Quality functions	**Thermal regulation (TR)**	Moderation of water temperature. Limits the transfer and storage of thermal energy to and from streamflow and hyporheic zone.	Low. The irrigation pond has limited capacity for thermal regulation due to shallow depth to accumulated sediment. Few trees along south side of pond provide afternoon shade for a narrow edge of pond. Overall, the transfer and storage of thermal energy is minimal due to shallow water.	1. Medium. Removal of accumulated sediment would deepen water depths in pond; thus, thermal storage and transfer would likely increase (not quantified). Inlet and outlet features would not be affected by sediment removal. 2. Temporary coffer dam, bypass pipe, and check dams would not change thermal regulation in irrigation pond and Woods Creek.