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memorandum

date	May 19, 2025
to	Portland Water Bureau
from	Sarah Hartung, Biologist V, Environmental Science Associates (ESA)
subject	Response to Upland Habitat Comments for Second Open Record Period

This memorandum responds to comments related to upland habitat issues submitted into the record during the first open record period (ORP) following the remand hearing.

Individual Written Testimony
S.2 testimony submitted by David Shapiro, 36014 SE. Lusted Rd., Boring, OR, 97009

Comment:

I spoke on behalf of the wildlife and I can assert that the operation of the PWB filtration plant will continue to do harm to the wildlife. Trucks will run over bobcats. Migration patterns of elk will be disrupted. The crows will continue their relentless march into East County. Currently the owls and hawks keep the crows out of the Sandy River Gorge but if they continue to lose habitat the crows will eventually gain a foothold and as we have seen in Portland and San Francisco, once the crows take hold, they take over and when they take over bird diversity disappears. Please protect the integrity of the rural reserve.

Response:

Wildlife-vehicle collisions. It is not clear why Mr. Shapiro singled out bobcats, but bobcats are primarily nocturnal and vendor and haul truck trips associated with the operation of the filtration facility will primarily occur in the daytime during core business hours (7 am to 7 pm, Monday through Friday). Far more importantly, while the operation of the filtration facility will require vehicle trips to and from the filtration facility site, the project does not create new rights-of-way in the area thus would not create any new barriers or hazards to wildlife movement. In fact, the hedgerow habitat and woody buffers that will be established on the filtration facility site will provide safer and higher quality habitat for bobcats and other species compared to vegetation within the road right-of-way. The benefits and risks of vegetation within transportation corridors is discussed in the Habitat Analysis Report (Exhibit N.56) and the first ORP wildlife response memorandum (Exhibit S.32). The creation of hedgerows and woody buffers at the filtration facility site, as shown on Figure 1 of Exhibit S.32, will provide alternate routes for animal movement away from road rights-of-way (see Figure 3 below) and will help reduce the overall risk of any vehicle striking an animal in the area and avoid an adverse effect.

Migration patterns of elk: The topic of animal movement patterns and migration corridors and the conclusion that the project post-construction will not only retain but improve movement corridors is addressed on Pages 10 and 11 of Exhibit S.32. The migration pathways available through the filtration facility site and

benefits of removing the existing elk fencing along the eastern boarder of the filtration facility site are further addressed in response to comment Exhibit S.15 below. As discussed in those responses, the layout of the filtration facility site in combination with the creation of vegetated habitat areas will facilitate improved and consistent migration pathways for elk and other species through the filtration facility site, thus avoiding an adverse effect on elk habitat.

Potential increase in crows adversely affecting biodiversity:
The American crow (*Corvus brachyrhyncos*) is a member of the Corvid family that includes jays, ravens and magpies. Although they may possess characteristics of an invasive species, crows are native to North America and are found in a variety of habitats in Oregon and across the United States. They are a highly social, intelligent and omnivorous species that forms communal roosts and are known to breed cooperatively where non-breeding helpers contribute to defending and raising young. They have a wide-ranging diet consisting of insects and other invertebrates, carrion, small vertebrates (rodents, lizards, salamanders, frogs, etc.), bird eggs, nestlings, seeds (especially corn), fruits, and nuts (Ehrlich et al. 1988). The American crow has benefitted from human development and has been able to establish population strongholds in cities in part because of the abundance of trash or refuse, easy sources of food in populated areas. Because crows predate the eggs and young of songbirds as part of their diet, the presence and abundance of crows can be a divisive topic in ornithological or nature-aware communities.

Uncollected trash or refuse, as well as the active feeding of birds in parks and campgrounds, have been shown to increase Corvid populations which can lead to increased predation of bird species in adjacent forests (Brunk et al. 2021, USFWS 2024). Because Corvids, including crows, are generalist foragers they will eat much of the food that is eaten by humans. While it is clear people can increase the presence of nest-predating crows by either intentionally feeding them or by being inattentive to food scraps, studies have shown that reducing human subsidies of food at campgrounds effectively reduces the abundance of Corvids (Steller's jays) (Brunk et al. 2021), which in turn reduces the predation levels in adjacent habitats. This result indicates that implementing regular trash collection policies can prevent adverse impacts from a potential new source of human development or use that may attract Corvids such as the filtration facility site. American crows are already present in the project area as documented in the streak horned lark surveys conducted in 2021 (see data sheets in the memo attached to Exhibit S.32). The facility will have relatively low human presence compared to national parks and campgrounds where the aforementioned studies have taken place, and the project will not result in attracting large populations of crows that could potentially adversely affect biodiversity.

S.5 testimony submitted by Guy E Meacham, 6930 SE Cottrell Rd., Gresham OR 97080

Comment: *I would like to address 2 points raised in the April 16 PWB Remand Hearing.*

1) *Proposed tree planting on the new PWB Filtration site. The PWB presentation showed renditions of a green space and tree planting on the SE corner of the site. It also showed a rendition of a low-profile view of the site looking North from Bluff Road to the South. The problem here is that despite thousands of dump truck loads of soil already being removed an enormous mountain of soil remains. It is my understanding that the PWB had not confirmed or is committed to all this soil being removed. If it is not removed, where will the tree planting happen?*

   It is this soil pile that will be the dominant feature on the landscape when looking North from Bluff Road. I have attached a current showing current view from Bluff Road looking North. (See Exhibit S.5 for Photo). *Photo taken from Bluff Road looking North towards the filtration site. Showing the massive soil*

pile where tree planting and land restoration is supposed to happen. A closer view, showing the massive soil pile where tree planting and land restoration is supposed to happen. See Figure 1 below.

Response: The picture provided in Exhibit S.5 of a large mound of fenced soil at the filtration facility site is taken during construction when material stockpiling is necessary to make space for grading and contouring the site according to the final engineering drawings. Stockpiling soil is an intermediate step during construction. Subsequent construction phases will include removal of much of the stockpiled soil from the filtration facility site and site regrading. Soils outside of the 37-acre filtration facility will be restored to similar contours using best management practices, which include:

- Decompacting the soil at the surface to prepare for planting. Drainage/infiltration of soils will be considered as will drainage of surface water runoff.
- Adding or ensuring the presence of a layer of topsoil for plant establishment
- Seeding and/or planting with native species.
- Monitoring and maintaining planting areas to establish desired plant community and prevent/minimize invasive plants.

S.6 testimony submitted by John & Janet Edmondson, 33318 SE Carpenter Lane, Gresham, OR 97080

Comment: *We live on Carpenter Lane a mile away from PWB's proposed water filtration facility. We strongly oppose the industrial water filtration plant that PWB is constructing. The 90-plus acre property that this behemoth industrial plant will be situated on is considered high-value farmland. It lies within a Rural Reserve, a sensitive riparian corridor and habitat for wildlife, as documented by County resource areas.*

This plant poses a substantial threat to local natural resources and ecological integrity, and it conflicts with Multnomah County Code (MCC) which outlines conditional approval criteria. MCC 39.7515 (B) states "it (meaning the project) will not adversely affect natural resources." With the recent destruction of at least 363 trees, it is inconceivable how this plant along with their 180 plus foot tower will not adversely affect the birds and other wildlife that has long coexisted on this land.

Since construction commenced approximately one year ago, we have observed that our regularly visiting owl, which would often perch in a cherry tree, has ceased its visits. Additionally, sightings of eagles and red tail hawks have diminished, and the frequency of coyote howls/cries has significantly decreased. Despite being predators, these animals play a crucial role in maintaining a balance of our ecosystem.

It is implausible that PWB chose to go ahead with construction when they did not have full land use approval. The location they chose for this facility and the scale is inappropriate for this ecologically sensitive area. Also, PWB did not complete their due diligence in providing an inventory of natural resources nor took appropriate steps to mitigate any damage to natural resources as required in MCC 39.7515 (B) and the Multnomah County Plan.

Response: This comment appears to primarily relate to construction activities and impacts. Neither construction nor the referenced tower are subject to the applicable conditional use standard at issue in the remand proceeding. For a response to the general contention that animal sightings/ detections have decreased since construction started, refer to pages 4-7 of S.32.

For a response to the characterization of the filtration facility site and pipeline alignments as "ecologically sensitive areas," refer to the description of pre-construction conditions on page 11 (commercial nursery operations) and page 26 (potential hazards of hedgerows as wildlife attractants in road rights of ways) of the Habitat Analysis Report (Exhibit N.56). Commercial nursery land is a heavily managed landscape where crops are rotated on a 3-to-4-year cycle, planting preparation includes plowing and subsoil disking, and maintenance of

ornamental plants involves the application of herbicides, pesticides, and rodenticides. Avoidance of adverse effects on the SEC zoned areas located on and near the filtration facility site during facility operation is also addressed in the record.

For a response to pre-construction site assessment and inventories, refer to pages 7-9 of Exhibit S.32.

S.9 testimony submitted by Steve Hopkins

Comment: *I am against having the filtration plant at this location. I live on Oxbow Parkway near the construction site. If it is allowed it will be there long after we are gone, disrupting nature. Allowing it is breaking the law and this law should not be allowed to be broken by one or a few "decision makers". Our demands should make a difference. The County should be on our side, not the side of the City of Portland.*

Response: Evidence in the record demonstrates that the project "will not adversely affect natural resources." For example, the Habitat Analysis Report concluded that a net gain in wildlife value was anticipated with post-construction conditions, and that is further supported by the updated HEP addressed below.

The comment claims that the facility will disrupt nature "long after we are gone." It is the case that the water filtration facility is designed to provide clean water to the region for generations, but for the reasons established in this response and in the record, the operation of the facility will not adversely affect wildlife habitat at any point in time. The record also establishes that the habitat benefits of the extensive plantings with the project area will continue to increase as the vegetation matures. For example, see response to comment 5 in Exhibit S.26 below.

S.10 testimony submitted by Susan Swinford

Comment:

Noise and Vibration: *The filtration plant will run pumps, blowers and machinery continuously, and heavy trucks will arrive and depart frequently. This continuous noise will significantly degrade wildlife habitat. Scientific studies show noise pollution "can impact all taxonomic groups of animals… through changes in reproductive fitness [and] community interactions" pmc.ncbi.nlm.nih.gov. Road-level traffic noise alone has been found to "degrade habitats" for birds and other wildlife news.mongabay.com. In one study, even moderate highway noise caused migrating songbirds to abandon otherwise suitable stopover areas news.mongabay.com. In MCCP terms, that is a loss of habitat quality: the birds' ability to use the area has been weakened. Continuous plant noise and vibrations will similarly drive other mammals, amphibians and birds from nearby forests and streams, undermining their quiet refuge and breeding success.*

Response: The filtration facility plant will include equipment that generates noise. However, as documented in the record and discussed in detail below, the facility was carefully designed to mitigate noise generation. It is also incorrect and misleading to state that the project will result in heavy trucks arriving and departing "frequently." Delivery trucks and haul-off trucks from operation of the facility are estimated to equate 5 truck trips per day entering and existing the site (Global Transportation Engineer, 2022; Exhibit C.1) and therefore, truck trips will not be a frequent occurrence throughout the day. Additionally, delivery truck activity will be limited to the interior of the fenced filtration facility and will not be directly adjacent to either on-site or off-site habitat areas.

The comment provides quotes that are purportedly related to the impact of noise on certain species. However, the quotes do not appear to be relevant to filtration facility operation. First, the comment does not cite the source of the quotes beyond general websites that do not provide direct access to the articles that the partial quotations were taken from. For example, pmc.ncbi.nlm.nih.gov is the home page for PubMed Central, an archive of literature available at the National Library of Medicine. A search of keywords did not reveal an article that contained the partial quotation included in the comment. Therefore, the context of the quote was not provided and is not

available for review. Similarly, an article about road level-traffic noise is not readily available when accessing news.mongabay.com. The referenced source seems related to a study in Idaho where researchers set up a "phantom road" in the Idaho wilderness and used speakers to replicate road sounds up to 65 dB(A) to simulate traffic sound within a forest corridor. That study has little relevance to the non-road noise generated by the filtration facility located in a non-wilderness area that includes a network of real roads. The quotes fail to provide necessary context to support the broad conclusion that the filtration facility will drive mammals, amphibians, and birds from the area.

More importantly, neither the quotes nor the broad statements of expected impact of noise on wildlife are site or project specific. There is extensive project specific evidence in the record related to noise and vibration. Sound that will be generated during facility operation is addressed on Pages 14 and 15 of N.56 and in Exhibits J.69 and A.49. As explained in N.56, during normal operation, filtration facility sound levels in close proximity to the filtration facility fence line will be below daytime background levels and will be at or below the median nighttime background levels. Even in the event emergency generators were needed for facility operation, and all sound generating systems were operating simultaneously, the sound modeling indicates that predicted sound levels are near or below daytime background levels at the perimeter of the site, including those points closest to the filtration facility fence. Even emergency sound levels are within the range of background nighttime levels at all points except point 1 at the northwest corner of the site, the area furthest away from the largest habitat areas. The following table (Table 1) compares the combined facility sound levels for both non-emergency and emergency operations at the previously evaluated points around the site.

Table 1: Comparison of Daytime and Nighttime Sound Levels for Non-Emergency and Emergency Operations

	Measured Sound Pressure Levels (L_{eq} in DBA)		Predicted Sound Levels	
Location	Daytime (7 am - 10 pm)	Nighttime (10 pm - 7 am)	Non-Emergency	Emergency
1	41-58	33-50	40	51
2	41-52	34-51	40	46
3	41-51	34-50	31	37
4	46-55	46-47	29	36
5	42-55	35-49	35	42
6	48-57	46-56	46	50

*The sound levels included in this table were originally presented in Exhibit A.49 and J.69.

Supplemental sound modeling that incorporates vegetation within the facility fence and outside/immediately adjacent to the fence, indicates sound levels from normal facility operations beyond the facility fence will be at or under 45 dBA (Figure 2). A few exceptions include a small area north of Carpenter Lane; a relatively small area that extends beyond the property line to the west; and a relatively small area of the savanna / oak woodland that is modeled to be within the 45 to 50 dBA sound contours.

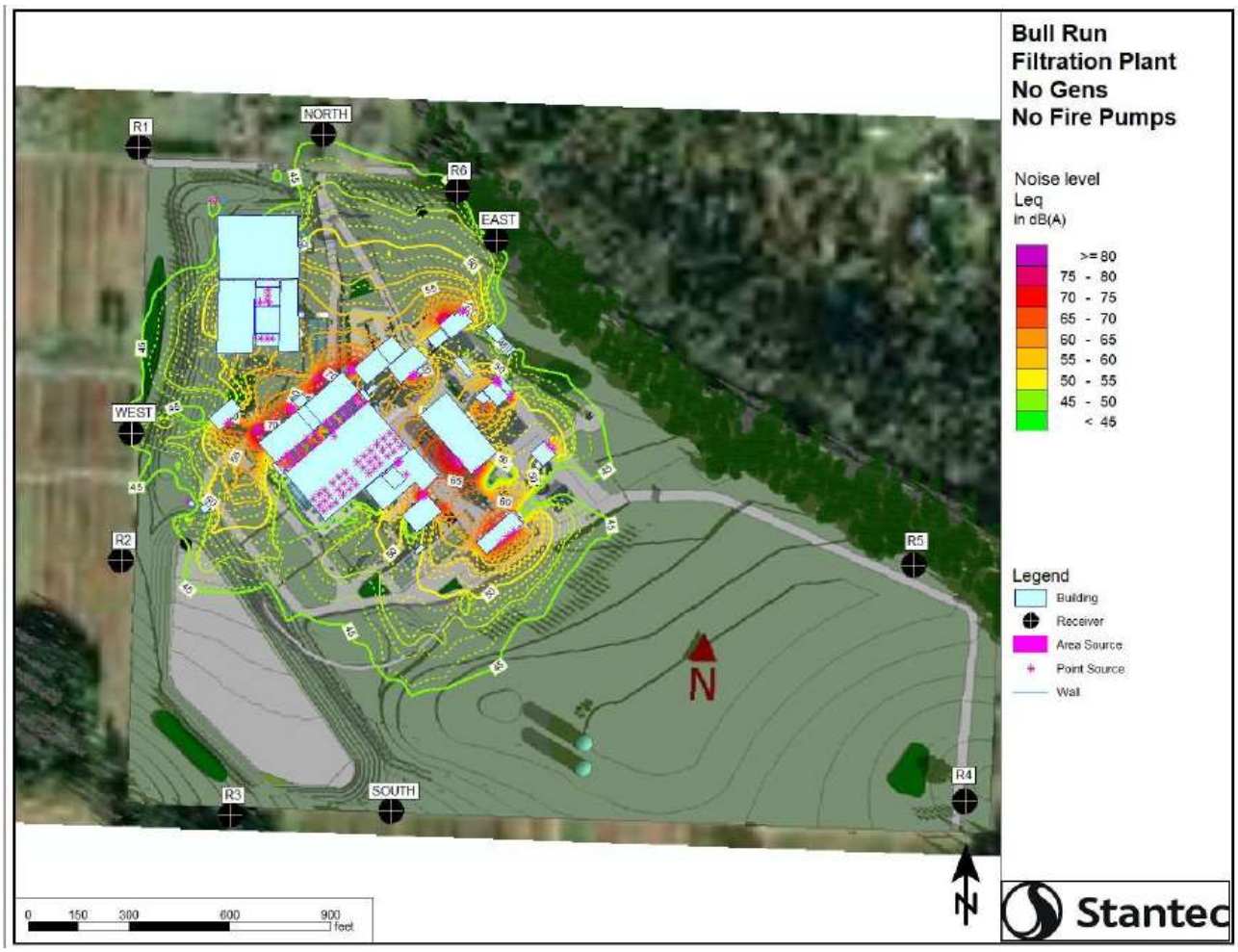


Figure 1: Sound contours to 45 dBA for normal filtration facility operation

The distance of the 45 dBA sound contour from the filtration facility is highlighted because some studies show birds will change their song behavior at noise levels of 45 dBA. A male bird's ability to attract a mate and defend a territory can be hampered by a noisy environment. Although the impact on reproductive success is uncertain, one study showed sound levels of 45 dBA caused 2 species of vireos to change song frequency and length (Francis et al. 2011a) and another study showed song frequency changes in two flycatcher species at sound levels of 45 dBA (Francis et al. 2011b). Adverse impacts to birds are more apparent when sound levels are above 55 dBA. For example, a reduction in the abundance of lekking greater sage-grouse occurs at 55 dBA (Blickley *et al*., 2012a; Blickley *et al*., 2012b); House sparrows (*Passer domesticus*) showed a reduction of breeding fitness at 68 dBA (Schroeder *et al.*, 2012); and the interactions of 5 avian species were altered at 60 dBA (Francis *et al.*, 2009). The fact that a majority of the enhanced habitat outside the facility fence will be below 45 dBA indicates the sound from facility operation will not have an adverse effect on wildlife habitat areas either within or adjacent to the site.

As addressed above, operation of the emergency generators simultaneously with other site equipment increases the facility sound levels. This situation is represented in the updated sound contour below that conservatively represents all noise generating systems operating simultaneously, including the emergency generators. As depicted, the level at the edge of the upland forest area remains at or near 45 dBa. The sound levels within the on-site habitat areas closest to the facility fence will have levels above 50 dBa during emergency generator operation. However, the emergency generators will only operate for periodic testing (typically once a month for

approximately 30 minutes) during daytime hours when background sound levels are higher and during actual emergency situations.

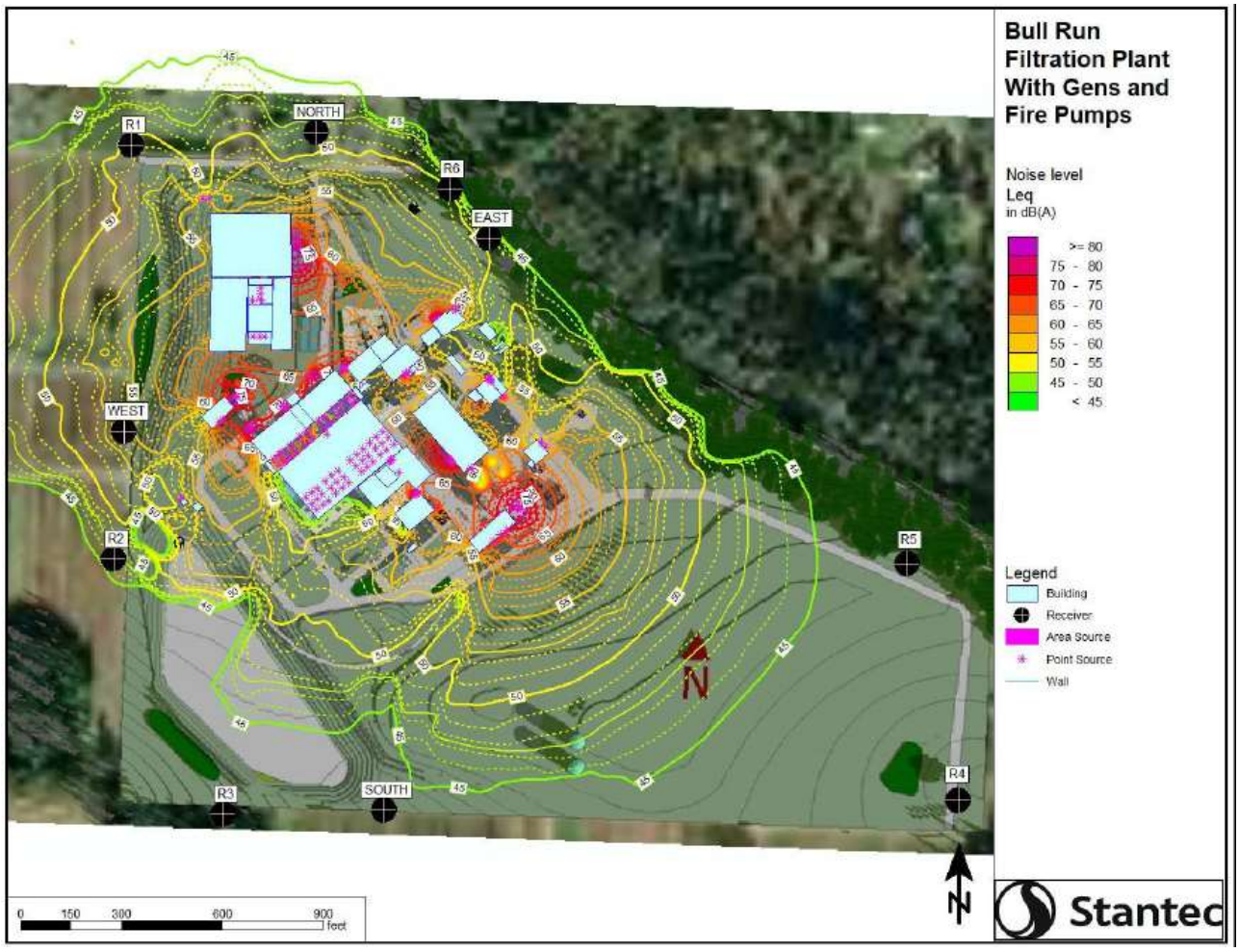


Figure 2: Sound contours to 45 dBA for all facility systems operating simultaneously.

The periodic and infrequent sound levels exceeding 50 dBa on portions of the on-site habitat areas will be less disruptive to the wildlife habitat than the more frequent and louder noise sources operating throughout the site when the commercial nursery was operating. Pre-construction conditions included various levels of noise from farming operations including tractors, trucks, and workers in close proximity to habitat areas, including within the SEC area in the southwest corner of the site near the riparian forest. Most of the filtration facility site was leased by Surface Nursery. Testimony submitted by Surface Nursery during the original land use proceeding confirmed, "[tractors and other farm equipment are part of accepted farm practices and normal operation at Surface." (Exhibit I.31, pg 3) The testimony further indicates that when tractor work is being performed there are typically 1-4 tractors operating in a field for less than 4 hours at a time. While there are likely variations among tractor models, sound generated by a tractor typically ranges from 80 to 100 dBa.

In addition to the past uses, the filtration facility site will continue to be located in an area surrounded by active nurseries, roads, and residential uses. Many of the animals in the area are expected to be at least somewhat habituated to human and machine generated noises. For landscapes where wildlife species occur near human activity such as industrial facilities, there are several animals of different species that can habituate to anthropogenic sources of noise and cease responding to the noise when the animal learns there are no significant

consequences. For example, in a study of wildlife barriers, researchers examined the distribution of chipmunks and mice perpendicular to roadways of varying traffic volumes (low to high) and found the small mammals to be at similar densities adjacent to louder, high-traffic two-lane roads compared with the same distance from quieter, low-traffic two-lane roads (McGregor et al., 2007). Cases of birds and mammals habituating to repeated, predictable noise including continuous noise have been well-documented by the Federal Aviation Administration (FAA) that is charged with discouraging wildlife use at airports to avoid wildlife-aircraft collisions. The FAA uses a variety of electronic noise and pyrotechnics, including cannons (120 dB) and shell crackers, to haze or intentionally discourage the presence of wildlife from airfields. Species that have been shown to habituate to regular hazing include gulls, Canada geese, starlings, American crows, coyote and deer. Birds also habituate to regular to recorded sounds of distress calls or other repeated/continuous electronic sounds (FAA and USDA 2005).

In contrast to the relatively "loud" hazing devices that several animals can habituate to at airports, the sound levels from the filtration facility will produce consistent and predictable noise that is at or below background noise levels within both on-site and off-site habitat areas. The noise levels generated when the emergency generator is periodically tested will be moderately higher within portions of the on-site habitat closest to the filtration facility fence line. However, those levels will only occur once a month for a short period of time, in contrast to the more regular and intense noise generating activities of the previous nursery use. Additionally, individuals within a species that are more noise-sensitive will have ample space outside the fenced facility, but still within the property, to find quiet microsites (< 45 dBA) in order to successfully feed, rest and reproduce. For these reasons, the sound generated by the filtration facility under all operating conditions will not adversely affect wildlife habitat.

Potential vibration impacts due to operation of the facility are addressed on Page 17 of Exhibit N.56. As described there, all equipment in the filtration facility that could cause vibration is mounted with mass and base isolation to limit vibration and protect the equipment. As a result, vibration can only be perceived in very close proximity to the source. Vibrations will not be perceived outside of the filtration facility fence and will not adversely affect the surrounding wildlife habitat.

Light Pollution: *Nighttime operations and security lighting will flood the site with artificial light, destroying natural darkness. Light intrusion is known to disrupt wildlife behavior: for example, it "alter[s] the biological timings, including daily and seasonal activity patterns, of birds" pmc.ncbi.nlm.nih.gov and similarly affects rodents and amphibians. The National Geographic likewise warns that excessive outdoor light "is affecting… wildlife behavior" education.nationalgeographic.org. This illumination weakens the forest and riparian environment by altering predators' and prey's cycles and by interfering with navigation and reproduction of nocturnal species. Even if the plants and animals remain physically in place, their capabilities are impaired by constant light (a clear loss of system capability).*

Response: Once again, links to the partially quoted articles are neither included in the record nor properly linked in the document. And once again, the comment fails to acknowledge the site-specific evidence in the record. PWB specifically designed light features at the filtration facility to avoid potential negative effects of night lighting on nocturnal wildlife and neighbors in the vicinity. As described in the Habitat Impact Analysis (Exhibit N.56, pg. 15) "The Filtration Facility will have lighting inside the Filtration Facility fence that meets or exceeds Multnomah County Dark Sky Lighting standards. As described in the Impacts of Lighting at the Bull Run Filtration Facility memo (Exhibit J.70)) and the Land Use Light Report (ExhibitA.47) the default lighting condition during nighttime hours will be a dimmed mode with full light output only triggered manually or via motion sensor when needed for a task." Lights will be directed down through the use of cutoff fixtures, and as demonstrated by the specific footcandle measurements included in the referenced reports, even when full brightness is triggered, lighting at grade will be contained within the filtration facility fence area and will not adversely affect the surrounding habitat.

The lack of a connection between the comment and the project specific lighting plan is evident based upon the speculation that light from the facility will impair species capabilities, is evident in the words and phrases used in the comment. For example, the comment 1) claims nighttime lighting will "flood the site"; 2) cites articles related to "light intrusion" and "excessive outdoor light"; and 3) references illumination of surrounding forest and riparian environments. Evaluation of the site-specific lighting evidence in the record reveals that none of these conditions will be present during facility operation.

Increased Vehicle Traffic*: The plant's operation will require routine truck deliveries of chemicals and materials, plus employee and service vehicle trips, far above current levels. New or intensified traffic "creates road noise and traffic patterns" that fragment habitat. Studies show that even moderate road noise will "push migrating birds away from their stopover habitats" news.mongabay.com, effectively rendering those areas uninhabitable. In practice, heavier traffic also raises the risk of roadkill and continuously bars movement for deer, elk, amphibians and other wildlife trying to traverse the landscape. The resulting barrier effect isolates wildlife pockets (weakened habitat connectivity). In sum, the traffic noise and barrier will degrade any forested or riparian corridors across the site, in violation of MCCP policy.*

Response: Vehicles traveling to and from the operating filtration facility site will travel on existing public rights-of-way. Any habitat areas adjacent to those public roads are already affected by vehicle noise, including the noise created by large trucks and farm equipment whose presence on surrounding roads is well documented in the record.

In terms of the risk of roadkill, that risk already exists for wildlife traveling across existing rights-of-way in the project area. The hedgerow area along Dodge Park Boulevard that was removed along the finished water pipeline alignment provided inconsistent stretches of habitat directly adjacent to the travel lanes. As discussed in the Habitat Impact Analysis, proximity created additional hazards for any wildlife using the habitat and limited habitat connectivity. In contrast, the wildlife areas PWB has committed to creating on the filtration facility site include hedgerow function in safer locations through wooded/shrubby buffers around the perimeter of the facility, thus improving habitat connectivity both on and through the site to the adjoining riparian and forest habitat areas. To provide in-place habitat replacement, as detailed in the Dodge Park Roadside Clusters Plan (00-LU-413) include in S.32, the area within the right-of-way previously occupied by sections of hedgerow will be planted with dense, alternating clusters of forbs and woody vegetation in addition to a roadside seed mix. The selected clusters provide diverse habitat functions for insects and small birds and mammals that are accustomed to roadside areas. The lower vegetated coverage will be less attractive to larger mammals more prone to vehicle strikes. Therefore, vehicle trips to and from the filtration facility will not adversely affect wildlife habitat.

Habitat Fragmentation*: The plant and its infrastructure (buildings, roads, vehicle areas, fencing, power lines) will permanently displace vegetation and divide existing habitat. What was once a contiguous forest or grassland patch will be sliced by roads and cleared areas. Fragmentation is known to reduce biodiversity and ecosystem function. For example, isolating a stream corridor with adjacent roads or lights impairs its function as a wildlife corridor. Even if the county allows native landscaping, the structural change weakens the system: smaller, fragmented patches cannot sustain the same wildlife populations or ecosystem services.*

Response: It is not clear what contiguous forest or grassland patches the comment is referring to. Following construction, the only two above-ground facilities will be located on land that has most recently been used as actively managed commercial nursery land – the filtration facility site and the intertie site. Furthermore, the project is not creating any new roads, with the possible and limited exception of driveways and vehicle areas within the fenced filtration facility site. A more complete discussion of habitat fragmentation is provided on pages 9 to 11 in Exhibit S.32. For the reasons discussed there, the project will provide unincumbered migration corridors through the unfenced areas of the filtration facility site and remove existing wildlife fencing installed to deter or reduce elk presence on the former nursery land. Thus, the project both avoids the fragmentation concern

raised in this comment and facilities new migration path through the filtration facility site. The response to S.15 below further addresses improvements to wildlife corridors throughout the project area.

Comment*: Each of these operational impacts, even if modest on its own, erodes natural resources in the sense used by the MCCP. The key test is weakening or loss of quality, not just wholesale destruction multco.us. For example, a small but constant noise level is a loss of the resource "quiet" that wildlife depend on; light trespass is a loss of the darkness environment; minor chemical seepage is a loss of water purity. These constitute "damage by weakening" of streams, forests and habitats under the Webster definition cited in MCCP multco.us. LUBA's standard requires denial if any such impairment occurs.*

*Conclusion**: The proposed filtration plant's ongoing operation will measurably degrade multiple "functioning natural systems" – from wetlands and streams to wildlife habitats and farmland multco.usmultco.us. By generating noise, light, traffic and contaminants, it will weaken or diminish the quality and capability of those resources.*

Response: For the reasons set forth above, the comment does not identify any specific or measurable degradation that is not addressed in the record. The habitat impact analysis provided at Exhibit N.56 appropriately assesses habitat quantity and quality both before and after construction and considers the potential impacts addressed in this comment, including noise and light impacts. Noise and light impacts are also addressed above in response to Comment S.10. The evidence in the record demonstrates that the presence of the filtration facility will not adversely affect wildlife habitat.

S.11 testimony submitted by John Swinford 7428 SE Cottrell Rd. Gresham, OR 97080

Comment:
1. The Use Will Adversely Affect Functioning Natural Systems

The filtration plant is not a passive facility. It will involve permanent structures, continual staff and vehicle access, mechanical operations, noise and light pollution, and chemical usage. These activities will produce ongoing disturbances that result in degradation of natural systems in several ways:

> ***Wildlife habitat** will be fragmented and disturbed by light, noise, traffic, and human presence.*

These impacts amount to a loss of quality and capability in the affected natural systems, meeting the definition of "environmental degradation" the County's land use system is designed to prevent.

Response: The filtration facility will provide a critical community service, and it is undisputed that in order to provide that service, the filtration facility will include permanent structures, staff and vehicle presence, mechanical equipment, and on-site chemicals. The facility will also generate noise and light, but in a controlled manner so as not to result in noise or light pollution. The comment does not mention that the vast majority of those functions will be concentrated within the fenced 37-acre filtration facility area. Understanding the impact of the operating filtration facility project on area wildlife habitat also requires consideration of the extensive native plantings and wildlife enhancements will be provided outside of the filtration facility fence and within the project area. The commercial nursey activities that directly preceded the filtration facility project also included human presence, noise generating vehicles and mechanical equipment, and the use of agricultural chemicals across almost the entire filtration facility site area.

The response to Exhibit S.10 above addresses habitat fragmentation, as well as claimed impacts of noise, light, and traffic generated by the filtration facility on wildlife and wildlife habitat. Wildlife habitat fragmentation is also addressed in detail on pages 9-11 of Exhibit S.32.

The claim that impacts from operation of the filtration facility amount to a loss of quality and capability of wildlife habitat is inconsistent with the evidence in the record and fails to account for either the preexisting commercial nursery farm operations or the wildlife habitat creation and enhancements PWB has committed to implement. As detailed in the Habitat Impact Analysis (Exhibit N.56), and as further supported by additional planting and enhancement identified in the first ORP and this submittal, the operating filtration facility will yield a net benefit to wildlife habitat quality through the creation and enhancement of several natural habitats at the filtration facility site including oak woodland and savanna, native grasslands, woody buffers/hedgerows, as well as the expansion of existing mature upland forest and riparian forest.

S.12 testimony submitted by Michael Skelton 5410 SE Oxbow Pkwy

Comment: *Please see the attached video PWB create for social media which clearly shows the destruction to the natural habitat. The video was posted by PWB "X" account on 12/10/24.*

The video shows aerial imagery of the filtration facility site pre-construction in March and April 2024 followed by construction mobilization in May 2024. The video proceeds with monthly images through December 2024, showing the different stages of site clearing, excavation, soil stockpiling, construction of temporary access roads, water quality facilities, etc.

Response: Construction activity is not subject to the applicable conditional use criterion, and thus the video is not relevant to this remand.

S.15 written testimony submitted by Jennifer Hart, 38200 SE Lusted Rd Boring, OR. 97009

Comment:

Habitat disruption: The physical presence of operation at the plant (equipment, operation activities, staff, trucking, vehicle, humans, and sound) will disrupt local habitats, affecting wildlife that relies on the perch and springs. This will lead too displacement or reduction in species populations.

Renee France, PWB Attorney spoke on wildlife and the enhanced habitat for wildlife in 48 acres of the property. This filtration plant is going to be fenced. The fence is not going to be five feet, but much higher. I have worked in the area since 1991 and currently live on 63 acre. I personally know how a fence can alter wildlife. As for 20 acres of my property is fenced with a 7 foot cyclone, with 12 inches of barbwire, equaling an 8 feet high of fence. It is nice to feel secure, however, it cuts the wildlife off from my property. Periodically I will get a deer in my fence line, as for I have uneven ground in areas and they can slide under the fence, or if a gate is left open. Currently, I do not have to worry about leaving a gate open as for the deer are not around. I live 1/2 mile from the project.

Unlike my fence having uneven areas where the animals can come through or dig under, I would imagine that the Filtration Plant fence will be much more substantial than my fencing. It will be harder to dig under and will be maintained. This being the case how will there be wildlife other than birds, snakes and little small critters using the land that now id fenced off to them for a migration path, food , and bedding down. This has had an adverse affect on the wildlife natural resources of the area and does not meet criteria of MCC 39.7515(B).

Response: The elements of plant operation referenced in the comment will occur almost exclusively within the fenced filtration facility that is confined to 37 acres of the total site. The activities described are addressed extensively in the record. Moreover, the very general statement claiming habitat disruption and long-term changes, fails to acknowledge the detailed and site-specific analysis explained in the Habitat Impact Analysis document (Exhibit N.56). The additional analysis concluded a net benefit to wildlife species overall within the project area due to the creation of several natural habitats at the filtration facility site outside of the filtration

facility fence, including oak woodland and savanna, native grasslands, woody buffers/hedgerows, as well as the expansion of existing mature upland forest and riparian forest. The many benefits of these habitats that will be created/enhanced after construction are described in detail in the Habitat Impact Analysis. Additionally, in response to subsequent comments, the project planting plans have been modified to 1) add dense woody and forb clusters on the south side of Dodge Park Boulevard along the finished water pipeline alignment, 2) add additional tree, shrub and hedgerow habitat on two properties owned by PWB on Carpenter Lane, and 3) replace bare root plantings with larger ball and burlap plantings in identified areas on the filtration facility site. Collectively, these changes will provide additional shelter, nesting sites and movement corridors for wildlife species, and will increase overall planting densities and maturity to off-set the necessary removal of trees from the project area during construction. Refer to Figure 3 (from Exhibit N.56) for arrows depicting likely wildlife movement corridors around the filtration facility site.

Regarding fencing, it appears that the commenter misunderstands fence locations at the filtration facility site and assumes that a robust fence will be located at the outer perimeter of the entire filtration facility site. However, only the 37-acre facility area will be fenced with security fencing within the larger filtration facility site which totals approximately 94 acres. The fence surrounding the filtration facility area will be metal mesh, 8-feet in height and will not be topped by barbed wire. Birds, bats, invertebrates (insects), snakes, and small rodents will be able to either fly over or move through the proposed fencing into the 37-acre facility. The remaining acres of the filtration facility site will not be fenced with the exception of an agricultural fence no more than 4-feet in height along a portion of the southern boundary at the edge of the adjacent nursery. The fence will be located to allow unobstructed wildlife movement through the habitat areas into adjacent forest to the east and riparian areas to the west consistent with Figure 3. Additionally, PWB will remove existing elk fencing that has historically impeded free movement of deer and elk from the forested area east of the filtration facility site through the site. Collectively these actions will improve the availability of the site for wildlife movement corridors, foraging, and resting/loafing.

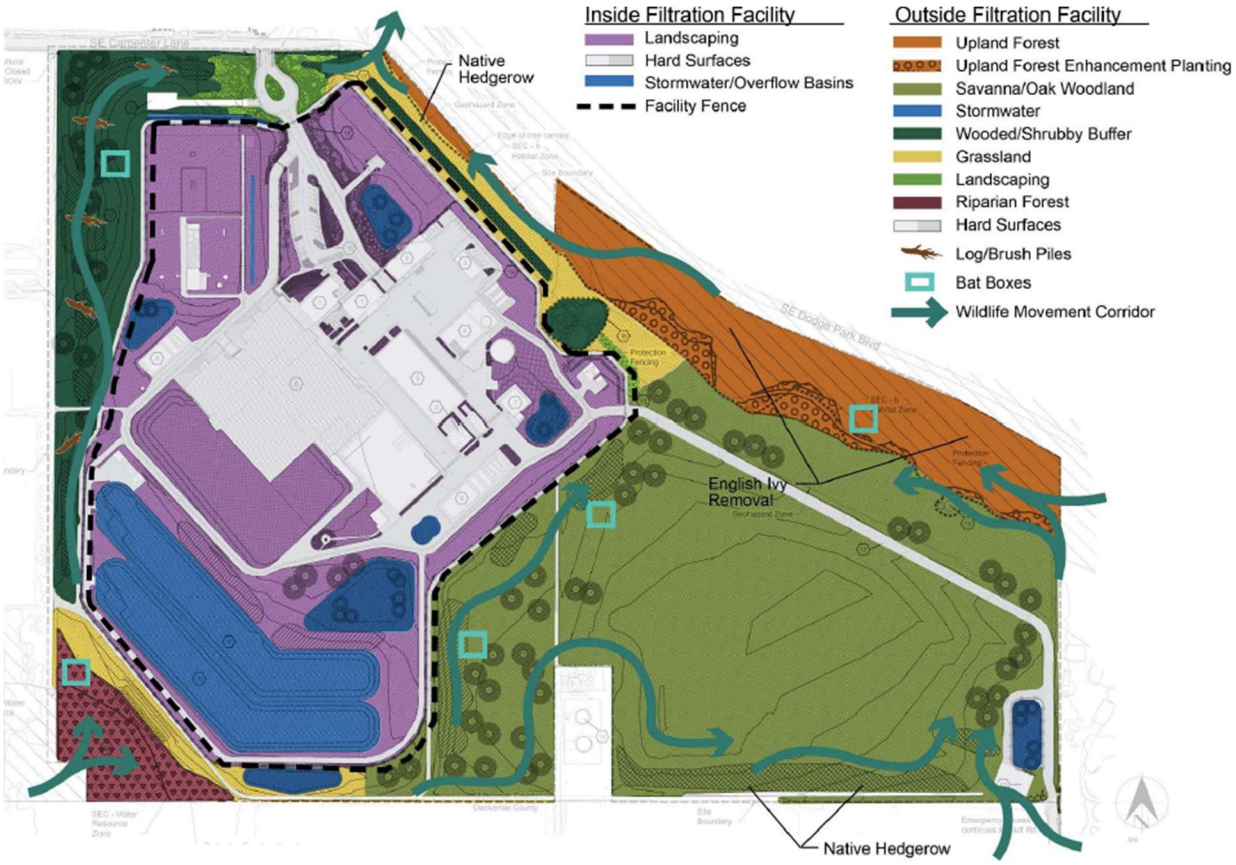


Figure 3: Facility fence shown as a black-dashed line around the 37-acre facility. Teal arrows approximate available wildlife migration pathways.

According to testimony from multiple project opponents, elk in the area regularly bed down for the night on much smaller properties close to inhabited houses and other structures. For example, Lauren Courter testified during the original land use proceeding that "elk bed down on our front pasture and our neighbor's pasture…" (Exhibit E.17, pg. 2). Ms. Courter lives on a 10.3-acre property near the corner of the filtration facility site with limited pasture area located close to structures. The large oak woodland and savanna will provide much larger area for elk to bed down for the night with further separation from human presence.

Figure 4: 36610 SE Dodge Park Boulevard

S.16 testimony submitted by Paul Willis, Carpenter Ln., Gresham, OR 97080

Comment: N*on-Construction/plant noise is addressed in Exhibit A.49, E3. E.3, pg. 11, states that emergency generators for the operating plant will have a 75 dBA enclosure around them, implying the sound without the enclosure is much more. So, at night the generator sound could be over the allowed 50 dBA, a Code limit. These generators needed to be regularly run to test reliability and readiness. This "unusual" area "farmland" noise will be disruptive to fish, foul and wildlife. Watershed fish and wildlife will potentially be affected by the uncontrolled noise levels. In wildlife, including birds, noise can have a detrimental effect, " "...noise can increase the risk of death by altering predator or prey detection and avoidance, interfere with reproduction and navigation, and contribute to permanent hearing loss." Additionally, fish get use to sounds like the wind and various vibrations. Unfamiliar sound and vibration levels will affect them too.*

Response: The emergency generators will only be operated within the enclosure system. Therefore, sound generation without the enclosure is not relevant for either the facility's ability to meet the numeric code standard or for consideration of the potential effect of noise generation from the facility generally on wildlife habitat.

While the comment includes quotations, those quotes do not seem to be attributed to a source, and there is no way to determine the level of noise the original author of the quoted material was referring to. The sound level created by filtration facility operation and expected effect on wildlife habitat is addressed in the response to S.10 above.

Comment: *Plant operation air quality and odors are of concern. Ozone generation is part of the PWB's water filtration process. It was recently removed but said to be installed in the future. Ozone has an odor that some may find objectionable and is described as follows: Metallic; like a burning wire; like chlorine; a "clean" smell; sweet and pungent. Breathing ozone can result in various health effects, including, induction of respiratory symptoms; decrements in lung function and inflammation of airways; and with respiratory symptoms, such as coughing, throat irritation, pain burning or discomfort in chest when taking a deep breath and chest tightness, wheezing or shortness of breath. Exposure concentration and time duration will determine ozone's effects. Wildlife have a keen sense of smell and will avoid the area with the presence of ozone.*

Response: Ozonation as a water treatment process is no longer part of the baseline filtration facility project. However, because the facility was designed to accommodate ozone treatment, it could be included in the future. Ozone injection contemplated as a future water treatment process would occur within a sealed concrete basin, kept under negative pressure to prevent gas in the headspace from escaping, and any ozone would be converted to molecular oxygen via a catalyst prior to atmospheric discharge. Redundant ambient sensors would detect elevated levels of ozone or oxygen and trigger alarms to shut down the systems if necessary. In other words, at all times ozone would be confined within a closed system at the facility equipped with sensors and automatic shut offs to prevent ozone from being discharged into the atmosphere. Therefore, if ozone were included in facility operations in the future, ozone odor would not be detectible outside in the wildlife habitat areas surrounding the filtration facility. Wildlife in the vicinity of the filtration facility, including species with a keen sense of smell, would not be adversely affected or deterred by ozone generation within the facility's closed system.

The facility's use of ozone is further addressed in the air quality response memorandum prepared by ESA and submitted concurrently with this document.

S.24 testimony submitted by Ian Courter and Lauren Courter (re: response to N.61 Air Quality)

Multnomah County land use policy, particularly in unincorporated and environmentally sensitive areas like those west of the Sandy River, emphasizes no adverse effects on natural resources. Natural resources includes air, water, and habitat. Low levels of diesel particulate matter or other pollutants have the potential to accumulate or impact nearby natural systems (e.g. riparian buffers, wildlife corridors) and rural communities when evaluated on a long-term or cumulative basis.

The primary response to Exhibit N.61 is provided in the air quality memorandum prepared by Phil Gleason of ESA submitted into the record concurrently with this memorandum. As explained in detail in the air quality memo, DPM's very fine particles have long atmospheric residence times on the order of days to weeks, allowing them to be transported tens to hundreds of kilometers from their source as they disperse in the atmosphere. These characteristics mean that DPM has only nominal deposition in proximity of where it is released. Additionally, the mass fraction of toxic constituents in DPM is minuscule, meaning that even less of the quantity of DPM that is deposited has actual toxicological properties. Additionally, human health risks associated with DPM exposure are based on long-term exposure (typically 30 years) and averaging periods (typically 70 years) at a fixed location where sensitive receptors may be present for extended duration (e.g., residences). Given that wildlife is typically more transient and would not be exposed to project DPM concentrations for such extended periods of time, any such effects on wildlife would not be enough to be "adverse." Finally, as noted in ESA's air quality response, pre-development conditions involved activities (e.g., diesel-powered tractors) that generated DPM at the site. Any corresponding change in DPM emissions would be a net change, further reducing the magnitude of the project's less than adverse effect. For these reasons, DPM from truck trip to and from the filtration facility will not adversely affect onsite or surrounding wildlife habitat.

S.26 testimony submitted by Steven P. Smith, Wildlife Biologist

Comment**:** *During the remand hearing, there was discussion concerning management of hedgerows by Multnomah County. The Comprehensive Plan (Chapter 12: Policy 16, Strategy C) recognizes the importance of hedgerows. Policy 9.c states: "Review of internal protocols related to road and road right-of -way maintenance including roadside hedgerow trimming and weed eradication. Work with the Soil and Water Conservation District, ODFW and wildlife conservation groups to protect wildlife and manage invasive species to ensure that habitat and water resource restoration projects are coordinated with road maintenance and control programs." Hedgerows also sequester carbon, attenuate heat and cold weather events, and filter storm and agricultural runoff. All of these attributes contribute to hedgerows natural resource values.(pg. 2)*

Response: Mr. Smith's reference to the Multnomah County Comprehensive Plan is incomplete and misleading. Chapter 12, Policy 16 is the Funding and Maintenance policy of the County's Transportation System Plan. Policy 16 directs the County to "[e]xplore alternative supplemental funding sources to improve County's road maintenance, safety projects, and other improvements." The language from 9.c quoted above is one of 5 strategies to implement that funding policy. In other words, simply because the Comprehensive Plan uses the term hedgerow does not mean that the Comprehensive Plan includes policies or strategies that prohibit removal of hedgerows for other high priority right-of-way purposes or assigns any specific habitat value to hedgerows within the right-of-way. In contrast, the County's Transportation System Plan specifically addresses and prioritizes the placement of public utility facilities in the County right-of-way. Overall Transportation System Policy 4 directs the County to "[c]oordinate with public service providers and private utility suppliers to maximize the efficient delivery of both public and private utilities and facilities in County Right of way."

Comment: *The habitat documents provided by the PWB (N.56) indicate that limited field effort was made to assess wildlife use of the proposed project area. The record refers to three field observation within the agricultural field to evaluate for presence of streaked horned lark. No discussion of the techniques used or data collected was provided, as would be customary. This would help determine the adequacy of the evaluations. Although some bird observations within the agricultural field were documented as part of the streaked horned lark survey, no apparent effort was made to assess the hedgerow, wetlands or forest edge for wildlife use or vegetation composition. Pages 9-10 of Exhibit N.56 document that ESA conducted pre-construction bird nesting surveys at the filtration site, raw water pipeline alignment area and right of ways in early spring and summer of 2024, these areas do not include hedgerow, wetlands or forest edge. Moreover, photographs in the record (EX.48, pages 8,10,12) show tree removal in progress on February 15, 2024 in the Dodge Park Blvd ROW (pg 8; along Carpenter Lane March 5, 2024 and February 8, 2024 at the raw water tunnel site. Construction of this project was well underway.*

The consultant does not provide documentation of the techniques used, time of day observations occurred, or where observation points were located, which again, is customary based on my 25 years of reviewing habitat impact analysis. Again, based on my decades of experience as a wildlife biologist, I find it highly unlikely that a scientifically valid bird survey would detect no migratory song birds, reptiles, amphibians or mammals in the forest edge, wetlands or hedgerows during the spring and summer period unless the disturbance activities had already commenced and impacted wildlife use. Species inventory data that is provided relies primarily on data base searches for existing known locations and species associations, not on any evaluation of the actual site conditions. (pgs. 2-3)

Response: Contrary to Mr. Smith's conclusion, the pre-construction habitat summaries, HEP assumptions, and quantification of habitat quality include the Habitat Impact Analysis was based upon extensive knowledge and evaluation of the operational project areas.

First, the summary of field work in the comment misrepresents the pre-construction surveys conducted to assess the value of wildlife habitat and the presence of wildlife species present within the project area. A more complete

and accurate list of inventories and habitat evaluations is provided in Topic 3 of the upland habitat response submitted during the first ORP (Exhibit S.32).

In terms of the streaked horned lark (SHLA) survey specifically, the surveys followed USFWS-approved protocol methodology which is a peer-reviewed/approved approach widely accepted as the method for determining if SHLA are present at a site. A copy of the SHLA memo was provided as an attachment to Exhibit S.32 and includes the data sheets compiled as part of the study. As described in the memo, surveys were conducted in accordance with Survey Protocols and Strategies for Assessing Streaked Horned Lark Site Occupancy Status, Population Abundance, and Trends (protocol) (Pearson et al. 2016) to determine occupancy in the project area.

In response to the comment specifically related to pre-construction nesting surveys, as described in Exhibit S. 32, pre-impact nest surveys of specific subareas of the project were also conducted prior to the removal of trees or impacts to nesting habitat, following the City's standardized approach to protecting nesting birds as described in the Portland Environmental Services Protecting Nesting Birds Best Management Practices document. The BMPs have been vetted by Oregon Department of Fish and Wildlife (ODFW) and the US Fish and Wildlife Service (USFWS), and USFWS considers the program "exemplary" and has actively distributed the BMP document as a model example. These BMPs have been successfully implemented on City projects for over a decade by experienced avian biologists, as they were on the PWB filtration facility project. A summary of the species observed across the project during each survey was provided as an attachment to Exhibit S.32.

Mr. Smith acknowledges that the surveys took place at the filtration site, the raw water pipeline alignment and rights-of-way, but then revealing the author's lack of familiarity with the project, claims those areas do not include hedgerow, wetland, or forest edge. As well documented in testimony and the record, the hedgerow that was removed for the finished water pipeline was exclusively located in the public right-of-way along Dodge Park Boulevard. In fact, as explained in the Temporal Impacts topic in Exhibit S.32, 91% of trees removed for the project were located in the public right-of-way. The raw water pipeline will be located beneath property that includes delineated wetlands and two ponds that will be avoided by the project during construction. The raw water pipeline will also be located on property with established forest edge that will remain following construction. The filtration facility site also includes extensive forest edge along the eastern boundary of the site and riparian forest edge in the southwest corner of the site. Both Portland staff and the author of the Habitat Impact Analysis and this response made multiple site visits to those areas both to conduct bird survey work and as a project consultant during project development phases.

The contention that the project construction was well under way prior to bird survey work is inaccurate based upon the phases of tree removal and mischaracterizes the City of Portland's bird nesting BMP approach. The following corrects and clarifies the date of the survey in relation the tree removal activity at specific locations:

- A nesting survey was conducted at Dodge Park Blvd ROW on February 13, 2024, prior to February 15, 2024 tree removals. No nests were found.
- A nesting survey was conducted at Carpenter Ln. on February 26, 2024, prior to March 5, 2024 tree removal. No nests were found.
- A nesting survey was conducted at the Bissell Property (raw water tunnel site) on February 2, 2024, prior to February 8, 2024 tree removal. No nests were found.

As detailed in the bird survey summaries included as S.32 Exhibit 2, subsequent surveys were also conducted in May of 2024 to track the breeding cycle of birds in the area after construction activity ceased.

Pre-construction nest surveys are targeted at specific areas where imminent construction activities – typically involving the removal of vegetation - are scheduled with surveys generally being conducted no more than 10 days prior to disturbance. The most common reason for pre-construction nest surveys was to determine if active bird nests were located within an area where the removal of trees, shrubs and/or extensive groundcover was pending in

order to avoid disturbance to birds. Construction mobilization was phased in a way that allowed for discreet areas to be surveyed for nests prior to construction activity, therefore construction at specific locations was not underway prior to nesting surveys at those locations. Intensive and localized nest surveys were conducted prior to any construction related vegetation removal. Over 35 nesting surveys were conducted in 2024 between February 2nd and July 10th. Whenever active nests were located, appropriate protective "no work" buffers were established around the nests using visible flagging until nests were no longer active. While conducting nest surveys, any bird detected during a survey was recorded, whether it was exhibiting nesting behaviors or not. In this way, nesting survey data also act as an additional species inventory of the project site both prior to and during construction activities.

Second, in addition to the recorded surveys conducted within the nursery fields, along the hedgerow, near wetlands, and along the forest edges within the project boundary, PWB staff and consultants conducted multiple visits to the project areas and have extensive personal knowledge of both the filtration facility site and pipeline alignments. For example, hedgerow plant structure and species composition along Dodge Park Boulevard was assessed in the summer of 2023 and included an examination of aerial imagery as well as two visits by ESA in August and September. Dodge Park Boulevard was the focus of the summer visits as this was the location where most shrubs/trees would be removed. ESA parked along several points of the Dodge Park Blvd. to photograph and confirm the type/extent of vegetation depicted in aerial imagery of the hedgerows in order to evaluate the wildlife that could potentially use vegetation within the rights-of-ways.

During pre-project planning and due diligence for determining potential disturbances to natural resources that could occur during construction along the raw water pipeline alignment, ESA assessed characteristics of a small pond in August of 2023 to evaluate habitat conditions and specifically determine if pond turtles could be present. The site visit included: interviewing the landowner related to the history of the pond; observing and recording the dimensions including width, length and depth; and observing habitat features such as the presence/absence of potential basking sites (logs, mats of vegetation). No turtles were observed in the pond and no turtles are mapped for the area. During that site visit, presence of wildlife was noted, including a great blue heron (juvenile) hunting along the edge of pond and American robins in the orchard trees near the house on the property.

The author of the Habitat Impact Analysis and this response also observed wildlife use of edge habitat along forest/field interfaces while participating in the pre-construction avian surveys described above. The most common type of wildlife observed was birds. Evidence of ungulates was also noted by the author, including matted down vegetation in the spring of 2024 in the southeastern corner of the filtration facility site indicating that either elk or deer had bedded down in the area for the night. This was while construction activity was on-going in the area and active 6 days a week. While evidence of this type of wildlife observation was not formally documented in a technical report at the time, it is part of the professional experience and background information that helped inform the Habitat Analysis Report (Exhibit N.56) assessing pre- and post-construction wildlife habitat conditions of the project area.

Vegetation inventories also consisted of the following, as described previously in several exhibits, including Exhibit N.56:

- A complete tree inventory along finished pipeline alignments, the raw water pipeline and the filtration facility site;
- Data plots established in several portions of the project area (raw water pipeline, filtration facility site, road rights-of-ways, and the Intertie), to characterize vegetation composition as part of wetland delineations/determinations (Winterbrook, 2023). Data plots characterize dominant plant species in standardized herbaceous species in a 5-foot radius area for herbaceous species and a 15-foot radius area for shrubs and trees according to Department of State Lands and U.S. Army Corps of Engineers current methodology. The Wetland Delineation Report is attached as Attachment 1.
- Comprehensive field assessment of plant species composition by City of Portland staff of the filtration facility site as previously described in Exhibit S.32 to inform site management and planting plans.

Collectively, this information informed the pre-construction habitat summaries, HEP assumptions, and quantification of habitat quality include the Habitat Impact Analysis.

Comment: *ESA relies on Habitat Evaluation Procedure (HEP) suggesting it is a widely accepted methodology and does not require species inventory. They suggest Habitat Suitability Indexes (HSI) and Wildlife Habitat Units (WHU) can be used to provide the information required for adequate assessment and mitigation. This is contrary to HEP analysis procedures outlined in the FWS HEP Manual (1996), as discussed in greater detail below. According to conversations this authority had with representatives of the Oregon FWS (personal communication, April/2025) did concur with the authors statement that HEP was widely used and accepted methodology by the FWS. However, FWS training for use of HEP was widely discontinued by the early 2000s. Use of HEP may be helpful but should only be relied on after peer review and validation using reference conditions. Neither of these conditions appear to have been satisfied in this case. Neither of these conditions appear to have been satisfied in this case. (pg. 3)*

Response: This comment relies extensively on the 1996 USFWS HEP manual, provided as Attachment 2, to support claims about that the methodology generally requires. However, the stated purpose of the referenced 1996 manual is "to provide policy, standards, and guidance for application of the Habitat Evaluation Procedures (HEP) in the Fish and Wildlife Service." In other words, the manual exclusively provides guidance for the federal agency and is not applicable to the application of a modified HEP methodology outside of the agency. This is further reinforced by Section 1.4 that describes the intended applications for a USFWS HEP subject to the manual guidance, which include federal projects required by the Fish and Wildlife Coordination Act, and federal agency planning activities particularly when USFWS is a cooperating agency under the National Environmental Policy Act. It is also relevant that the guidance the commentor sought to understand the use and requirements of the HEP were USFWS staff who are presumably familiar with how it was applied by USFWS staff on USFWS projects or USFWS consultations with other agencies. Collectively these sources indicate that Mr. Smith has a singular perspective for a HEP that is not directly relevant to how the HEP methodology was applied in this case.

The general description of a HEP in the manual is a habitat-based approach for assessing environmental impacts of proposed development projects. It further states the method can be used to document the quality and quantity of available habitat for selected species. The Habitat Impact Analysis prepared for the filtration facility project report clearly states that the methodology used is a "modified" HEP and describes the approach for selecting the eight (8) focal species as representative species. In this case the modified HEP methodology was effectively used to identify and compare the pre-construction upland habitat quantity and quality to the post-construction upland habitat quantity and quality across all project areas. The analysis was used, in part, to inform recommendations for additional plantings or other habitat enhancement that PWB has committed to implement as part of the project. The resulting planting plans and habitat enhancements identified in the project plan sets were also prepared and evaluated by qualified PWB and Portland Bureau of Environmental Service (BES) staff who are familiar with ecological restoration projects, such as the projects identified in S. 25, Exhibit 4.

While HEP was a methodology used by USFWS, the methodology has been applied on other public and private development projects. As an example of HEP application to different types of projects, a 2014 HEP analysis implemented by the Sacramento District Army Corps of Engineers (Corps) and DWR to assess pre- and post-levee removal impacts on wetland and stream habitat relied on limited field inventory and used one focal species: the marsh wren, (Corps 2014). Other examples of HEP studies include the following:

- The West Beaver Lake Project (BPA 2005). A HEP analysis was conducted to assess baseline conditions and evaluated the following 5 species: bald eagle, black-capped chickadee, mallard, muskrat, and white-tailed deer. Members conducting the HEP relied on visual estimation of the Habitat Suitability Index (HSI) values.

- Pend Oreille Wetlands Wildlife Project (BPA 2002/2003). A similar study as for the West Beaver Lake project was conducted for this land acquisition by the US Department of Energy. The assessment of habitat features (vegetation communities, presence of open water or barriers such as roads), was assessed using a combination of field surveys, review of aerial photographs and topographic maps as well as visual estimation of distances to water, size of water bodies, ratios of open water to emergent vegetation etc.

As noted in the West Beaver Lake HEP study, visual estimation of suitability index values based on reconnaissance site visits or review of aerial imagery can be combined with vegetation data and/or understanding of the dominant species and plant structures within the cover types (such as grassland, mature forest, etc.) to assign habitat values for the focal species in order to quantify habitat units (HUs). The modified HEP conducted for the PWB, used a similar approach of combining site reconnaissance / visual estimation with a review of relevant literature and best professional judgment to inform the assigning of habitat quality ratings for each focal species and cover type for pre- and post-construction conditions.

The descriptions of the characteristics of the post-construction cover types (e.g. savanna, oak woodland, etc.) and suitability characteristics demonstrate that ecological uplift will occur with project monitoring and maintenance standards in place. A major benefit of the HEP is to translate landscape or cover type changes to habitat units in order to compare pre- and post-construction conditions. This provides a common currency for evaluating losses/gains to the landscape.

Comment: *Inventory for wildlife use requires multiple techniques and repetitive seasonal visits to assess wildlife presence. For example, bird surveys should be completed in winter and summer periods and include point-based listening/observation plots within each habitat type. Completion of valid scientific protocols allow more accurate quantification of habitat and its use. Mammal surveys typically use night cameras and scent stations to document movement and presence. Amphibian and reptile surveys should occur in the early spring and summer months when these species are moving to and from seasonal water features and forested cover. Field data and reference sites are then used to validate Habitat Suitability Indexes and thus, HEP models. ESA does not address any of these elements. No reference areas were identified to validate ESA's model assumptions. (pg. 3)*

Response: Mr. Smith does not connect the claim for a complete multi-season assessment of wildlife presence to any specific methodology or regulatory requirement. Neither the modified HEP methodology as used in this case, nor the County code require multiple, seasonal inventories. Nevertheless, ESA and City of Portland staff conducted sufficient site visits to all portions of the project area, including the hedgerows, wetlands, and different areas of the filtration facility site at different times of the year to observe wildlife species that use the area and understand the vegetation structure/density/composition which was also used to infer the presence of wildlife species.

Moreover, the Habitat Analysis Report assumes the presence of the focal species if there was uncertainty, which is the conservative and objective approach to assessment. For example, the little brown bat, one of the focal species, was assumed to forage over the filtration facility site in pre-construction conditions because of the open landscape and proximity to forested habitats. Because the modified HEP applied is a habitat-based approach that uses representative species, understanding the structure of the plants on-site is important and that level of familiarity was achieved by the HEP team for this project. The HSI model assumptions are presented in the updated Habitat Impact Analysis Appendix A.

Comment: *Page 23 of Ex. N.56, photo 6 of the hedgerow along Dodge Park Blvd appears to misrepresent the size, quality and vegetation complexity of the hedgerow. Other photos of the site (see Ex. 48 pages 3,4, & 5) provide a much different picture of the existing habitat. (pg. 4)*

Response: The Habitat Impact Analysis (Exhibit N. 56) contains three different photographs of the hedgerow along Dodge Park Boulevard to objectively depict the range of vegetation types/structures that were present pre-construction. The photos depict varying degrees of vegetation structure and quality ranging from an open, blackberry thicket lacking trees (Photograph 7, Pg. 24); taller woody vegetation including canopy trees (Photograph 6, Pg. 23), as well as more mature/larger trees and dense understory at the east end of Dodge Park Boulevard. (Photograph 8, Pg 25). The three photos provide an accurate representation of the varied vegetation within the Dodge Park Boulevard right-of-way area cleared for the finished water pipeline alignment. In contrast, the three photos included in Exhibit N.48 are limited to the most densely vegetated areas along the Dodge Park Boulevard right-of-way hedgerow removal area. Therefore, the three N.56 photos provide a more complete understanding of the vegetation removed along the entire finished water line corridor on Dodge Park Boulevard than the referenced photos included in Exhibit N.48.

Comment: *Reference sites are generally required to validate species assessments, habitat models, and mitigation proposals. Reference sites allow comparison of proposed impacts and remediation efforts with sites supporting similar habitat and species. They also help to verify "expert" assumptions used to predict affects and validate mitigation outcome predictions (WHUs).*

Response: Once again, the comment includes vague representations of what is "generally required" without identifying any specific methodology and regulatory requirement. The reference sites or reference habitats that were used to inform the habitat assessment and planting plans for the project include the existing upland forest along the eastern edge of the filtration facility site and along the hillside of the Lusted Forest, the existing mature hedgerow at the eastern end of Dodge Park Blvd., and the existing riparian forest at the filtration facility site and off-site to the south. The vegetation compositions of these habitats were considered when compiling suitable plant species for habitat enhancements at the filtration facility site, the pipeline alignments and the intertie. In response to public comments during the remand hearing process, additional beneficial native plant species and planting areas were also added to the proposed habitat enhancements, including native woody and forb clusters within the Dodge Park Boulevard right-of-way, ball and burlap plantings on two residential lots located on Carpenter Lane, and wetland specific plantings along the edge of the two wetlands historically separated by a dirt farm road on the raw water pipeline alignment. Each of these additional plantings increase the functional habitat value in those areas for a multitude of wildlife species including several of the HEP focal species and species with similar habitat needs including, for example: pollinator species (western bumble bee, other bees/flies, butterflies, moths and hummingbirds); a variety of songbirds (white-crowned sparrow, spotted towhee, dark-eyed junco), native amphibians (red-legged frog, Pacific chorus-frog).

Additionally, Angie Kimpo the PWB staff working to design this project with the project's landscape architect firm has had extensive experience working in all habitat types including oak and prairie habitats in the north Willamette Valley and West Cascades lowlands. This knowledge serves as a baseline for designing projects with knowledge of reference sites. Prior to working at the Water Bureau, staff worked as a Senior Natural Resource Scientist for Metro Regional Government. Some of the work completed includes the following:

- On going invasive species and adaptive management of oak and prairie sites over multiple decades.
- Botanical inventory of ecologically significant public lands including riparian surveys throughout the Sandy Basin, forest sites throughout the Portland region and oak and prairie sites including Cooper Mountain, Canemah Bluffs, Mt. Talbert, the Willamette Narrows, Gotter Prairie (Quamash prairie), Penstemon Prairie and Clear Creek
- Design and implementation of oak release projects at Canemah Bluffs, Mt. Talbert, Peach Cove
- Design and implementation of oak and riparian restoration projects at Penstemon Prairie (Lovejoy) and Graham Oaks

The work identified above lends to a significant baseline knowledge and understanding reference sites of the regions' ecological systems including north Willamette Valley oak and prairie habitats. This experience contributes to the design of a successful restoration project. PWB staff is also the co-author of the *Urbanizing Flora of Portland: 1806-2008.* This document is a comprehensive Flora of the Portland Metro Region and includes the distribution of all plant species including many rare native plants and exotic plants in the Portland Metro Region. This knowledge was in place while staff developed the restoration plans with the landscape architects. Please refer to S. 32, Exhibit 4 (PWB Resource Protection Projects) to see project descriptions for a partial list of projects implemented at the Water Bureau since 2010.

Comment: *The PWB consultant's report refers to baseline inventories are made but the techniques used and a full accounting of species presence and habitat conditions within each impacted habitat was not completed. Again, this would be customary. ESA's assessments or mitigation proposals are not based on actual wildlife presence or use of the impacted areas. This is a significant limiting factor and calls into question the reliability of project impact analysis and mitigation effectiveness. (pg. 4)*

Response: "Full accounting" for species' presence is not required for a modified HEP methodology designed to evaluate habitat quality and functional value prior to construction using representative focal species expected or known to occur in the area and relevant habitat attributes. Furthermore, as discussed above, the author of the Habitat Impact Assessment personally evaluated the pre-construction habitat across all project areas and consulted with City staff and consultants who worked in the field in the project area to understand the pre-construction habitat and pre-construction use of the filtration facility site.

Comment: *HEP requirements and limitations include:*

> *1. HEP is a single species analysis. It cannot be used to address other species impacted by the proposed project. Because HEP is a species-based "expert" assessment methodology, it is applicable only for the species evaluated and does not to species within other ecosystem components. The only species addressed by the current HEP and HSI analysis are those species referenced (bobcat, elk, red-legged frog, little brown bat, downy woodpecker, western bumble bee). The PWB apparently used these species as surrogates for all species of the area potentially impacted by the pipeline and filtration projects. The use of only these surrogate species is a misrepresentation of wildlife impacts and mitigation adequacy.(pgs. 4-5)*

Response: More traditional HEP assessments might use the "single species approach" to analyze pre- and post-project conditions for a specific sensitive species for projects specific to that species or to comply with federal laws or other regulations that are species specific. The "will not adversely affect natural resources" standard at issue in this case is not species or even wildlife specific. Therefore, to demonstrate that the operating project will not adversely affect wildlife habitat, as opposed to a specific species, the Habitat Impact Analysis applies a "modified" HEP based on key habitat components of selected wildlife species that represent the different habitat needs of a wide range of species both suspected and known to occur in the project area. rankings of habitat suitability based on anticipated "use" of habitats by representative focal species to quantify pre- and post-construction habitat quality and inform habitat enhancements, to conclude that the operating facility will not adversely affect wildlife habitat on or around the project site.

In this modified HEP study, for example, the white-crowned sparrow represents other species with an affinity for grasslands/savannas/shrubby areas like spotted towhee, Lazuli bunting, and potentially the Savannah sparrow as well as the dark-eyed junco, all of which have been observed during pre-construction avian surveys at the filtration facility site. As another example, the western bumblebee was selected to represent the foraging habitat needs of other important pollinator species including sweat bees, moths and butterflies. Several native pollinator species require a diversity of flowering plants throughout the growing season for essential life requirements. Refer to Table 2 below for other wildlife species represented by the selected focal wildlife species.

Comment: *Furthermore, ESA purposefully left out species in their analyses, such as the streaked horned larks. Streaked horned larks are assumed to be present in the impacted area, according to OCS. However, because ESA did not detect the streaked horned lark in their singular bird observation day and is designated a rare species, they intentionally chose not to include it in their analysis. (pg. 5)*

Response: This comment is both inaccurate and misleading. As documented in the record and discussed above, the SHLA survey conducted on the filtration facility was not limited to a single day and followed all required protocols. While the commenter did not yet have access to the detailed field notes submitted during the first open record period with specific dates of the survey work, Section 2.1 of the Habitat Impact Analysis clearly states that the SHLA surveys occurred "over 3 different days of 4- to 5-hour site visits from April to mid-July." (N.32, pg. 9). Second, focal species for the HEP were thoughtfully selected in consultation with other habitat and wildlife experts (as discussed below) to represent species that are known to occur in the area and that require habitat components representative of other wildlife species. It is the case that species that do not occur in the project area, as is the case for the streaked horned lark, were not initially included as focal species, as doing so would be inconsistent with the goal of a site-specific evaluation tailored to quantify the operational impact of the proposed filtration facility.

The SHLA memo attached to S.32 concludes that breeding SHLA were not detected at the filtration facility site and suitable SHLA breeding habitat is absent likely for the following reasons:1) lack of historic presence; and 2) lack of suitable terrain (flat) and vegetation cover. The nearest occupied site (Portland International Airport) is 15 to 20 miles to the northwest on flat terrain adjacent to the Columbia River. Although the pre-construction conditions of nursery land replicated certain aspects of preferred streaked horned lark habitat such as sparsely vegetated ground, several aspects contributed to the project area and vicinity being unsuitable including:

- several vertical structures (stakes) that support the nursery plants provide perch sites for aerial predators, which reduces SHLA habitat suitability.
- the rolling landscape and nearby tall trees and water towers at the filtration facility site reduce the suitability of the habitat for SHLA.
- No additional SHLA surveys were recommended based on final conclusions of the unsuitability of the terrain (too hilly / too many trees and vertical structures).

The ecology and historical distribution of the SHLA, suggests that the filtration facility site is not suitable breeding habitat for the rare species and that is supported by the survey results. There is, however, a slight chance that the project area and vicinity could provide limited wintering SHLA habitat. Although wintering habitat for the SHLA is generally similar as breeding habitat (treeless expanses of sparsely vegetated fields on relatively flat ground), wintering habitat is much more ephemeral and evidence suggests SHLA do not use the same agricultural field for more than 2 years in a row, likely due to crop rotation and/or operational changes (Moore, 2005). SHLA will form mixed flocks with other small bird species in the winter season and roam agricultural land throughout the Willamette Valley in search of suitable forage, which generally consists of grass and weed seeds from the previous season's harvest. Therefore, as discussed below, the analysis has been updated to include SHLA.

Comment: Pages 4 & 5 of S.26:*According to ODFW, other rare and threatened or endangered species are also present in the area (as previously identified in Exhibit J.19). Such species include, but are not limited to:*

a. Northern spotted owl (sensitive species, ODFW; threatened, ESA)
b. Bald eagle (protected and threatened, USFWS)
c. Short-eared owl (sensitive species, ODFW)
d. Columbia white-tailed deer (endangered, USFWS; sensitive, ODFW)
e. Columbia torrent salamander (sensitive species, ODFW)
f. Oregon slender salamander (sensitive species, ODFW)

Given the potential for impacts to many sensitive, threatened, or endangered species, at the filtration and pipeline sites, the use of surrogate species is clearly not adequate and wholly ignores potential impacts

First, the conditional use approval criterion at issue on remand draws no distinction between habitat for sensitive species and habitat for other wildlife species. Therefore, the claim that use of representative species is inadequate in not accurate. The statement that the extensive analysis included in the Habitat Impact Analysis wholly ignores potential impacts is both inaccurate and reveals a lack of impartiality by the commentator. Second, the potential for sensitive, threatened, or endangered species to be present at the filtration and pipeline sites was addressed prior to construction and included site visits to visually assess habitat conditions and desktop analysis and evaluation of suitable cover types that could be present for rare species. Additionally, PWB recently verified the absence of occurrences of the species listed above through an updated request to the Oregon Biodiversity Information Center (ORBIC) for sensitive site-specific data that is not available to the general public. The nearest northern spotted owl nests sites are mapped east of the Sandy River and thus well east of the filtration facility site and raw water pipeline alignment. (ORBIC 2025). Mr. Smith correctly notes that databases do not definitively prove the absence of a species. However, given the proximity of the site to state and federally managed lands along and east of the Sandy River, the ORBIC data provides relevant information for this site. Site specific inventories/studies are also previously explained and include:

- Streaked horned lark USFWS-protocol survey to determine presence/absence of breeding habitat and observations of "competitors / predators" of streaked horned larks
- Nelson's checkermallow survey
- General vegetation inventory and habitat assessments

Nonetheless, in response to comments that the evaluation is inadequate without evaluation of the identified species, the modified HEP analysis has been updated to include 5 additional focal wildlife species: the bald eagle, northern spotted owl, short-eared owl, streaked horned lark and Oregon slender salamander, for a total of 13 focal species. Including species that could not be present at the project site is inconsistent with the site-specific focus of the evaluation. The following species from the list identified by Mr. Smith in a. to f. above are not included in the updated HEP analysis for the following reasons:

- Columbia torrent salamander is only found in coastal regions of Oregon and is not present in the project vicinity.
- Columbia white-tailed deer only occur in two locations in floodplain habitat in Oregon (previously described in I.96). No floodplain habitats are present at the filtration facility site, pipeline alignments, or the Intertie.

A similar modified HEP was conducted for the 5 additional focal species that had some possibility of presence at or near the project areas. In order for the updated analysis incorporating the new species to be accurate and to respond to the criticisms in this comment to the results for the original 8 focal species were also updated to reflect the most recent plans for replanting the Dodge Park Boulevard right-of-way with dense woody and forb clusters that will provide habitat for birds, insects and small mammals, the additional planting in the wetland and pond areas on the raw water pipeline provided in response to wetland comments addressed in a separate memo, and the plantings on the two Carpenter Lane properties. Suitability index models for the added species were created based on literature reviews. (Attachment 3) Habitat associations of the 13 focal species and examples of other wildlife species represented by the focal species are presented below in Table 2.

TABLE 2 HABITAT ASSOCIATIONS OF 13 HEP FOCAL SPECIES AND ASSOCIATED SPECIES

Focal Species* & Other Wildlife Species with Similar Habitat Requirements	**Fields / Savannas / Agricultural Land** Filtration Facility Site & Intertie	**Hedgerows** Finished Pipelines - Road Rights-of-Way	**Upland Mature Forest** Filtration Facility Site	**Mixed Woodland / Shrubs / Grass / Small Ponds** Raw Pipeline	**Riparian Forest** Filtration Facility Site	**Oak Woodland** Filtration Facility Site
Original Focal Species – April 15, 2025 HEP Analysis Report (N.56)						
Little brown bat [Other *Myotis* bat species]	X		X	X	X	X
Bobcat [coyote, badger]		X	X	X	X	X
Elk [deer]	X	X	X	X	X	X
Downy woodpecker [black-capped chickadee, red-breasted nuthatch]			X	X	X	X
Red-legged frog [Pacific chorus-frog]			X	X	X	X
Red-tailed hawk [Cooper's hawk]	X	X	X	X	X	X
White-crowned sparrow [Also spotted towhee, , Lazuli bunting]	X			X		
Native bumble bee [Other pollinators like butterflies, moths, other bees and flies]	X	X		X		X
Additional Focal Species in Response to S.26						
Bald eagle [No representative species]	X		X		X	
Northern spotted owl [No representative species]			X		X	
Ore. slender salamander [other terrestrial salamanders like the western red-backed, Dunn's, Long-toed, etc.]			X		X	
Short-eared owl [American kestrel for foraging habitat]	X					
Streaked horned lark [Pipits for winter foraging and other species, killdeer for nesting]	X					

Results from the updated modified HEP analysis indicate a net gain in habitat units (HUs) for wildlife habitat based on conservative assumptions that favor the presence of species pre-construction (Figure 5). This result is similar to the results from the April 15 HEP version that relied on 8 focal species and which also showed an anticipated increase in HU's (+ 18 HUs). The additional mitigation considered at the raw water pipeline property and the Carpenter Lane properties to extend the hedgerow of Dodge Park Boulevard, increases the HU's post-construction to a total of + 23.8 HUs. The net gain of 23.8 HUs will continue to increase as the enhancements establish and become resilient native vegetation communities. Even without the additional plantings proposed at the raw water pipeline property and the Carpenter Lane properties, the net gain in HUs is estimated to be + 20.5 for the project areas post-construction.

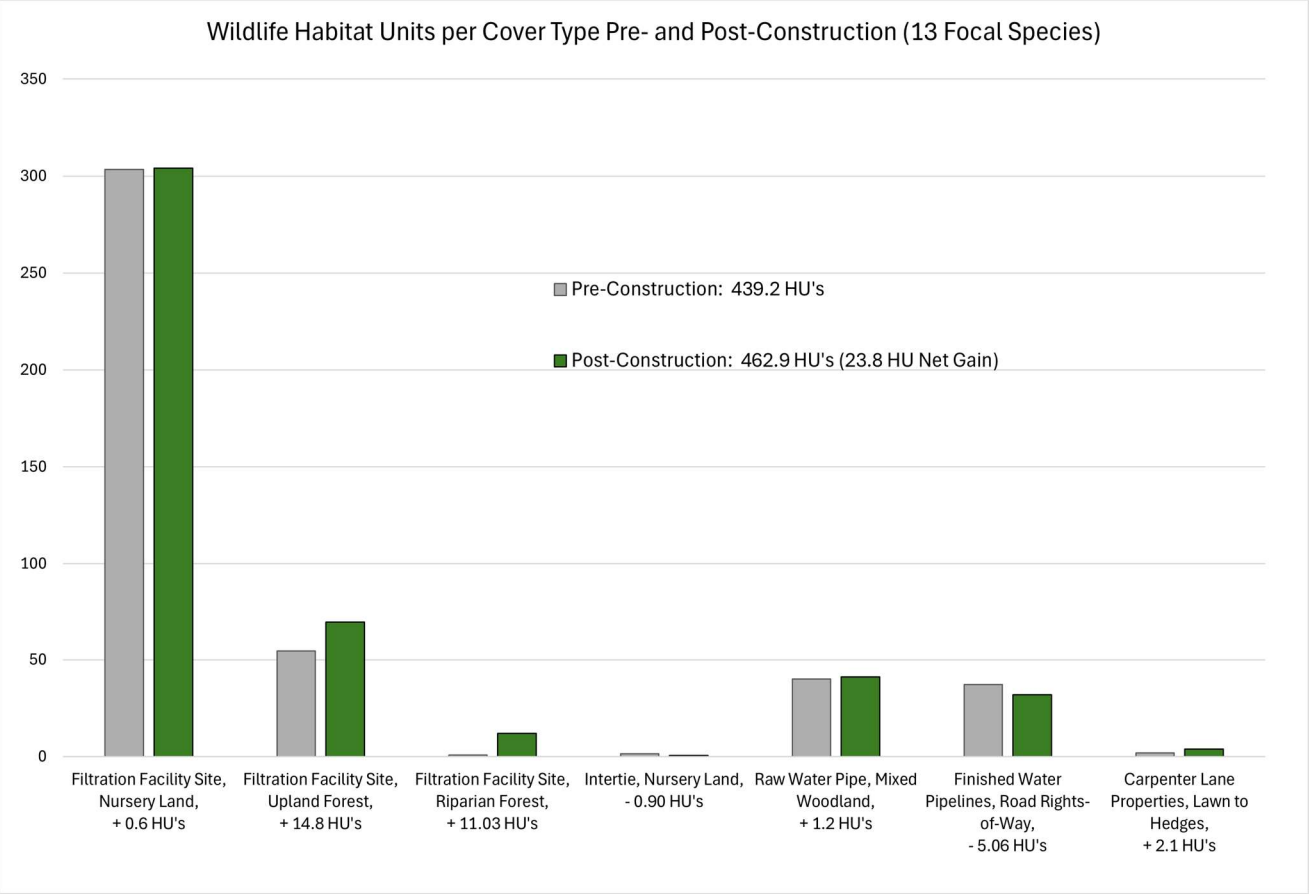


Figure 5: A modified HEP Analysis indicates an increase in Wildlife Habitat Units (+ 23.8 HUs).

As described in detail in the aquatic habitat response memorandum prepared by Biohabitats, in response to comments related to temperature concerns in Johnson Creek, PWB is committing to implementing a Johnson Creek restoration project that includes riparian and upland plantings adjacent to the reestablishment of the natural stream channel. The evaluation of changes to wildlife habitat within 1,000 feet of the filtration facility has been updated to consider the aquatic and riparian forest habitat enhancements. The updated off-site evaluation results in a net gain of 14.6 HUs because of the expansion of red-legged frog breeding and foraging habitat (which includes the upland / riparian forest) as well as movement corridors at the filtration facility site, which will improve connectivity among potential breeding ponds in the project vicinity. Establishing movement corridors and promoting dispersal habitat is crucial for the recovery of sensitive species like the red-legged frog. If the Contrell Pond restoration and plantings were not considered, the indirect effects within 1,000 feet of the filtration facility site would still result in a net gain of 7.5 HUs as identified in the original Habitat Impact Analysis (Exhibit N.56, pg. 32).

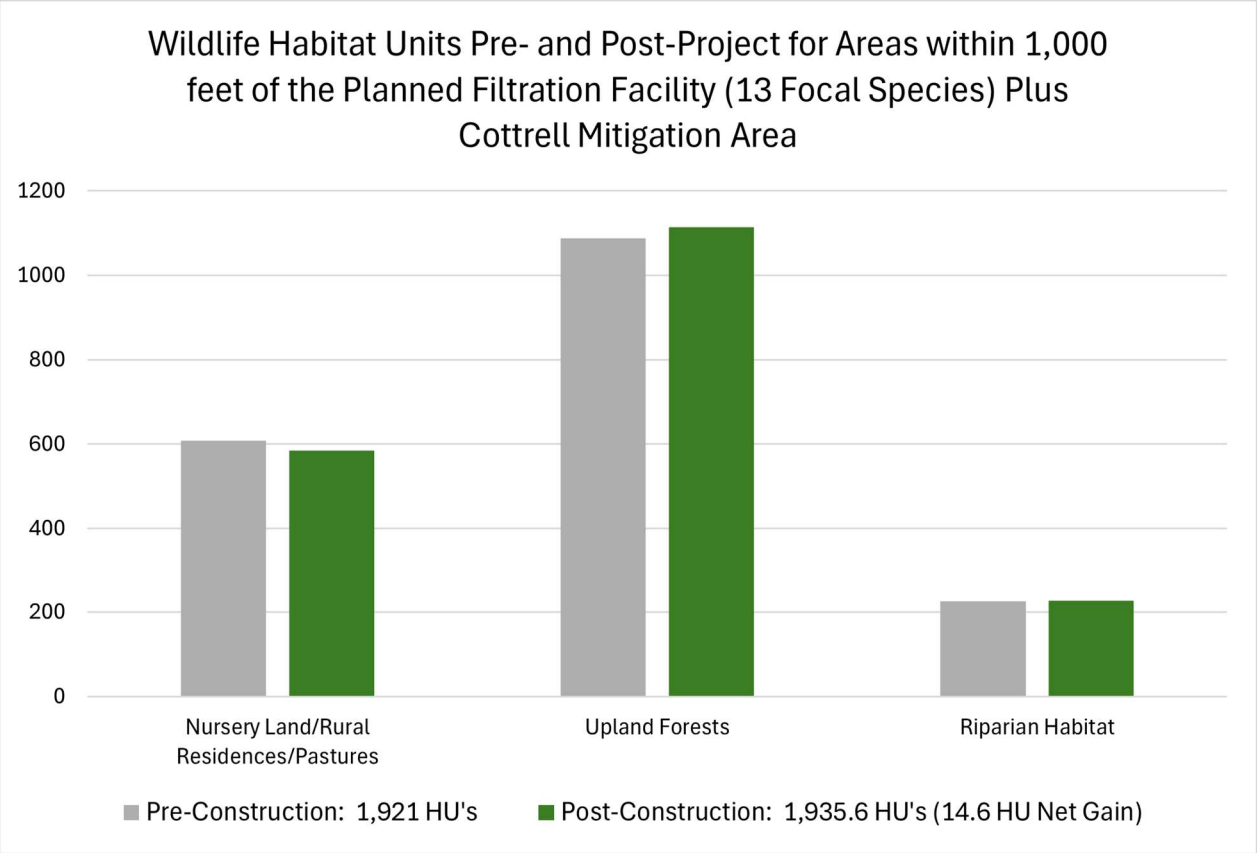


Figure 6: A modified HEP Analysis incorporates planned habitat enhancements at Cottrell Pond and indicates an increase in Wildlife Habitat Units post-construction for the project vicinity.

A revised summary of the pre- and post-construction habitat changes, showing an expected increase in HUs for the project and vicinity is presented in Figure 6 An updated Appendix A (HEP Methodology and Representative Wildlife Species) and an Updated Appendix B (HEP Data and Results Table) are attached as Attachment 3. The HEP assumptions contained in the original Appendix C continue to apply.

TABLE 3
ADDED FOCAL SPECIES (13) AND ADDITIONAL MITIGATION: PRE- AND POST-CONSTRUCTION WILDLIFE HABITAT UNITS (WHUS) BY HABITAT TYPE

Habitat Types – Pre-Construction	Pre-Construction Conditions		Habitat Types – Post-Construction	Post-Construction Conditions		Change in WHUs post-construction
	Acreage	WHUs		Acreage	WHUs	
Filtration Facility Site (Nursery Land[)]	89.2	303.3	See below	0	See below	
Filtration Facility Site (Upland Forest[)]	5.8	54.5		6.8	69.4 **(+)**	
Filtration Facility Site (Riparian Forest[)]	0.2	0.9		1.9	11.9 **(+)**	
Intertie (Nursery Land)	0.5	1.5		0.5	0.6 **(-)**	
Finished Water Pipelines (Road Rights-of-Way with Additional Plantings, portion of Nursery Land and Lusted Hill Facility)	16.87	37.1		16.87	32.0 **(-)**	
Raw Water Pipeline (Mixed Woodland)	4.0	40.0		4.0	41.2 **(+)**	
Carpenter Lane Properties	1.5	1.8		1.5	3.9 **(+)**	
			Filtration Facility Site (Outside the 8-ft fence)	38.6	287.6 **(+)**	
			- Savanna / oak woodland			
			- Woody buffer / hedgerow / grassland			
			- Upland forest / riparian forest			
			Filtration Facility Site (Inside the 8-ft fence)	23.3	16.3 **(+)**	
			- Landscaping			
			- Storm ponds			
Project Totals	**117.07**	**439.1**		**93.2***	**462.9 (+)**	**23.8 (+)**
Indirect Effects (within 1,000 ft) of the Filtration Facility Site – Includes Cottrell Pond Mitigation Site	**~ 305**	**1,921**		**~ 305**	**1,935.6**	**14.6 (+)**
Grand Total	**422.07**	**2,360.1**		**398.2**	**2,398.5**	**38.4 (+)**

NOTES:

* Post-construction acreage is less than pre-construction because hard surfaces within the facility fence are not included in the HEP analysis.

Comment:

2. HEP requires creditable inventories of possible impacted species. This includes on-the ground surveys aimed at specific species or groups of species, their life history, and habitat use throughout the year. Project inventories should include resident and migratory birds, mammals, and pollinators regardless of whether these groups include Federally protected Threatened or Endangered Species. As I previously stated, HEP is considered an "expert" model. Expert models refer to the use of a team of species experts to evaluate individual species impacts and select species which may be used to estimate Habitat Units for mitigation. (pg. 5)

Response: There is nothing inherent in the HEP methodology that requires a specific type or level of inventory. As discussed above, Mr. Smith provides no support for the contention that conducting a HEP analysis requires multiple, seasonal inventories. In this case, ESA and City of Portland staff conducted sufficient site visits to all portions of the project area, including the hedgerows, wetlands, and different areas of the filtration facility site at different times of the year to observe wildlife species that use the area and understand the vegetation structure/density/composition which was also used to infer the presence of wildlife species. The extensive catalogue of animals in the area created by public testimony in the land use process was also considered in the development of the representative species list. Additionally, as explained in the methodology description in Appendix A of the Habitat Impact Analysis, conservative assumptions were made in the analysis and pre-construction conditions were assumed to be at least somewhat favorable for a species if there was any justification or likelihood of occurrence. It is notable that the commenter challenges the methodology applied rather than the directly challenging or even addressing the HEP data in and results in Appendix B or the HEP assumptions in Appendix C of the Habitat Impact Analysis.

The reference to a HEP as an "expert" model is addressed in the response to comment 4 below.

Comment:

3. HEP and HSI require habitat assessment of the impacted area. Typical habitat characteristics critical for evaluating habitat quality and quantity include ground cover, vegetation composition, habitat structure (height of shrubs and trees), and presence/location of dead and down wood. Each of these habitat components is important for determining Habitat Suitability and which wildlife species may be present. Habitat characteristics also determine what technique is appropriate to inventory for species presence, as well as how to select a reference area that represents the current conditions and mitigation outcomes. In the case of agricultural fields, this must include a history of crop rotation and wildlife use of that habitat. Wildlife responds to each condition differently and one cannot assume species presence or absence from a single growing season. Accurate habitat evaluation (using HEP and HSI) requires assessing multiple habitat characteristics across different conditions and seasons, especially in agricultural fields where crop rotation and changing habitat states significantly influence wildlife presence — meaning species presence can't be determined from a single season alone.

The current HEP/HSI analysis limits the habitat structure and vegetation composition evaluated. Thus, the current analysis on records provides a limited assessment of what constitutes suitable habitat for nesting, foraging or wintering habitat for individual species or for communities of wildlife expected within those habitats.

Response: The Habitat Impact Analysis provides a complete pre- and post-construction habitat assessment of the areas that will be impacted by the operational project. In response to the claim that the, "*current HEP/HSI analysis limits the habitat structure and vegetation composition evaluated,*" five additional focal species were analyzed in an updated HEP analysis to capture a wider use of vegetation structure, such as foraging habitat for the streaked horned lark which prefers large, sparsely vegetated bare fields during the winter months.

As detailed above, the pre-construction habitat qualities are based upon familiarity with all project areas from in-person site visits spanning multiple years during project development by the project team that contributed to the

analysis. The collective surveys and site visits included evaluation of the identified character traits. Mr. Smith is correct in stating habitat characteristics are critical for evaluating habitat quantity and quality. The Habitat Impact Analysis Appendix A, attached to this memorandum as Appendix 3, includes the habitat suitability criteria considered for the representative species included in the updated analysis.

In terms of the evaluation of the habitat characteristics of the former commercial tree nursery on the filtration facility site, the commentator offers no support for the position that detailed seasonal evaluation of the tree nursery was need in this case. Again, the purpose of the modified HEP methodology applied in this case is to demonstrate that the operating project will not adversely affect natural resources, which includes wildlife habitat. Demonstrating compliance with that specific approval criterion requires consideration of the quality of the habitat value of the project area under the prior land use in comparison to the wildlife habitat quality of the same project area when the filtration facility is operating. There is nothing in the code to support the suggestion that the evaluation of the pre-construction habitat quality must include every iteration of habitat characteristic over multiple years of change at an active commercial tree farm. Instead, the determination of adverse impact on wildlife habitat as a broad category requires evaluation of the general characteristics of the nursery habitat that include both the general functional values of habitat types at typical point of crop rotation, as well as limits to habitat values at an actively and heavily managed commercial nursery field. The modified HEP analysis in case considered both elements in assigning the pre-construction habitat values to the filtration facility and intertie sites.

Comment: *The impacted habitats that should have been quantitatively assessed include the seasonal waterway and wetlands within the construction zone, the agricultural fields, hedgerows and forest edge habitats. In addition, the assessment of the agricultural fields reflects a single agricultural use present at the time of evaluation and makes no reference to habitat suitability changes within agricultural systems as crops are rotated, cover crops planted or fields left fallow. These are significant factors which make agricultural land valuable to wildlife over time. None of this data was presented by the PWB. There is no evidence in the record indicating quantitative field data was collected during the planning process or that there was an effort made to look at how changes in agriculture production changes HSI over time. Quantitative field data is critical to supporting HEP and HSI conclusions, and its absence makes the HEP and HSI reporting incomplete and casts doubt over the reliability of the conclusions. (pgs. 5-6)*

Response: The comment specifically calls out four areas that should have been qualitatively assessed: waters and wetlands within the construction areas, agricultural fields, hedgerows, and forest edge. All upland habitat areas that could be impacted by the final operational project components were qualitatively assessed. This includes the areas at the filtration facility site and the intertie site where the above ground facilities will be located, as well as areas that will be temporarily disturbed by construction activities. As discussed above and well documented in the record, the assessment included the hedgerow located along Dodge Park Boulevard. The assessment also included evaluation of delineated wetlands and waters identified and addressed separately in the memorandums prepared by Anita Cate Smyth from Winterbrook at Exhibits N.59 and S.33. The assessment of forest edge and the agricultural area are addressed further below.

Forest Edge

Both this comment and others included in the record place considerable emphasis of the important function of the forest edge. The forest edges within the project areas were qualitatively assessed and considered in both the modified HEP analysis and the development of habitat enhancements across the site. There is no disagreement on the functional value of forest edge habitat to multiple species. There is, however, disagreement about the impact of the filtration facility on that specific habitat as there is no support for claims that the operating project will adversely affect edge habitat. The composition of the forest edge within the project area remains intact following project construction activities. To the extent there is any change, it is positive change as a result of additional plantings and habitat enhancement work within the forest edge areas. Forest edge habitat is typically defined as the transition zone along a wooded boundary with open habitat such as grassland or shrubland. Plant species

richness is often greater along forest edges and thus these habitats provide benefits for many different types of wildlife species. The images shown in Figures 7 a-c identify the forest edge areas with a 50-foot buffer on the filtration facility site and near the raw water pipeline alignment. Each of the edge habitat areas will remain intact and will continue to function as edge habitat following construction.

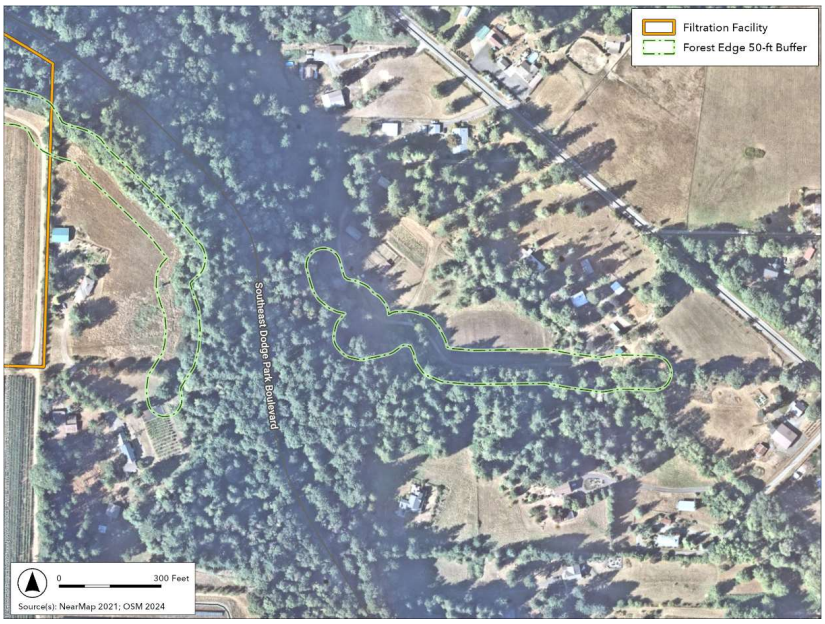


Figure 7a: Raw water alignment forest edge

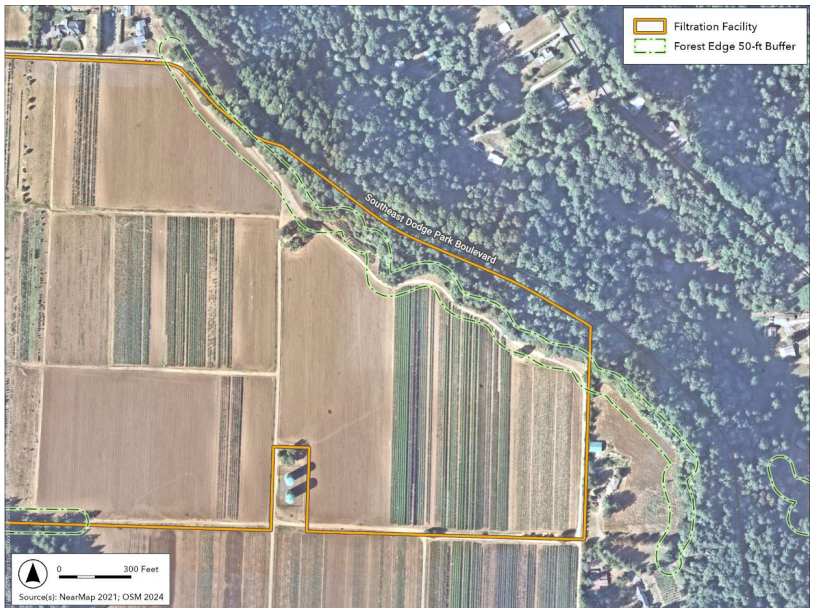


Figure 7b: Filtration facility site upland forest edge

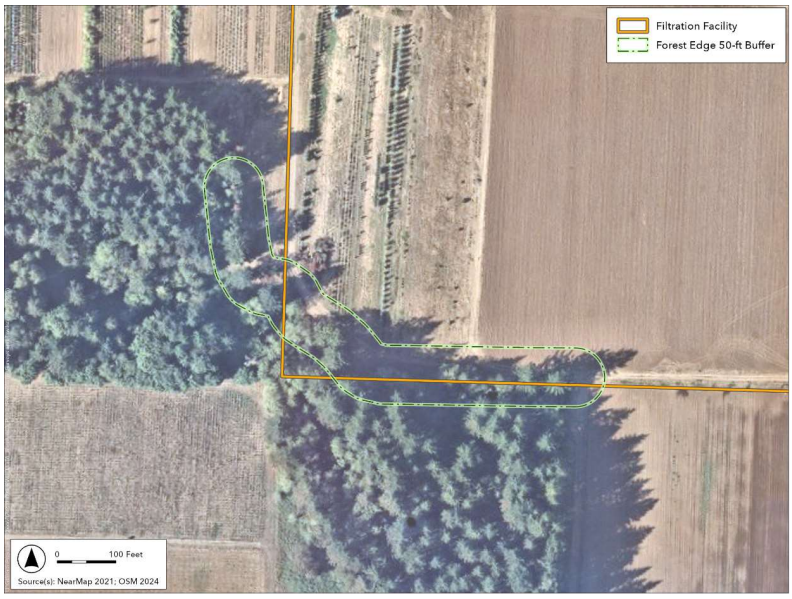


Figure 7c: Filtration facility site riparian forest edge

Additionally, high contrast edges from mature forest to field, such as those that occurred at the filtration facility site in pre-construction conditions, are less valuable for wildlife than a wider transition zone that will occur post-construction with more diverse plant structures like a hedgerow, native grasses and shrubs adjacent to the mature forest. See the image below for a sample comparison of pre- versus post edge habitat conditions along the eastern portion of the filtration facility site where native plantings will occur.

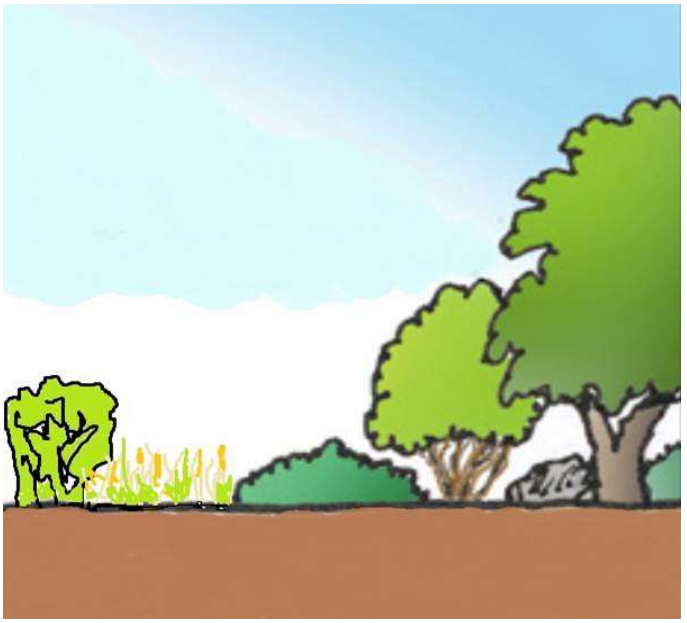
	
Pre-Construction Edge Habitat: Low habitat value is judged for the FFS pre-construction due to high contrast/simplified edge and narrow transition zone from mature forest to nursery land.	Post-Construction Edge Habitat: Higher habitat value at the FFS with post-construction conditions is expected due to additional plantings and wider transition zone.

Figure 8: Filtration Facility site forest edge pre- and post-construction comparison

As noted above, the forest edge habitat areas that existed prior to construction will remain in all locations on the raw pipeline alignment and on the filtration facility site. Beyond just remaining intact, the project habitat enhancement efforts add plantings at and near the forest edge in three specific locations. First, as detailed in Exhibit S.32, in February of 2024, PWB planted 20 trees along the forest edge of the SEC zone near the raw water alignment. Second, as detailed in the updated planting plans for the filtration facility site included as an attachment to Exhibit S.32, PWB has committed to provide extensive tree and shrub plantings in an area identified on the planting plan as Upland Forest located at the edge of the existing mature forest area within the SEC zone on the filtration facility site. PWB will also remove English Ivy and English Holly from the adjacent established forest area. The removal of the invasive species will protect existing mature trees in that area and improve habitat quality for a number of species throughout the removal area, which includes areas within the forest edge transition zone. The native trees, shrubs, and ground cover that will be planted east of the forest edge will overall provide improved habitat in comparison to the extensively managed commercial nursery fields previously directly abutting the forest edge. Third, extensive riparian forest plantings in the southwest corner of the site will create additional riparian edge area in the filtration facility site itself. In that case, the new riparian edge will be relatively close to the filtration facility fence. However, overall, the functional benefits of a thicker band of riparian forest adjacent to Johnson Creek exceeds the functional value of extensive edge habitat in this area, particularly when considering the past commercial nursery activities extended through the SEC-w area to the existing riparian edge (See, Exhibit N.64, pgs. 16-20). Collectively these habitat enhancements along the retained forest edges within the project will increase the size and complexity of the edge habitat creating an overall increase in wildlife habitat in the area.

Agricultural Fields

In terms of the agricultural fields in the project area, the record demonstrates that there was extensive evaluation of the habitat quality present across the commercial nursery operations at both the filtration facility site and the intertie site, and habitat value was conservatively assigned in those areas through the HEP analysis. Mr. Smith neither recognizes nor critiques the specific values assigned to the nursery land in Appendix B of the Exhibit N.56 Habitat Impact Analysis. Instead, he argues that an extensive, multi-year study of every crop rotation is necessary in order to fully understand species presence. However, the comment fails to connect that extensive level of evaluation to the purpose of the modified HEP in this case, which is to determine if the operation of the facility will adversely affect natural resources, including wildlife habitat. In order to make that assessment it necessary to generally consider both the habitat values within the former nursery land across the varied drop rotations and consider the habitat limitations created in an intensively and actively managed commercial nursery. As detailed in the habitat considerations in the updated Appendix A, the HEP evaluation for this project does both across all representative species The methodology appropriately compares the net change from the known commercial nursery land conditions and practices – which included a known vegetative structure and disturbance cycle – to predicted future conditions of enhanced habitats informed by best professional judgment by the HEP team, Notably, the HEP team relied in part on input from Bruce Prenguber from Globalwise, Inc. based upon extensive familiarity with commercial nursery farming generally and with the specific operations on the filtration facility and intertie sites specifically.

Mr. Smith attempts to make the case that the managed and ever-changing habitat on agricultural lands in itself creates wildlife habitat value. It is undisputed that changes in tree species and ground cover creates differences in habitat attributes over time at a nursery field, the claim made by Mr. Smith ignores the fundamental fact that overall, the intensive human and equipment management along with the everchanging ground and vegetation cover is an overall detriment to wildlife habitat for most species. The specific activities included in nursery land and crop management are discussed in detail in the Second Open Record Period Response prepared by Mr. Prenguber submitted into the record concurrently with this memorandum.

It is also the case that the commercial nursery operations at the site have historically included a variety of commercial nursery trees and vegetation, and as discussed below the habitat benefits of that vegetative was expressly considered in the assignment of habitat values in the modified HEP. However, the evaluation also appropriately considered the nature and make-up of the plant communities planted, cultivated, and harvested from the project area. Nurseries are established to cultivate a diverse array of plant species, primarily focusing on high-density plantings of non-native ornamental cultivars. These cultivars arise from intentional human intervention, particularly through hybridization, with the aim of achieving desirable traits such as specific growth habits, vibrant colors, and disease resistance.

Unlike native plants that co-evolved with local wildlife, these ornamental varieties do not provide the same nutritional resources or habitat for native insects as native plant species. There are a number of ecological studies that show the correlation between native plant cover and increased wildlife and insect use and ecosystem services, even in the early stages of vegetation development. In one study by Burghardt et. al, authors planted two areas of similar size and geography, one with native vegetation and the other with ornamental species. They found that diversity indices of both native lepidoptera (butterflies) and native breeding birds were significantly more abundant on native plant areas than on those with landscape plantings, even in the early stages of development. One conclusion drawn from this study was that native insects were also more abundant in the native planting areas and served as the base of a more abundant food web in the native plant communities.

The following table from Burghardt et al. describes abundance of native lepidoptera on native as opposed to non-native vegetation in three height classes- 1, 5 and 15 meters. The study also documents the use of native vegetation at all heights by native insects.

Table 1. **Comparison of mean percent cover of vegetation at 4 height strata on study sites landscaped with predominantly native plants and sites landscaped with a combination of non-native ornamentals and natives (conventional).**

Height of vegetation transect	*Category of cover*	*Native (SE)*	*Conventional (SE)*	t	p
1.0 m	total	33.4 (3.8)	21.3 (8.9)	-1.641	0.162
	native	31.4 (3.8)	7.5 (4.6)	-5.498	0.003
	non-native	2.0 (1.5)	12.6 (6.4)	−2.276	0.072
4.0 m	total	35.0 (6.5)	43.3 (10.0)	−0.974	0.375
	native	32.6 (5.5)	23.4 (8.4)	-1.338	0.239
	non-native	9.6 (8.1)	25.7 (9.6)	−1.795	0.133
>15 m	total	48.3 (10.6)	36.5 (9.8)	-0.971	0.376
	native	48.0 (10.5)	30.5 (10.8)	-1.261	0.263
	non-native	0.3 (0.3)	5.8 (3.8)	−1.543	0.184

Lepidoptera abundance was 4 times greater on native sites (12.7 [2.1] larvae/site) than on conventional sites (3.0 [1.4] larvae/site, t= 8.665, $p < 0.001$), and lepidopteran species richness was 3 times greater on native sites (6.8 [1.1] species/site) than on conventional sites (1.8 [0.8] species/site, t= 7.906, $p < 0.001$).

Table 4 *From Burghardt et al.*

In another study, Cunningham found a positive correlation between bird species richness, the number of native species present, and the percent native vegetation cover. Cunningham notes that the number of bird species increased by 0.65 with every doubling of native woody vegetation cover. He also noted that the number of species of conservation concern increased with native vegetation cover. Benefits from native vegetation cover begin at around 2% native cover.

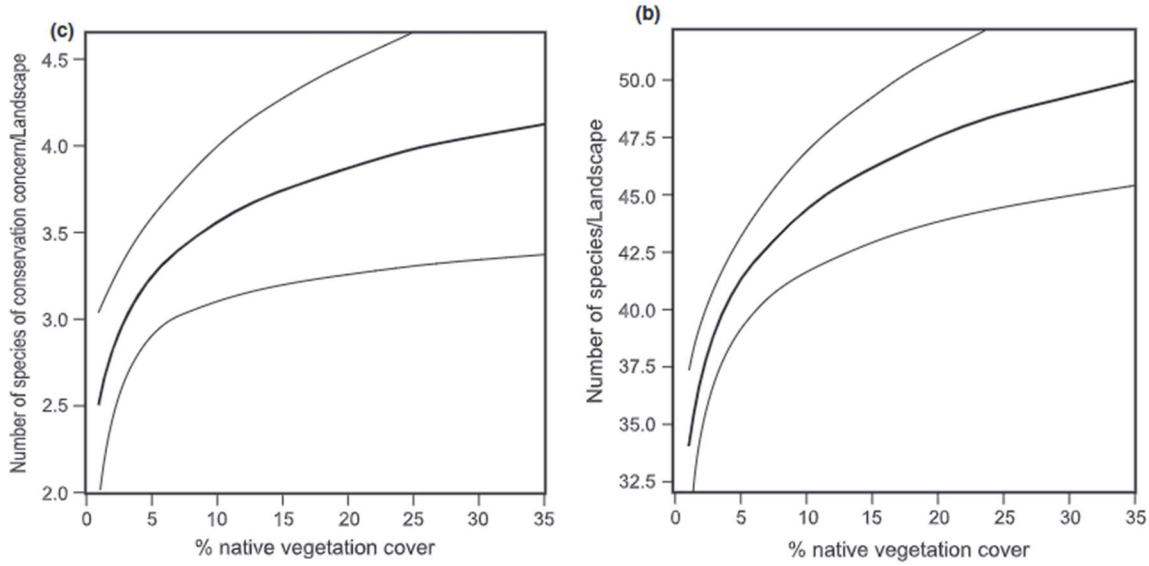


Figure 9: Increase of native wildlife and species of conservation concern in relation to increases in % native vegetation cover (from Cunningham, 2014).

Finally, in a review of 165 scientific papers, Tartaglia and Aronson (2024) noted that 120 of the studies found that native plants outperform non-native plants in supporting higher wildlife abundance and diversity. The following tables tabulates the results of the 165 papers showing in the white bar that native plants have a greater benefit than non-native for birds, bees, Lepidoptera, arthropods, beetles, spiders, mammals and herpetofauna (reptiles and amphibians).

Table 7. From Tartaglia (2024), *Studies reporting benefit of native species over non-native species (in white)*

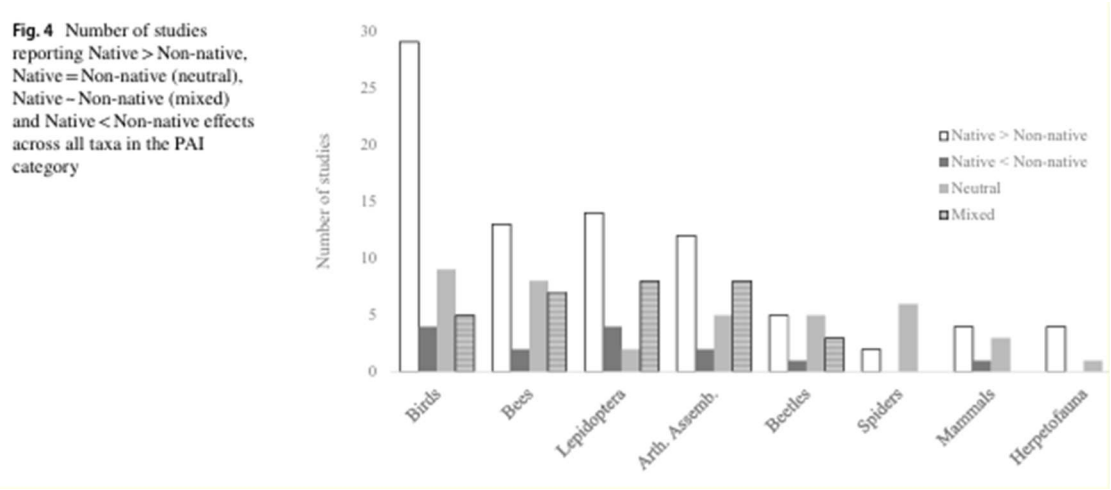


Fig. 4 Number of studies reporting Native > Non-native, Native = Non-native (neutral), Native ~ Non-native (mixed) and Native < Non-native effects across all taxa in the PAI category

The study also evaluated 35 papers which evaluated ecosystem services in native vs. non-native ecosystems. Ecosystem services include such items as air quality, biodiversity support, carbon storage, pollination, stormwater reduction and water quality, among others. In 29 of the studies (48.3%), concluded that native plant communities provided more ecosystem services than non-native plant communities.

Despite the habitat limits created by both the intensive management of commercial nursery land and the overall character of nursery vegetation, the HEP analysis makes appropriately conservative assumptions about the pre- and post-construction habitat value and function across all species. For example, in the updated Habitat Impact Analysis Appendix B attached to this memorandum, , a moderately high (0.7) habitat value was assigned to foraging habitat for the little brown bat and white-crowned sparrow for the pre-construction condition of the filtration facility site and the intertie site based on an assumption that insect outbreaks may occur thus providing a source of food, despite evidence that insect abundance was likely low due to pesticide/herbicide use and the fact that many ornamental cultivars are not as nutrient-rich and therefore not as suitable as forage for insects. An additional example of the conservative approach taken in the HEP analysis is the fact that no breeding habitat value was assigned for the white-crowned sparrow within the fence of the 37-acre facility for post-construction conditions despite a strong likelihood that sparrows and other songbirds will nest in the mix of ornamental/native plantings proposed at the facility. Taking a less conservative approach would have further increased the post-construction value of the site. As another example, the post-construction conditions of the mature forest on-site were assumed not to change value for the red-tailed hawk and bald eagle that rely of living mature trees for nesting/perching. English ivy is present in the forest and threatens the long-term health of the trees. The post-

construction conditions do not account for the English ivy removal proposed as part of habitat enhancements in the on-site mature forest which will improve the long-term health and viability of the mature trees on site which area important habitat for several hawks, owls, and eagles known to exist in the area. Again, and notably, Mr. Smith does not address or directly challenge any of the specific HEP data or results in Appendix B of the Habitat Impact Analysis, nor does he challenge the HEP assumptions considered in Appendix C.

Comment:

4. HEP was designed as an "expert model." It is not designed to be not completed in a vacuum by a single professional. HEP is designed to be collaborative, team effort and involve multiple types of species experts to review and select species of concern. Yet, this expert level evaluation did not occur here. The FWS manual recommends experts from agencies and NGOs provide input and evaluation of species and their habitats. In Oregon these "experts" could have included biologists from ODFW, FWS, NRCS, OSU Extension Service, Audubon Society, American Bird Conservancy, Xerces Society. Selected experts work as a team to assess model outputs, species selection and HSI development. No documentation of the requirement to use experts to evaluate qualitative wildlife species assessments and habitat analysis has been submitted as part of the record.

Response: Mr. Smith asserts that there is a "requirement" to use expert teams but provides no support for the assertion aside from a document specifically intended to apply to the USFWS application of the HEP methodology. Even that document does not require a team for the analysis. Instead, the 1996 manual cited by Mr. Smith directs USFWS staff to use "maximum effort" to conduct HEP evaluations using interdisciplinary teams made up primarily of other federal and state agencies. As noted above and as detailed in the Application section of the manual, Section 1.4, the HEP is to be applied by the USFWS in fulfilling its function as a coordinating and cooperating agency in fulfilling its function under federal laws. The requirement for USFWS staff to make an effort to use planning teams for HEP evaluations is most likely based in large part, if not exclusively, on the agency's respective role in federal actions, rather than anything inherent in the HEP methodology.

That is not to say that the modified HEP prepared for the filtration facility project was prepared in a vacuum by a single professional – it was not. The development of pre- and post-construction habitat conditions, representative species, the HEP assumptions, and the assignment of HIS values for this modified HEP included 1) peer review within ESA, 2) input from project staff and consultants familiar with the project site and past land use practices, including commercial nursery practices at the site, 3) input from PWB staff with extensive habitat restoration and enhancement work, including Angie Kimpo who has extensive experience with habitat restoration work generally and with oak savannah restoration specifically; and 4) review and comments on drafts of the Habitat Impact Analysis provided by City of Portland Bureau of Environmental Services Staff familiar with habitat analysis and mitigation and by Christe Galen from Pacific Habitat Services. Collectively, the input from all of those sources shaped the evaluation and conservative approach taken in the modified HEP and is analogous to the input of other federal and state wildlife agencies described in the USFWS manual.

Finally, the modified HEP in this case is subject to additional review through the hearing and public comment process. In other words, the public, including Mr. Smith, have been provided an opportunity to provide a peer review of the modified HEP used in this case. Based upon that review, the additional species that feasibly could have been present at the site prior to the start of construction were added to an updated analysis.

Comment: Page 6 of S.26:

5. *HEP does not address loss of habitat function or the time required to replace the impacted functions resulting from a new use. The differences in habitat quality (HSI) and quantity (area) between existing habitat (baseline) and projected future conditions is required to document project-related impacts to selected evaluation species. Neither HSI nor HEP were designed to predict outcomes from development for communities of species. HEP also*

does not provide guidance for performing future projections. The FWS Manual on HEP states that projected impacts are no better than the user's ability to predict future conditions.

For example, planting several tree seedlings to replace a single large conifer, maple, or cherry tree does not compensate for the loss of structural complexity and habitat functions those mature trees provide to wildlife. Exhibit N.56 illustrates post-construction planting plans, which fail to replicate the original habitat conditions and composition. In particular, the proposed plantings do not resemble the previous hedgerow structure. Even under ideal conditions, it could take up to 60 years for newly planted trees to develop comparable habitat functions. Moreover, there is no evidence that the planted trees will ever achieve the canopy size, structural complexity, resilience, or cavity formation characteristic of existing mature trees.

Response: The modified HEP methodology applied to meet the applicable conditional use standard in this case appropriately quantifies the differences in habitat quality and quantity between the use of land within the project area before construction of the project and during filtration facility operation following construction of the project. As reflected in the negative values assigned to specific species for specific areas in the updated Post-Construction Table 4 this HEP analysis directly and appropriately accounts for loss of habitat function as a result vegetation removed during the construction period. The comment that neither the HSI nor HEP were designed to predict outcomes from development for communities of species, is seemingly reflective of Mr. Smith's limited view of the value of a traditional HEP methodology through a USFWS lens and is addressed above in the description of the modified HEP applied in this case for the specific purpose of addressing the conditional use approval criterion at issue on remand.

In response to the comment that HEP does not address the time required to replace impacted functions, the modified HEP analysis applied in this case also appropriately considers the time required to replace impacted functions primarily related to vegetation removed during construction. Critically, however, the project does not rely on the HEP itself as a tool to address the time required to replace the functional habitat value of vegetation removed as a construction activity, referred to in other testimony as temporal loss. Instead, as addressed in Topic 5 in Exhibit N.32, the temporal loss created by the necessary removal of trees and other vegetation during construction of the filtration facility project is directly addressed through extensive planting and thoughtful habitat design and features in and around the project area.

In this case, both the impacts of vegetation removal and the short- and long-term benefits of the proposed planting plans were thoroughly considered in the development of the original planting plans and reevaluated in response to public input. In his example, Mr. Smith specifically challenges the ability of planting several tree seedlings to replace a structural complexity or habitat function of a mature tree. The planting plans for the project addresses this issue in multiple ways.

First, as discussed in the N.32 Topic 5 response, at planting plans for the filtration facility and the Carpenter Lane properties owned by PWB result in the planting of over 3,400 native trees and over well over 46,000 native shrubs. Note that the total conservatively excludes: 1) all vegetation to be planted at the intertie site; 2) the trees that have been and will be planted along the raw water alignment, including the 20 trees planted in 2023 at the forest edge of the SEC overlay; and 3) the extensive riparian, upland forest, and oak woodland trees and shrubs, totaling approximately 680 trees and 830 shrubs, to be planted across 5.5 acres at the Cotell Pond property. Even with those exclusion, the replacement ratio equates to 7.9 trees planted for every 1 tree removed.

It is common in natural resource mitigation to compensate for the amount of time needed for large vegetation such as trees to grow and provide full habitat benefits by increasing mitigation ratios for re-establishment of mature vegetation to greater than 1:1. A review of tree codes for mitigation replacement values was conducted as a planning tool. While each jurisdiction applies slightly different requirements, the typical approach is to 1) require a specific number of trees be planted, often calculated through a graduated replacement ratio based on the size of the trees removed, 2) require a certain caliper be planted based upon the total caliper of trees removed,

or 3) a mix of those approaches. Statistics of trees mapped for removal by PWB were evaluated using the various tree codes and the result is in the table attached as Attachment 4. While the comparison is not provided for the purposes of demonstrating that the project satisfies MCC 39.7515(B), it is notable that the tree replacement values proposed by PWB far exceed the requirements by all jurisdictions evaluated in this exercise.

Second, Mr. Smith's comment that there is "no evidence that the planted trees will ever achieve the canopy size, structural complexity, resilience, or cavity formation characteristic of existing mature trees," fails to account for the full scope and complexity of the planting plans prepared for the filtration facility site. He only mentions one limited feature on the planting plan identified in N.56. While the comment is vague, to the extent it means that an intermittent hedgerow with multiple non-native and invasive species within a road right-of-way is not precisely replicated on the filtration facility site, he is correct. Importantly, however, the conditional use standard does not require that any given wildlife habitat area that might be impacted by a conditional use be exactly replicated. In this case, the full extent and wildlife habitat benefits intentionally considered in development of the filtration facility planning plan, the Carpenter Lane properties planting plan in close proximity to the area of hedgerow removal, and the Dodge Park Boulevard right-of-way work collectively to immediately replace and over time will greatly exceed the structural complexity and habitat functions of both young and mature vegetation removed during construction from the Dodge Park Boulevard right-of-way and from other locations within the project area.

The details of the planting plans matter and the following response to Mr. Smith's comment related to replacement tree characteristics was authored by Angie Kimpo, the HEP team member that developed the planting plans:

Structural Complexity and Resiliency

One of the significant benefits of doing a large scale planting is the diversity of native plant materials that are installed during the course of the project. Structural complexity is an indicator of biodiversity on a site. While the formation of tree-related microhabitats (TreMs) such as cavities are often attributed to mature trees, it is also recognized that small diameter, younger trees represent important cavity nesting TreM's. Hardwood trees typically develop rot at smaller sizes and in younger individuals than do conifers. In a 2002 paper by Bunnell, he describes the diverse array of cavity excavating birds and the variance in preference for larger conifer trees as opposed to smaller hardwood trees which develop in a relatively short time period. The diversity of trees (16 species) chosen for the filtration facility site will develop in different growth rates and patterns and present an array of structural and habitat functions for wildlife using the site. Species such as cottonwood will grow very fast and succumb to rot much more quickly than others. Species such as Oregon white oak will grow very slowly and be resistant to developing rot until an older age. Species such as Douglas-fir will grow very quickly and develop structure for habitat functions within the first decade. Additionally, to further address concerns raised in this comment about tree growth and structure, the landscape team identified additional areas for larger ball and burlap (B&B) trees to the planted and supported by irrigation. Therefore, the total number of B&B to be planted between the filtration facility site and the Carpenter Lane site is approximately 694. Updated planting sheets that specifically identify the B&B plants are provided in Attachment 5. Each of these factors provides evidence to demonstrate the very high likelihood that the planted trees will achieve the canopy size, structural complexity, resilience, or cavity formation characteristics of those trees removed over time. To further address temporal loss, invasive management in the existing conifer forest to control and eradicate English ivy will help to preserve existing structure and TreMs. The Water Bureau has demonstrated a commitment to managing and maintaining the site over time to ensure that this structure, complexity and function develop.

Native Cover Projections

In terms of canopy size specifically, projected cover levels for trees are based on the Portland Plant List, sections 3.1 through 3.8 which provide a projected height and cover at 10 years for most trees on the planting lists and a height at maturity for shrubs on the list. The pages of the Plant List relevant to the species included on the project

planting lists is attached as Attachment 6. For the few species missing from the list, additional information about projected height and spread were obtained from the following sources:

- Oregon State University, College of Horticulture website
- Washington State University Extension Service

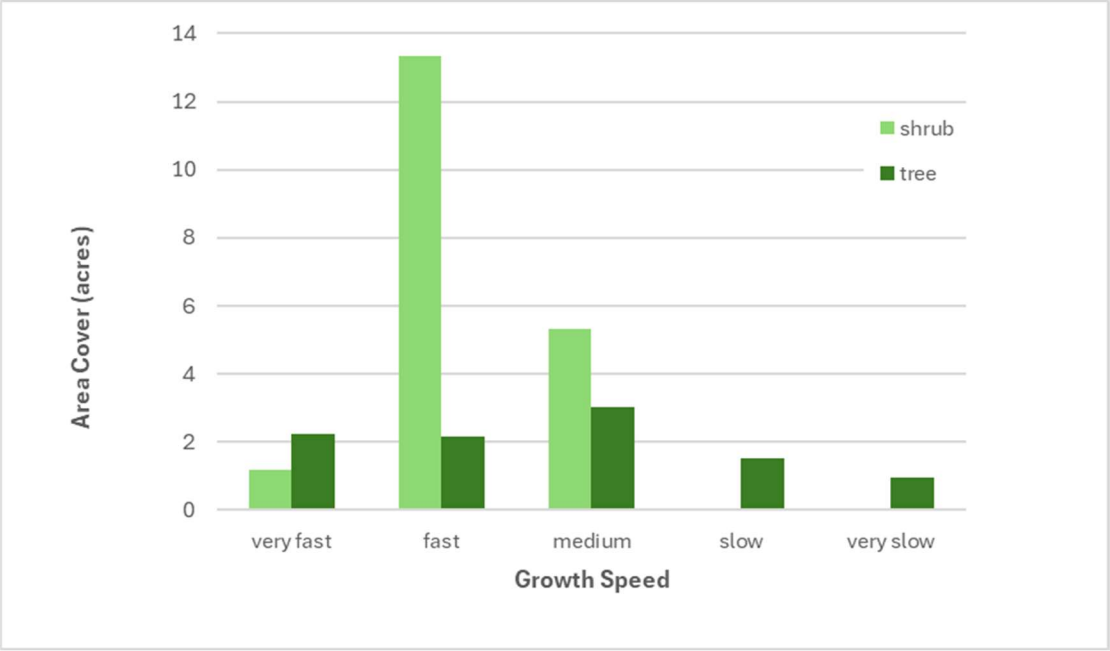
Using the list of all plants to be installed across all sites (filtration, raw water pipeline, Carpenter Lane and Cottrell Pond), estimated cover was calculated for each individual species and also for each habitat type to be restored. Cover estimates included areas projected to be planted at the Cottrell Pond site which includes 1.7 acres of riparian forest and 2.2 acres of upland forested habitat and 1.6 acres oak prairie habitat. Table 1 summarizes the results comparing removed vegetation with the projected cover at the 10-year mark. For the purpose of this evaluation, roadside hedgerows with native vegetation were calculated in the hedgerow category while ornamental hedges were included as landscape.

Projected Cover by Habitat (all sites)	**Approximate Acres Removed**	**Planting Area Acres**	**Projected Tree cover at year 10 (acres)**	**Projected Shrub Cover at year 10 (acres)**
Forest	1	19.2	1.3	0.73
Hedgerow	2.9	6.9	3.6	11.5
Riparian	0	5.7	4.6	9
Oak and Prairie*	0	34.8	0.9	0.5
Landscape	0.5	1.5	1	0**
Total	**4.4**	**68.1**	**11.4**	**21.73**
*Oak and prairie units designed to be low woody plant density				
**Shrubs not included in calculations for landscape areas				

Table 5 - Comparison of vegetation removed with acres of restored habitat

Tree and shrub cover estimates for the 10-year mark are detailed in Attachment 7. **By year 10, it is estimated that native tree cover will be approximately 12 acres and native shrub cover will be approximately 21 acres.**

When considering projected cover, the projected tree cover and projected shrub cover will overlap in many areas. It is also important to note that the size of trees planted has an impact on the temporal development of the site. Trees planted as B&B tend to be 5-8' in height and can range from an age of 4-7 years at the time of planting. Many trees originally proposed for planting as bareroot without irrigation have been converted to bald and burlap with irrigation to speed development of the structure and development of those individuals. As noted above, the current plans will result in a total of 694 B&B trees being planted on the filtration facility site and the Carpenter Lane properties. Additional B&B trees are proposed in the area south of Johnson Creek at the Cotrell Pond site. The average height of trees planted at the 10-year mark is projected to be 17.5'. Some of the faster growing trees are projected to be much taller, including black cottonwood at 50' and Douglas-fir at 40'.



Growth Speeds of Planted Species			
Row Labels	**shrub**	**tree**	**Total**
very fast	1	2	3
fast	13	5	18
medium	16	8	24
slow		1	1
very slow		1	1
Total	**30**	**17**	**47**

Tables 6 and 7 Growth speeds of various plant materials to be planted

As tables 6 and 7 indicate, there is a mixture of speeds at which trees will develop on the sites with a high concentration of trees in the medium and fast categories.

Species Diversity

An additional factor in assuring that replacement trees develop characteristics that provide complexity and habitat function is to provide diversity. A planting list of all species to be planted across the project areas is provided at Attachment 8. As detailed in the table, the species planted provide:

- 16 species of native tree
- 30 species of native shrub

In contrast, and as detailed in Attachment 9, the list of plants removed during construction includes:

- 8 species of native tree
- 12 species of ornamental trees
- 5 species of native shrubs
- 1 species of ornamental shrub
- 2 species of invasive shrub

In addition to the overall diversity of plantings, the recognized functional habitat benefit of native plants is addressed above.

Comment: HEP and HSI do not account for the long-term costs and care required to monitor or maintain habitat. Given that it will be several decades before the habitat function returns and wildlife populations respond, impacts to wildlife will accumulate over time. This is a primary reason for having a reference area to assist in comparing landscape designs for habitat replacement. Reference sites become critical to assessing when mitigation efforts are completed and adverse effects to wildlife mitigated.

In Oregon, the Division of State Lands (DSL) working with ODFW has implemented a successful wetland mitigation policy. The policy relies on the establishment of Wetland Mitigation Banks to replace wetland habitats impacted by development. The program uses reference sites to validate habitat conditions that mitigate wetland impacts. A significant component of the Wetland Mitigation Bank program is the establishment of habitat conditions prior to development impacts, and the creation of stewardship funds to ensure long-term maintenance and monitoring of the mitigation site. This helps remove some of the risk associated with creating habitat and hydrology to replace impacted wetlands. This model should be applied to other mitigation proposals that rely on mitigation of habitat functions over long periods of time. (pgs. 6-7)

Response: The premise that it will take decades before the habitat function returns is inaccurate. As explained above, in just 10 years, the projected cover just from trees planted over 68 acres is projected to be 11.4 acres in comparison to the approximately 4.4 acres of tree cover removed during construction. The comment also fails to consider or acknowledge the elements of the planting plans and habitat enhancements that will provide immediate and short-term habitat benefits throughout the site, including:

- Planting a diverse array of quickly establishing species in all structural layers including a wide variety of grasses and herbaceous plants; quick growing and colony forming shrubs such as native roses, spiraea and thimbleberry; and fast-growing trees such as red alder, cotton, fast-growing-fir and Ponderosa pine. Planting project areas before the filtration facility is complete and operational.
- Invasive removal of English Ivy and holly from the established forest on the filtration facility.
- Installation of blue bird and bat boxes on the filtration facility site.
- Placement of log/brush piles in filtration facility habitat areas.
- Removal of elk fencing along the eastern boundary of the filtration facility site.

In terms of long-term costs and care of monitoring and maintaining the habitat areas on the filtration facility site. As discussed above, the filtration facility is designed to provide the region with clean water for decades to come. This is not an oak savannah habitat project seeking funding and a long-term commitment from a private property owner. Instead, PWB is a public agency with expertise and experience in planting and maintaining the types of

habitats developed for the filtration facility site. Additionally, within the context of a land use proceeding with binding conditions of approval, it not necessary for the modified HEP to address long-term costs and care required to monitor and maintain habitat as suggested in the comment. Instead, the project will be subject to existing natural resource conditions of approval imposed through the 2023 land use decision. Proposed monitoring and maintenance conditions for the project planting areas are provided as Attachment 10. These conditions require annual reporting and specific maintenance targets that will ensure that all planted vegetation is established and provides functional habitat value that exceeds the functional habitat value of what was removed during construction across the project area as a whole. Even after the formal reporting ends, PWB will continue to maintain trees, shrubs, and vegetation on the properties it owns and controls for the life of the facility. After the right-of-way maintenance and reporting period ends for the planting in the Dodge Park Boulevard right-of-way, Multnomah County Transportation will maintain the planting areas consistent with County right-of-way management practices.

Conclusion

Taking into consideration all comments and evidence in the record, it continues to be ESA's expert opinion that the filtration facility project will not adversely affect wildlife habitat.

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Attachment 1

WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

A complete report and signed report cover form, along with applicable review fee, are required before a report review timeline can be initiated by the Department of State Lands. All applicants will receive an emailed confirmation that includes the report's unique file number and other information.

Ways to submit report:

- **Under 50MB** - A single unlocked PDF can be emailed to: wetland.delineation@dsl.oregon.gov.
- **50MB or larger** - A single unlocked PDF can be uploaded to DSL's Box.com website. After upload notify DSL by email at: wetland.delineation@dsl.oregon.gov.
- OR a hard copy of the unbound report and signed cover form can be mailed to: Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279.

Ways to pay review fee:

- By credit card on DSL's epayment portal after receiving the unique file number from DSL's emailed confirmation.
- By check payable to the Oregon Department of State Lands attached to the unbound mailed hardcopy OR attached to the complete signed cover form if report submitted electronically.

Contact and Authorization Information

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Mobile phone # (optional)
E-mail: Bonita.Oswald@PortlandOregon.gov

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: Bonita Oswald **Signature:** [signature]

Date: 02/13/2023 Special instructions regarding site access: ____

Project and Site Information

Project Name: Portland Water Bureau: Bull Run Filtration Project, Multnomah and Clackamas Counties

Latitude: 45.46852093235169 Longitude: -122.31134985550483
decimal degree - centroid of site or start & end points of linear project

Proposed Use:
Drinking water filtration facility with raw and finished water pipelines connecting to the existing Bull Run conduit system.

Tax Map # 1S4E22D-00400, -00100; 1S4E22DB-00300; 1S4E23C-00800, 01400, -01500, -02200; 1S4E21A-00900; 1S4E22BA-00200, 00100; 1S4E15-00801; 1S4E22BC-01300; 1S4E27-00100, 00200; 1S4E26-04800; 05000.

Project Street Address (or other descriptive location):
SE Carpenter Lane (across from 35319 SE Carpenter Lane); & tax lots with water pipelines (see Appendix A - Figures)

Tax Map #
Tax Lot(s)

Township 1s Range 4e Section QQ —

Use separate sheet for additional tax and location information

City: Gresham, Boring County: Multnomah, Clack

Waterway: River Mile:

Wetland Delineation Information

Wetland Consultant Name, Firm and Address:
Anita C. Smyth, SPWS
Wetland Scientist, Winterbrook Planning
610 SW Alder St. Suite 810
Portland, OR 97205

Phone # (503) 869-7897
Mobile phone # (if applicable)
E-mail: ACSmyth@comcast.net

The information and conclusions on this form and in the attached report are true and correct to the best of my knowledge.

Consultant Signature: ACSmyth Date: 2/17/2023

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

Wetland/Waters Present? ☒ Yes ☐ No Study Area size: 145.4 acres Total Wetland Acreage: 0.6670

Check Applicable Boxes Below

☐ R-F permit application submitted
☐ Mitigation bank site
☐ EFSC/ODOE Proj. Mgr: ____
☐ Wetland restoration/enhancement project (not mitigation)
☐ Previous delineation/application on parcel
If known, previous DSL # ____

☒ Fee payment submitted $ 540
☐ Resubmittal of rejected report ($100)
☐ Request for Reissuance. See eligibility criteria. (no fee)
DSL # ____ Expiration date____
☐ LWI shows wetlands or waters on parcel
Wetland ID code ____

For Office Use Only

DSL Reviewer: ____ Fee Paid Date: ____/____/____ DSL WD # ____

Date Delineation Received: ___/___/___ DSL App.# ____

Determination and Delineation of Wetlands and Waters of the United States

Portland Water Bureau Bull Run Filtration Project

Multnomah and Clackamas Counties, Oregon

Prepared for

Portland Water Bureau
1120 SW 5th Avenue, #405
Portland, Oregon 97204
(503) 865-6039

Prepared by

Winterbrook Planning
610 SW Alder Street, Suite 810
Portland, Oregon 97205
(503) 827-4422

February 2023

Table of Contents

Tables

Figures

Appendices

Site Directions

- From Portland, proceed east on I-84
- Take Exit 17 – Marine Drive / SW 257th Avenue; go straight on NW Frontage Road
- Turn slight right onto NW Graham Road
- Turn left onto E Columbia River Highway
- Turn right onto S Buxton Road
- Turn slight left onto SE Division Drive
- Turn slight right onto SE Oxbow Drive
- Turn right onto SE 327th Avenue/SE Altman Road
- Turn left onto SE Dodge Park Boulevard

1.0 Introduction

Winterbrook Planning (WP) was retained by Brown and Caldwell, who is contracted to the City of Portland Water Bureau (Water Bureau), to prepare a wetland determination and delineation to identify the location and extent of waters of the state for the Water Bureau's Bull Run Filtration Project (the project). The project includes a new drinking water filtration facility (WFF) located on SE Carpenter Lane in Multnomah County. This facility will be served by raw and finished water pipelines connecting to the existing Bull Run conduit system. The project study area is shown on the Location Map (Figure 1) and Tax Assessor Map (Figure 2).

New raw water pipelines will connect to the existing Bull Run conduits along Lusted Road and convey water approximately 0.4 mile in an easterly direction to the WFF. New finished water pipelines will convey treated water from the WFF by gravity and connect back to the existing conduits along a route generally in the northwest direction. A separate local distribution main will connect from the new pipelines in SE Dodge Park Boulevard to the existing main adjacent to the Lusted Hill Treatment Facility on SE Cottrell Road to supply existing local water customers.

The project is designed to meet federal drinking watertreatment requirements to protect public health under the U.S. Environmental Protection Agency's (EPA's) Long-Term 2 Enhanced Surface Water Treatment Rule. The Oregon Health Authority Drinking Water Services and the Water Bureau signed a bilateral compliance agreement in 2017 that laid out a schedule for completion of the project by 2027.

Following several reconnaissance visits in 2019, fieldwork to collect sample plot data for identification of potentially jurisdictional resources and determining the jurisdictional boundaries was performed on four occasions. Data were collected for the initial concept study area and then in response to additional data needs to consider project alternatives as they were identified and considered. Field data collection occurred on April 7, 2020, March 5, 2021, October 19, 2021, and January 28, 2022.

Work was performed using the Routine Onsite Methodology set forth in the 1987 Federal Interagency Wetland Delineation Manual and the Mountains, Valleys and Coast Regional Supplement.

2.0 Site Description

An escarpment divides the study area from northwest to southeast, creating a watershed boundary between the Sandy River and Beaver and Johnson Creeks to the west (Figure 1). Dodge Park Boulevard traverses this escarpment (hereafter referred to as the "upper escarpment") and provides a road connection between the Sandy River and the generally agricultural land on the high terraces to the west.

The eastern portion of the study area lies within the Lower Sandy River Watershed. The Sandy River lies offsite to the northeast approximately 1,500 lineal feet away at the closest point. This portion of the study area lies west of SE Lusted Road and passes through properties currently supporting small-scale agriculture and rural residential uses. The sites near Lusted Road are flat to gently sloping to the northeast toward the Sandy River.

The western portion of the study area includes the filtration facility site as well as distribution lines connecting to it. These features lie within the upper reaches of the Beaver and Johnson Creek watersheds. Topography in this area is generally flat to gently sloping. Beaver Creek and its tributaries drain northwest, while Johnson Creek and its tributaries drain to the west.

2.1 Landscape Setting

The eastern portion of the study area lies in the Lower Sandy River watershed about 17 miles upstream of its confluence with the Columbia River. The site elevation ranges from a low point near the center of the project at 500 feet NGVD to approximately 730 feet where the pipeline crests an escarpment that bisects the Lower Sandy River and Beaver Creek/Johnson Creek watersheds. The project lies well above the 100-year floodplain of the Sandy River.

The major regional landscape features are the Sandy River and a steep (lower) escarpment that parallels the river to the west. This reach of the river flows through a floodplain with steep sides that confine high flows. Above the floodplain is a narrow terrace that parallels the river; Lusted Road was constructed on this terrace. Upslope of that flat to gently sloping terrace, the aforementioned (upper) escarpment rises steeply to a higher, broad terrace that serves as the watershed break between the Lower Sandy River and Johnson Creek Watersheds.

Several small streams originate at the eastern foot of the upper escarpment, passing through the study area to discharge into the Sandy River. The topography also favors the development of seeps along the base of the escarpment that feed smaller, intermittent streams crossing the study area. Several of these have been impounded for agricultural use.

The western portion of the study area west of the escarpment is high and flat. This high terrace is lightly dissected by ephemeral, intermittent and perennial streams. The ephemeral streams are generally fed by local runoff, with seepage contributing seasonal or perennial groundwater flow lower down. Most of these have been altered by large-scale agricultural land uses, road construction, or impoundments for irrigation.

2.1 Soil Survey

The study area lies mostly in Multnomah County, crossing into Clackamas County at one location (Figure 3). Note that Clackamas County and Multnomah County soil survey areas may have two different labels with the Clackamas County designation first. An array of soil series is mapped in the study area by the Natural Resources Conservation Service (NRCS) soil survey for the area.

Wollent silt loam (map unit 57) is the only hydric soil series mapped in the study area, though other series may have minor inclusions of hydric soils in certain landforms such as terraces or depressions. Following is a summary of soils in the study area based on NRCS official soil series descriptions.

Cazadero silty clay loams (map units 15B / 9B, 9C) range from flat to 15 percent slopes. They are found along the base of the upper escarpment in the southeast part of the study area. The steeper sections are forested, though the areas with gentler slopes are typically cleared for past or present agricultural uses.

Cornelius silt loam, 8 to 15 percent slopes (map unit 10C) is found in the northwest portion of the study area near Figure 5e. Cornelius soils are deep, well drained and moderately permeable, and commonly used for agriculture.

Cottrell silty clay loam, 2 to 8 percent slopes (map unit 24B) is found in the southeast part of the study area, near Figure 5d. This series comprises deep, moderately well drained soils formed in old alluvium. Within the study area, these soils are in agricultural-related use.

Dystrochrepts, very steep (map unit 31F) is mapped on the upper escarpment in the southeast part of the study area. This band is generally forested with little development due to the steep slopes.

Haplumbrepts, very steep (map unit 20F) is mapped on the northern (Multnomah County) portion of the upper escarpment. Similar to Dystrochrepts, it is forested and relatively unaltered due to the steep slopes.

Mershon silt loams, 0 to 15 percent slopes (map units 27B and 27C) are located on high terraces in the central part of the study area, north of Figures 5a and 5b. They are formed in old mixed alluvium and are moderately well drained.

Powell silt loams, 0 to 30 percent slopes (map units 34A/34B/34D) were identified in the northwestern part of the study area. Powell soils are somewhat poorly drained soils that formed in silty soil over silty alluvium.

Wollent silt loam (map unit 57) is a hydric soil associated with stream corridors in the Beaver and Johnson Creek watersheds. Wollent soils are very deep, poorly drained soils formed in old silty alluvium found on high terraces.

3.0 Site Alterations

Site alterations in the study are mostly the result of long-term efforts to create arable land for row crops, nursery stock, and pasture or hay production. These alterations include the removal of forest communities in favor of pasture and croppable land, with some areas at the eastern toe of

the escarpment and properties adjacent to drainages likely drain-tiled. The alterations for specific properties are discussed below.

On Figure 5a, Dodge Park Boulevard bisects what was once a larger wetland. The feature on the upslope (southern) side drains under the roadway prism through a culvert. On the north side, a segment of the culvert is missing, allowing water that collected along the roadway slope to flow in. The culvert resumes, conveying water under the farm field to the northwest.

Figure 5b depicts an upper reach of Beaver Creek bisected by Cottrell Road. The stream is culverted under Cottrell Road and the culvert appears appropriately sized. Historically, the road construction and culverting likely constricted a broader swale into a point source for ease of conveyance.

On Figure 5c, a complex of streams, ponds, and wetlands were identified. The property is bisected by a small unnamed drainage that crosses the site from southeast to northwest, turning north near where it flows offsite, and returning onsite near the northern property line. The southwestern side of this property is currently used for growing cattle while the northeastern side is primarily residential. The two sides of the property are joined by an access road constructed prior to 1995; the stream passes under this road via a culvert. A ditch was observed along the southern edge of the property but there was no evidence of water flow. Based on historical aerial photographs reviewed on Google Earth, the northerly (downstream) pond was created via excavation in 2012, and we observed subsurface discharge filling the pond during the April 2020 site visit. The channel of the unnamed stream may have been widened upstream of the access road to create the southern pond but tree cover obscures the pond during most of the time span of the historical aerials reviewed.

Figure 5d shows a farm road with an adjacent roadside ditch. The road was likely constructed across this low spot to facilitate year-round access and the ditch and inlet installed to direct the runoff into a farm drain tile system to the west.

The feature shown in Figure 5e is an artifact of the roadside drainage system. The roadside drainage ditch collects in a small basin with a standpipe and area drain. This collects and conveys water under the roadway to Beaver Creek. Historically, water would have drained directly to the creek.

Figure 5f shows a portion of the proposed filtration facility and lies in an area of active nursery usage, which is subject to annual disturbance as nursery crops turn over. A drive aisle lies over the area of hydric soil, providing access to nursery plants to the north and south. Surface runoff from rainfall flows west, entering a roadside ditch on the adjacent property to the west.

Figure 5g depicts a swale that historically drained directly downslope and is now blocked by SE Altman Drive. Water collects against the roadway and passes under it through a culvert.

4.0 Precipitation Data and Analysis

WETS and observed climatological data were accessed from the NOAA database at the Portland Water Bureau Headworks weather station. Table 1 summarizes precipitation for the 2019-2020 water year through the date of the April 7, 2020 site investigation. All data were obtained from AgACIS.[1]

Table 1. Average Monthly Precipitation (NRCS WETS Table) April 2020 site visit

Month	Average (inches)	30% chance will have (min-max inches)	Observed Precipitation	Comparison to the Normal Range
October 2019	7.46	5.38-8.81	4.85	Outside range – low
November 2019	10.62	7.69-12.52	2.89	Outside range – low
December 2019	11.62	9.33-13.29	6.87	Outside range – low
January 2020	10.24	8.10-11.77	14.88	Outside range – high
February 2020	7.93	5.56-9.41	7.35	Normal
March 2020	8.50	6.37-9.94	6.50	Normal
April 2020, prorated to 4/7	1.71	1.32-1.96	1.61	Normal
Two weeks prior to site visit	3.63	2.75-4.42	5.26	Outside range - high

The 2019-2020 water year started out dry but normalized in the three months leading up to the April 7, 2020 site visit. Overall, precipitation was recorded at 82 percent of normal to date in the water year, with the heavier rainfall months later in the season.

Precipitation for the three months prior to the April site visit was higher than normal, with heavy precipitation received in January and normal rainfall for February and March. Rainfall for the two weeks prior to this site investigation was 5.26 inches, which is above normal for the end of March-early April time period.

As shown in Table 2, rainfall during the 2020-2021 water year through the March 5, 2021 site visit trended near the normal historical average for much of that period. Long term average precipitation from the three months prior to the field visit totals 29.88 inches compared to observed precipitation of 30.17. This represents 101 percent of normal rainfall.

Table 2. Average Monthly Precipitation, March 2021 site visit

Month	Average (inches)	30% chance will have (min-max inches)	Observed Precipitation	Comparison to the Normal Range
October 2020	7.37	5.32 – 8.70	4.65	Outside range – low

[1] http://agacis.rcc-acis.org/?fips=41005

Month	Average (inches)	30% chance will have (min-max inches)	Observed Precipitation	Comparison to the Normal Range
November 2020	10.62	7.73 – 12.48	10.06	Normal
December 2020	11.67	9.34 – 13.23	10.71	Normal
January 2021	10.26	8.10 – 11.77	9.87	Normal
February 2021	7.95	5.56 – 9.41	9.59	Outside range – high
March 2021, prorated to 3/5	1.37	1.03 – 1.60	0.28	Outside range – low
Two weeks prior to site visit	3.92	2.82 – 4.08	2.97	Normal

Table 3 tabulates rainfall from March 2021 through the October 19, 2021 site visit. Spring and summer 2021 were very dry compared to the historical average, but recovered somewhat in September. October precipitation through the date of the site visit and the two weeks immediately prior to the site visit were within the normal range. Long term average precipitation from the three months prior to the field visit totals 9.51 inches compared to observed precipitation of 8.61 inches. This represents 91 percent of normal rainfall.

Table 3. Average Monthly Precipitation, October 2021 site visit

Month	Average (inches)	30% chance will have (min-max inches)	Observed Precipitation	Comparison to the Normal Range
March 2021	8.50	6.37 9.94	4.14	Outside range – low
April 2021	7.34	5.84 – 8.38	1.75	Outside range – low
May 2021	5.72	3.59 6.75	4.06	Normal
June 2021	3.96	2.74 4.69	2.66	Outside range – low
July 2021	0.95	0.39 – 1.11	0.01	Outside range – low
August 2021	1.20	0.44 – 1.38	0.49	Normal
September 2021	3.42	1.49 – 4.17	5.30	Outside range - high
October 2021 prorated 10/19	4.52	3.26 – 5.33	2.81	Outside range – low
Two weeks prior to site visit	3.33	2.40 – 3.93	2.81	Normal

Table 4 tabulates rainfall early 2021-2022 water year through the January 28, 2022 site visit. As noted above in Table 3, spring and summer 2021 received below-normal precipitation. That trend recovered in fall 2021. The month of January received normal levels of precipitation, though that rainfall was concentrated in the first half of the month. Long term average precipitation from the three months prior to the field visit totals 31.56 inches compared to observed precipitation of 35.41 inches. This represents 112 percent of normal rainfall.

Table 4. Average Monthly Precipitation, January 2022 site visit

Month	Average (inches)	30% chance will have (min-max inches)	Observed Precipitation	Comparison to the Normal Range
October 2021	7.37	5.32 – 8.70	7.38	Normal
November 2021	10.62	7.73 – 12.48	12.89	Outside range - high
December 2021	11.67	9.34 – 13.23	13.15	Normal
January 2022 prorated 1/28	9.27	7.32 – 10.63	9.37	Normal
Two weeks prior to site visit	4.63	3.66– 5.32	2.18	Outside range - low

5.0 Methods

WP evaluated the wetlands on the project site according to guidelines in the COE 1987 Manual (Environmental Laboratory 1987), and the Western Mountains, Valleys, and Coast Regional Supplement Version 2.0 (2010).

WP staff walked the conduit alignment with the project team during several reconnaissance visits prior to commencing formal data collection. Staff focused on areas with mapped hydric soils, drainages, and surface water features, watching specifically for slope discharge points and alterations to site drainage. During all data collection site visits, depth to saturation and a water table, where present, were documented and their location relative to changes in dominance in the vegetation community was noted. Similarly, depth to hydric soil indicators such as redoximorphic activity was recorded.

6.0 Description of Wetlands and Other Waters of the State

The project contains a variety of potentially jurisdictional resource types. These are discussed individually below.

Wetland 1 (Figure 5a) is a linear wetland that formed against the roadway fillslope of Dodge Park Boulevard. Water from the adjacent agricultural area drains to the south, collecting against the roadway and flowing to the local low point. At this location, a break in the culvert conveying water northwest to Beaver Creek allows water to flow into the drainage system and offsite. Some water ponds, allowing a colony of reed canarygrass to thrive outside the cultivated area.

Based on the season, WP focused on the direct observation or absence of wetland hydrology to determine satisfaction of the wetland hydrology parameter. Based on those observations, the wetland boundary was established between the roadway embankment toe and where saturation dropped below 12 inches.

Wetland 2 (Figure 5a) formed in similar conditions as Wetland 1. Water collects against the toe of the roadway embankment slope and flows west to join a small swale. Water from the swale is collected at the low point and enters a culvert opposite Wetland 1. Water in the culvert is piped out of the study area and ultimately joins Beaver Creek.

The wetland boundary was identified similarly to Wetland 1, using direct observation of hydrologic conditions.

Water 1, shown on Figure 5b, is a stream flowing from east to west under Cottrell Road. The stream flows through a shallow trapezoidal channel with a flat bottom and variably sloping sides. Sample plots were taken to determine the absence of adjacent wetlands based on absence of wetland hydrology, evidence of overbank flow, and other factors. Ordinary High Water was delineated based on wrack lines indicating peak flows.

Figure 5c depicts Waters 2 and 3 as well as Wetlands 3, 4, 5, and 6. These are a contiguous series of features that begin at the toe of an escarpment and flow to the west down to Lusted Road. Beginning at the upper end of this complex, Water 2 is a pond formed by excavating the stream that flows into the property from the east. The pond has a wetland margin (Wetland 3). This stream is likely perennial, fed by groundwater seeping from the toe of the escarpment. This water exits the pond, flowing under a farm road and into a stream channel (Water 3) with a wetland adjacent to it to the south (Wetland 4). Wetland 4 is a slope-valley feature fed by a seasonally elevated water table.

The stream is connected to a second excavated pond with near-vertical sides. Hydrology is fed through groundwater discharge evident on the sideslopes; water from the stream also backfills into this area. This second pond is included as part of Water 3. The stream proceeds downslope, joined by a wetland swale that enters from the south. Thus enlarged, the stream flows north in a wide but incised draw, with water flowing through a network of braided channels with vegetation growing on the sides and in between the channels; this entire feature is mapped as Wetland 5. This feature exits the study area and re-enters farther downhill (Wetland 6).

Waters 2 and 3 were delineated on the basis of wrack lines, transition to woody vegetation, and a well-defined channel or pond edge. Where wetlands were identified, the boundary was located by establishing a plot in an area with strong surface indicators and locating subsequent plots perpendicular to the slope, observing where the depth to saturation fell below 12 inches and/or hydric soil indicators were no longer satisfied.

Water 4 (Figure 5d) is a roadside ditch in an agricultural field. The road was built to create 4-season access across a topographic low area. No areas of standing water or surface flow are evident in the surrounding area, suggesting that an underground drainage system was installed in the past to facilitate agricultural activities. Water collected in the ditch from runoff is collected in an area drain and exported, likely into the field drain system to the west.

Several sample plots were taken in areas with mapped hydric soil but no wetlands or waters were identified at those locations.

- Plot 15 (Figure 5f) was taken on the filtration facility site in an area at the head of a topographic swale. This area is in active nursery use, currently used to grow conifers. Wetland conditions were not met at this location.
- Plot 16 (Figure 5e) is located in a roadside ditch with a standpipe and area drain. Though the drainage infrastructure at this location are suggestive of water, the plot lacked hydric soil indicators.
- Plot 17 (Figure 5g) lies on Altman Drive, north of Lusted Road. Due to lack of entry permission on this location, an Offsite Determination was conducted from Altman Drive. This is a roadside ditch that crosses a small, discontinuous lobe of Wollent silt loam. This plot was taken at the bottom of a green swathe visible on aerial photography and is the lowest point in this segment of roadside ditch. An area drain in the lowest portion of the ditch conveys water into a culvert under Altman Drive and directly into a drainage system on the west side of the road. Vegetation consisted of weedy annuals and escaped pasture grasses; no evidence of standing water was observed.

  Based on the lack of evidence of standing or flowing water, WP determined this location to be non-wetland. However, all project activity will be in the right-of-way of Altman Road, which consists of roadway fill above the adjacent farmland. The area described by offsite sampling will not be disturbed by construction.

7.0 Deviation from LWI or NWI

There is no DSL-approved Local Wetland Inventory (LWI) for these areas in Clackamas and Multnomah Counties. The National Wetland Inventory (NWI) Map (Figure 4) depicts wetlands associated with the Johnson and Beaver Creek headwater tributaries but none within the study area itself.

8.0 Mapping Method

The proposed jurisdictional boundaries and sample plots were professionally surveyed by Winterbrook Planning staff using a Trimble Geox 8000 handheld data collector with accuracy +/- 1.0 foot. The data were post-processed by Mears Design Group and georeferenced to aerial photography base mapping. Plot 17 was located via aerial photography and is accurate to +/- 5 feet.

9.0 Additional Information

No additional information needed.

10.0 Results and Conclusions

Potentially jurisdictional wetlands and waters of the state/United States are shown in Table 5 and on Figures 5a through 5g. Based on field observations, WP delineated wetland conditions on several properties along the proposed easement, totaling 19,180 sq. ft. (0.44 acre). Four waters were identified totaling 10.005 sq. ft. (0.229 acre). Classification and acreage data are broken out by wetland and water below.

Table 5. Potentially Jurisdictional Resources

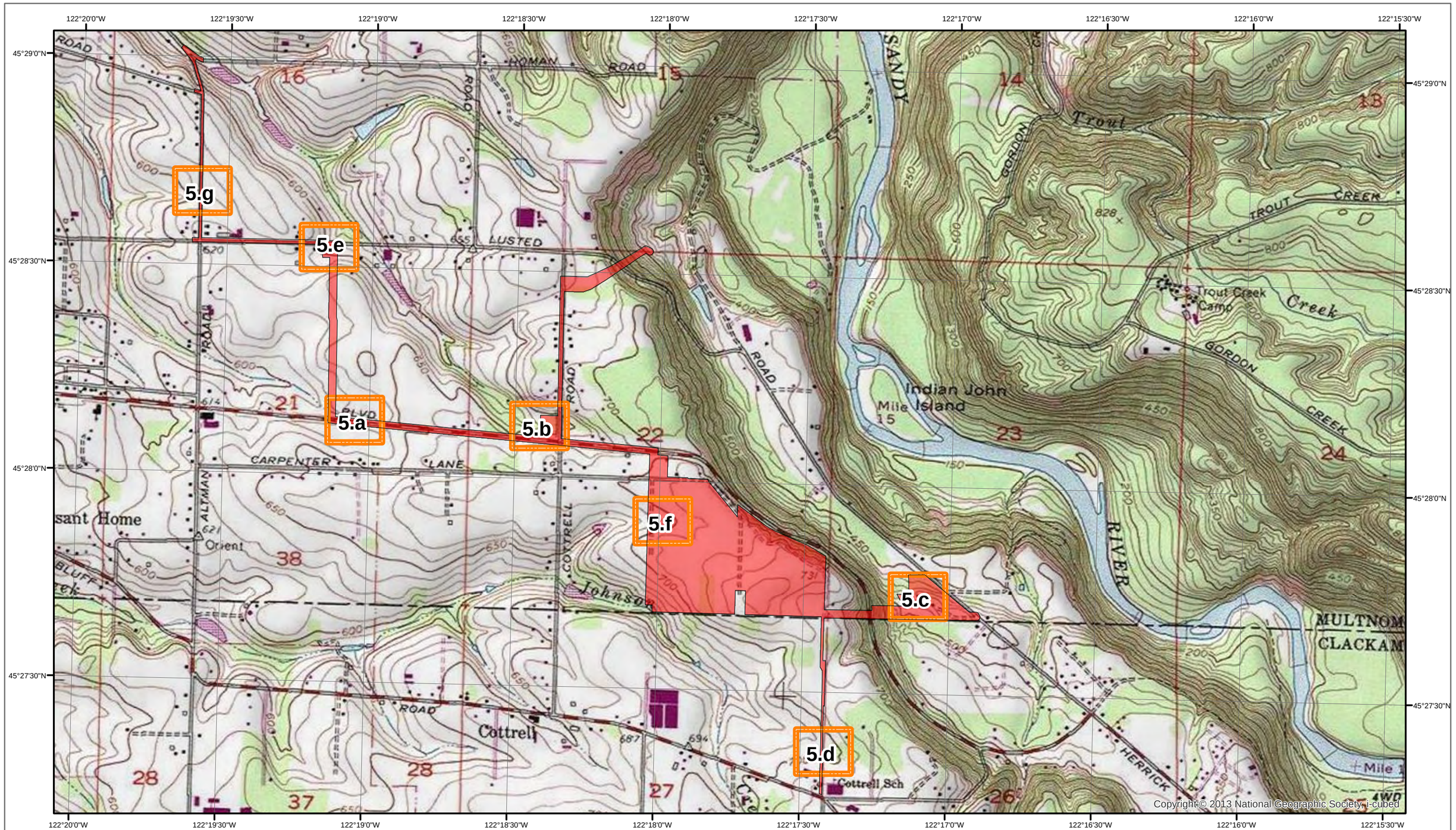
Feature	Area (sf)	Area (acres)	Cowardin Classification	HGM Classification
Wetland 1: Dodge Park Blvd north	567	0.013	PEMA	Slope Valley
Wetland 2: Dodge Park Blvd south	4,003	0.092	PEMB	Slope Valley
Wetland 3: Pond (Water 2) margin	4,654	0.107	PEMB	Riverine Flow-Through
Wetland 4: Stream (Water 3) margin	2,825	0.065	PEMB	Slope Valley
Wetland 5: Swale trib below Water 3	6,004	0.138	PEMB	Slope Valley
Wetland 6: Swale trib below Wetland 5	1,127	0.026	PEMB	Slope Valley
TOTAL	**19,180 s.f.**	**0.44 ac.**		
Water 1: Beaver Creek trib @ Cottrell	2,884	0.066	R3UB1	Riverine Flow-Through
Water 2: Pond	1,910	0.043	R3UB3x	Riverine Flow-Through
Water 3: Stream/pond complex	4,797	0.110	R3UB3x	Riverine Flow-Through
Water 4: Farm road ditch	414	0.009	R4UB3x	Riverine Flow-Through
TOTAL	**10,005 s.f.**	**0.229 ac.**		

11.0 Disclaimer

"This report documents the investigation, best professional judgment and conclusions of the investigator. It is correct and complete to the best of the preparers' knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk unless it has been reviewed and approved in writing by the Oregon Department of State Lands in accordance with OAR 141-090-0005 through 141-090-0055."

APPENDIX A

Figures



Bull Run TREATMENT PROJECTS **Filtration**

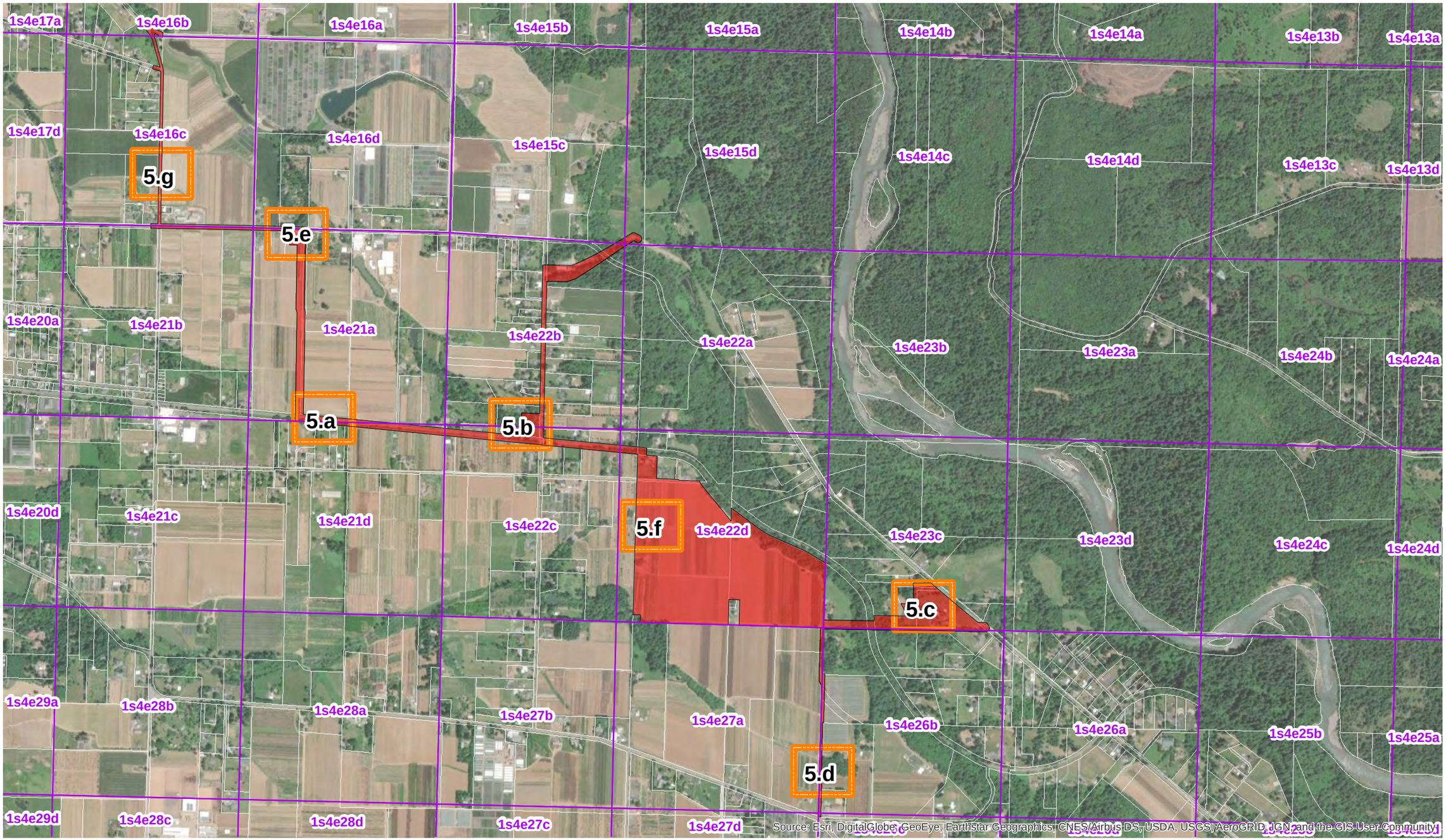
Figure 1: Location Map

Wetland Maps **Study Area**

1 inch = 0.25 Miles

0 500 1,000 2,000 3,000 4,000 Feet

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl



Bull Run TREATMENT PROJECTS | Filtration

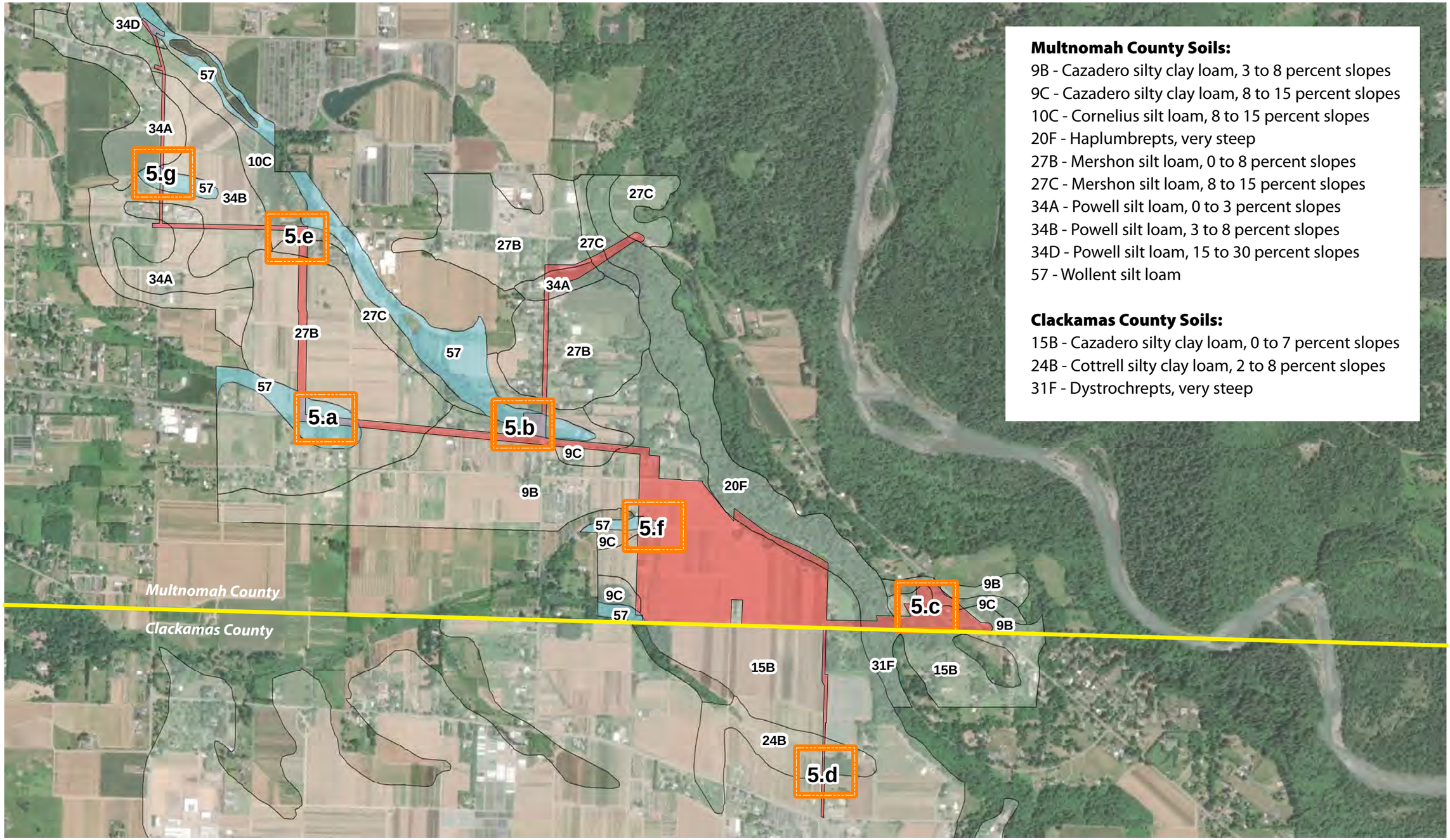
Figure 2: Tax Assessor Map

Wetland Maps
Study Area
Quarter Sections
Tax Lots (White)

1 inch = 0.25 Miles

0 500 1,000 2,000 3,000 4,000 Feet

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl



Multnomah County Soils:

9B - Cazadero silty clay loam, 3 to 8 percent slopes
9C - Cazadero silty clay loam, 8 to 15 percent slopes
10C - Cornelius silt loam, 8 to 15 percent slopes
20F - Haplumbrepts, very steep
27B - Mershon silt loam, 0 to 8 percent slopes
27C - Mershon silt loam, 8 to 15 percent slopes
34A - Powell silt loam, 0 to 3 percent slopes
34B - Powell silt loam, 3 to 8 percent slopes
34D - Powell silt loam, 15 to 30 percent slopes
57 - Wollent silt loam

Clackamas County Soils:

15B - Cazadero silty clay loam, 0 to 7 percent slopes
24B - Cottrell silty clay loam, 2 to 8 percent slopes
31F - Dystrochrepts, very steep

Bull Run TREATMENT PROJECTS **Filtration**

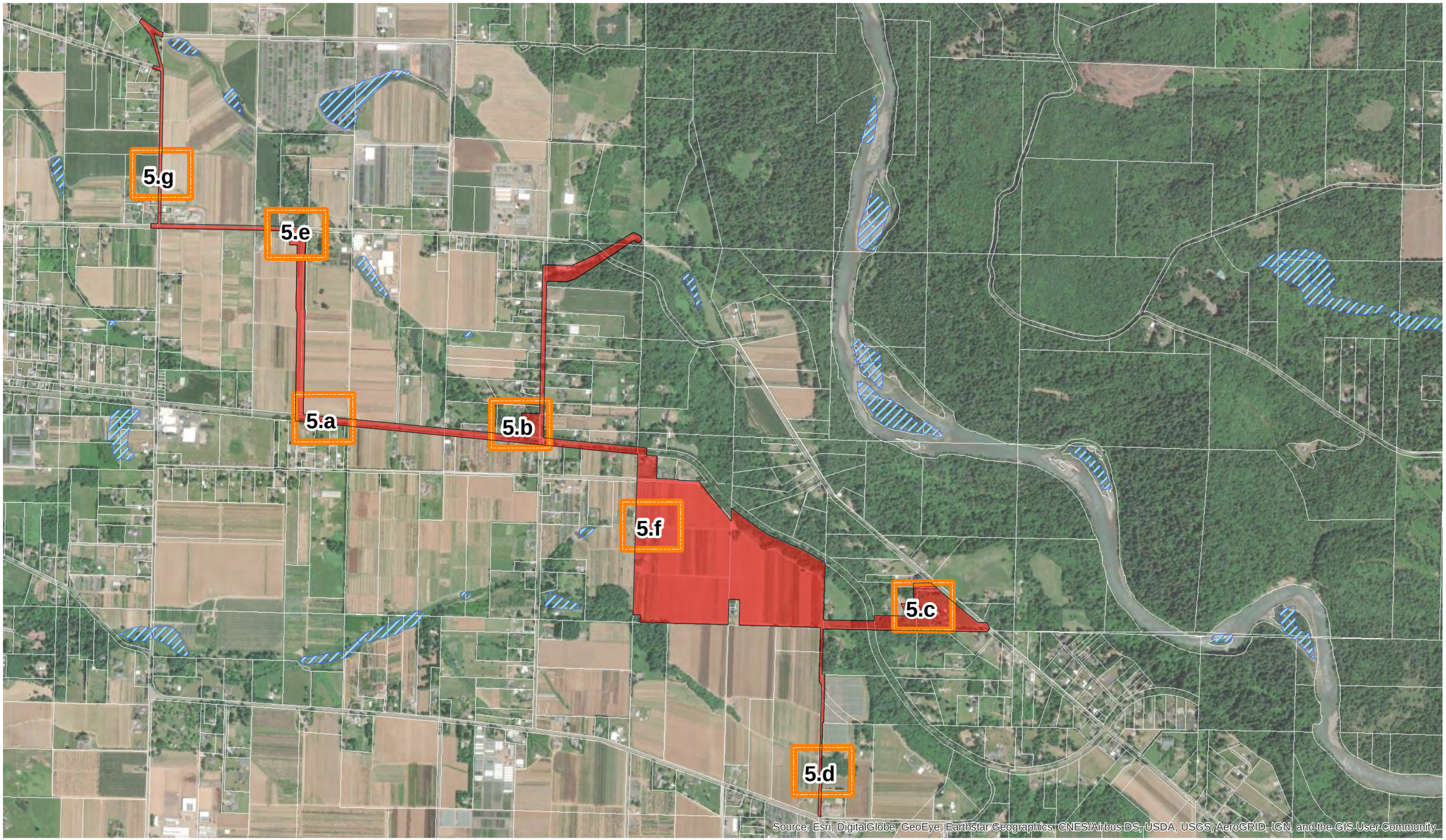
Figure 3: County Soil Survey Map

Wetland Maps
Study Area
Soils
Hydric Soils

1 inch = 0.25 Miles

0 500 1,000 2,000 3,000 4,000 Feet

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl



Bull Run TREATMENT PROJECTS | Filtration

Figure 4: NW Wetlands Map

Wetland Maps
Study Area
NWI Wetlands
Tax Lots (White)

1 inch = 0.25 Miles

0 500 1,000 2,000 3,000 4,000 Feet

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

Bull Run TREATMENT PROJECTS **Filtration**

Figure 5a: Potentially Jurisdictional Resources Map

Study Area | Tax Lots | # Photopoint & Direction of View

Key Map Area | Wetland Boundary

1 inch = 100 feet

0 25 50 100 Feet

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

Bull Run TREATMENT PROJECTS Filtration

Figure 5b: Potentially Jurisdictional Resources Map

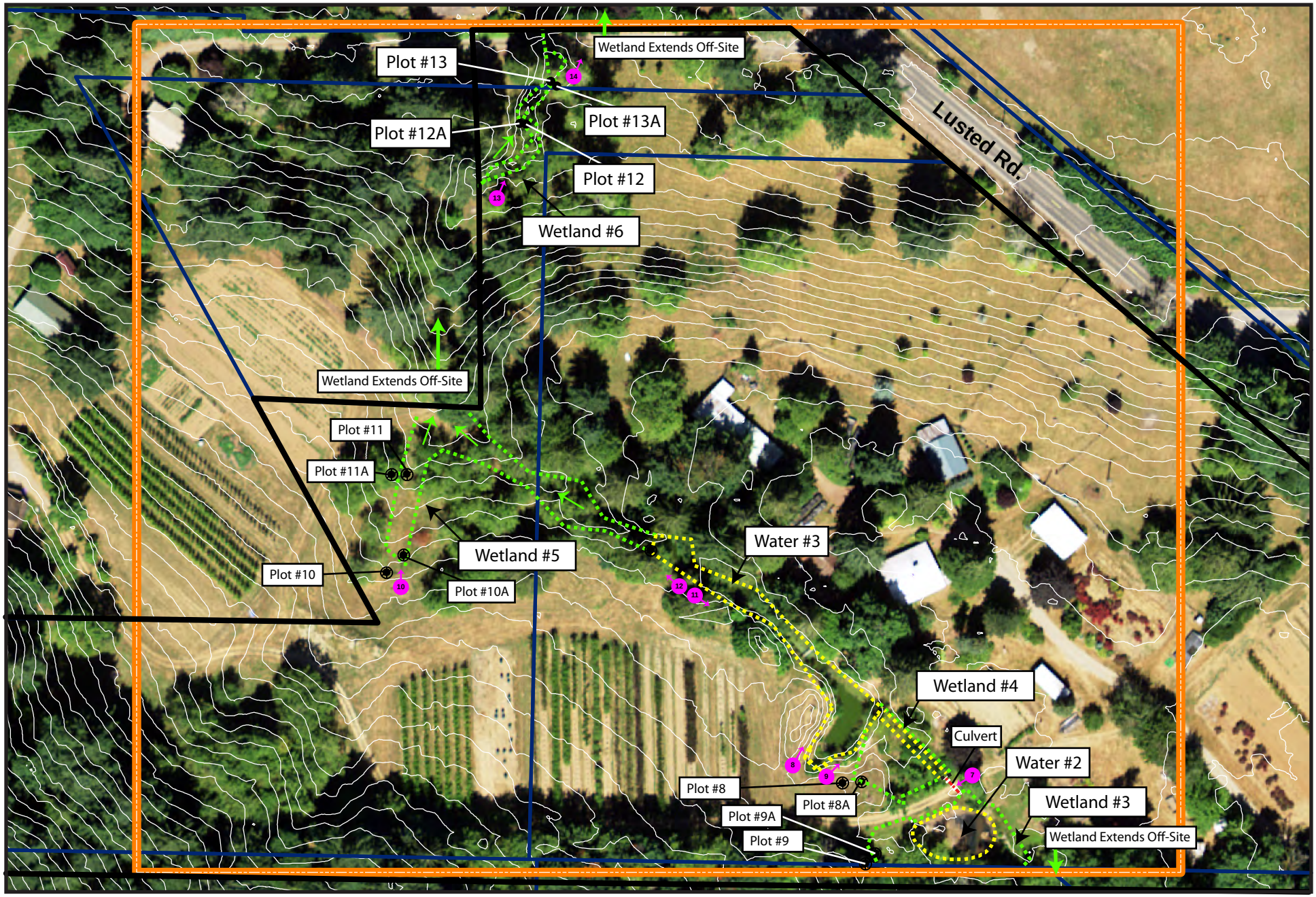
Study Area | Tax Lots | # Photopoint & Direction of View

Key Map Area | Ordinary High Water Line | 2-Foot Contours (White) | Direction of Flow

1 inch = 100 feet

0 25 50 100 Feet

Coordinate System: NAD 1983 HARN StatePlane C



Bull Run TREATMENT PROJECTS Filtration

Figure 5c: Potentially Jurisdictional Resources Map

Study Area | Tax Lots | Ordinary High Water Line | # Photopoint & Direction of View

Key Map Area | Wetland Boundary | 2-Foot Contours (White) | Direction of Flow

1 inch = 100 feet

0 25 50 100 Feet

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

Bull Run TREATMENT PROJECTS Filtration

Figure 5d: Potentially Jurisdictional Resources Map

Study Area | Tax Lots | # Photopoint & Direction of View

Key Map Area | Ordinary High Water Line | 2-Foot Contours (White)

1 inch = 100 feet

0 25 50 100 Feet

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

Bull Run TREATMENT PROJECTS **Filtration**

Figure 5e: Potentially Jurisdictional Resources Map

Study Area

Tax Lots

Key Map Area

Photopoint & Direction of view

1 inch = 100 feet

0 25 50 100 Feet

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

Bull Run TREATMENT PROJECTS Filtration

Figure 5f: Potentially Jurisdictional Resources Map

Study Area

Tax Lots

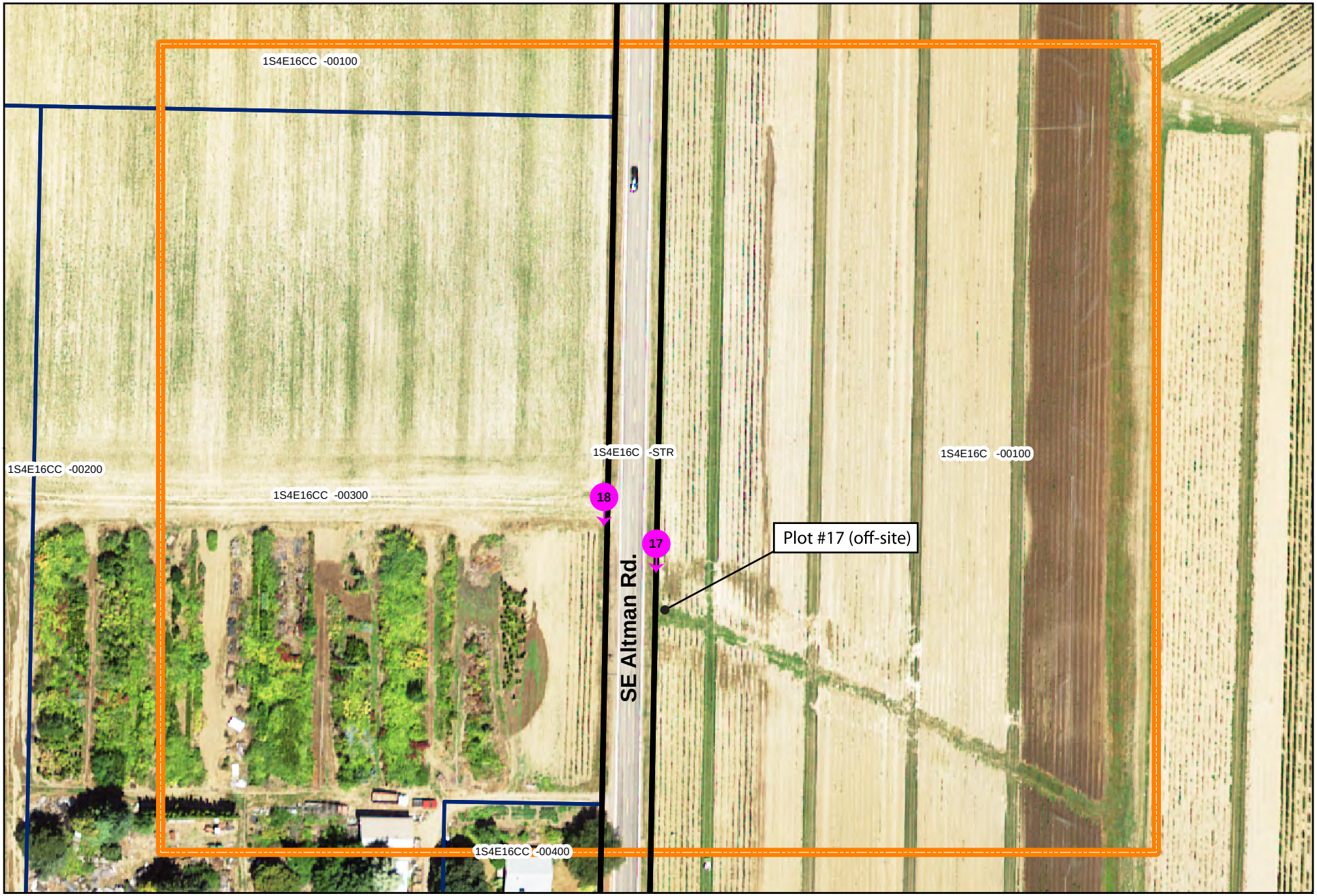
Key Map Area

Photopoint & Direction of view

1 inch = 100 feet

0 25 50 100 Feet

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl



Bull Run TREATMENT PROJECTS Filtration

Figure 5g: Potentially Jurisdictional Resources Map

Study Area

Key Map Area

Tax Lots

\# Photopoint & Direction of View

1 inch = 105.17 feet

0 25 50 100 Feet

N

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

APPENDIX B

Data Sheets

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

Project/Site: Bull Run Filtration Project City/County: Multnomah Sampling Date: 1/28/ 2022
Applicant/Owner: Portland Water Bureau State: OR Sampling Point: Plot 1
Investigator(s): TB / ACS Section, Township, Range: T1S R4E Section 21D TL 100
Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): none Slope (%): 5%
Subregion (LRR): A - Western MVC Lat: 45.4686 Long: -122.3162 Datum: City of Portland Datum
Soil Map Unit Name: Wollent silt loam NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes	X	No	**Is the Sampled Area within a Wetland?** **Yes X No**
Wetland Hydrology Present?	Yes	X	No	

Remarks: Plot taken in right-of-way along Dodge Park Boulevard. Steep slope down gravel roadway embankment to agricultural area.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus latifolia	50	X	FACW
2. Prunus avium	35	X	FACU
3.			
4.			
	85	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1. Rubus armeniacus	70	X	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	70	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

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

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

Hydrophytic Vegetation Present? **Yes X No**

Remarks: Toe of road prism slope in right-of-way. Edge of Fraxinus latifolia community with heavy cover of Rubus armeniacus under the canopy. Outside of blackberry zone, the land use changes to active agricultural use.

SOIL

Sampling Point: Plot 1

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-10	10YR 4/2	100					Silt loam	Friable
10-18+	10YR 4/2	95	10YR 3/3	5	C	M	Silt loam	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

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

Remarks: Just meets soil indicator F3.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present?	Yes	___	No	X	Depth (inches):	
Water Table Present?	Yes	X	No	___	Depth (inches):	11
Saturation Present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	7

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

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

Remarks: Upslope of wetter area to the west and south.

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

Project/Site: Bull Run Filtration Project | City/County: Multnomah | Sampling Date: 1/28/2022
Applicant/Owner: Portland Water Bureau | State: OR | Sampling Point: Plot 2
Investigator(s): TB / ACS | Section, Township, Range: T1S R4E Section 21D TL 100
Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): none | Slope (%): 5%
Subregion (LRR): A - Western MVC | Lat: 45.4686 | Long: -122.3162 | Datum: City of Portland Datum
Soil Map Unit Name: Wollent silt loam | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks: Plot taken in right-of-way along Dodge Park Boulevard. Steep slope down gravel roadway embankment to agricultural area. Plot 2 taken to the east of Plot 1.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1. Rubus armeniacus	80	X	FAC
2. Agrostis stolonifera	20	X	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	

Woody Vine Stratum (Plot size: 5)		
1.		
2.		
	0	= Total Cover

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: Toe of road prism slope in right-of-way. No tree cover in this area.

SOIL

Sampling Point: Plot 2

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-14	10YR 3/2	100					Silt loam	Friable
14-18+	10YR 4/3	98	10YR 3/3	2	C	M	Silt loam	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

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

Remarks: .

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

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

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

Remarks: No saturation or water table observed at this location. Plot 2 is upslope of Plot 1.

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

Project/Site: Bull Run Filtration Project City/County: Multnomah Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau State: OR Sampling Point: Plot 3 – Dodge Park Blvd
Investigator(s): TB / ACS Section, Township, Range: T1S R4E Section 21A TL 900
Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Slight concave Slope (%): 1%
Subregion (LRR): A - Western MVC Lat: 45.4688 Long: -122.3160 Datum: City of Portland Datum
Soil Map Unit Name: Wollent silt loam NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks: Plot taken adjacent to Dodge Park Blvd embankment, at the edge of an agricultural field.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5'r)			
1. Schedonorus arundinaceus	50	X	FAC
2. Phalaris arundinacea	40	X	FACW
3. Poa pratensis	10		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: Edge of agricultural field at the toe of the Dodge Park Boulevard embankment.

SOIL

Sampling Point: Plot 3

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4	10YR 3/2	100					Silty clay loam	
4-18	10YR 4/2	90	10YR 4/4	10	C	M	Silty clay loam	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes ___ X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

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

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

Remarks: Plot taken above linear swale where water collects from the road embankment and agricultural field runoff. Water flows west to a culvert that enters from under Dodge Park Boulevard. Water discharges to the surface at the edge of the Dodge Park Boulevard embankment, flows at the surface for about 5 feet to allow swale drainage to enter, then enters another culvert that conveys water northwest. Water flow is channelized by ecology blocks set in a V shape to funnel water from under the road and along the embankment into the downstream culvert.

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

Project/Site: Bull Run Filtration Project City/County: Multnomah Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau State: OR Sampling Point: Plot 11a – Dodge Park Blvd
Investigator(s): TB / ACS Section, Township, Range: T1S R4E Section 21A TL 900
Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Slight concave Slope (%): 1%
Subregion (LRR): A - Western MVC Lat: 45.4688 Long: -122.3160 Datum: City of Portland Datum
Soil Map Unit Name: Wollent silt loam NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soil Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks: Plot taken adjacent to swale abutting roadway embankment.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1.			
2. Phalaris arundinacea	100	X	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes X No ___

Remarks: Edge of agricultural field at the toe of the Dodge Park Boulevard embankment.

SOIL

Sampling Point: Plot 4

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-4	10YR 3/2	100					Silty clay loam	
4-18	10YR 4/2	85	10YR 4/4	15	C	M	Silty clay loam	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes X Depth (inches): 8

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

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

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

Remarks: Plot taken below the upper extent of inundation indicators (grass matted directionally downslope, sparse vegetation)

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

Project/Site: Bull Run Filtration Project City/County: Multnomah Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau State: OR Sampling Point: Plot 5 – Dodge Park Blvd
Investigator(s): TB / ACS Section, Township, Range: T1S R4E Section 21A TL 900
Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Slight concave Slope (%): 1%
Subregion (LRR): A - Western MVC Lat: 45.4688 Long: -122.3160 Datum: City of Portland Datum
Soil Map Unit Name: Wollent silt loam NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1.			
2.	Phalaris arundinacea	100 X	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes X No ___

Remarks: Edge of agricultural field at the toe of the Dodge Park Boulevard embankment.

SOIL

Sampling Point: Plot 5

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	10YR 3/2	100					Silty clay loam	
12-18	10YR 3/2	95	10YR 4/4	5	C	M	Silty clay loam	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes ___ X Depth (inches): _____

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

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

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

Remarks: Plot taken west above culvert on higher ground than plots on the opposite side of the culvert. No evidence of standing or flowing water. Soil is moist but not saturated at 18 inches.

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

Project/Site: Bull Run Filtration Project | City/County: Multnomah | Sampling Date: 1/28/ 2022
Applicant/Owner: Portland Water Bureau | State: OR | Sampling Point: Plot 6
Investigator(s): TB / ACS | Section, Township, Range: T1S R4E Section 22BC TL 1300
Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): none | Slope (%): 0
Subregion (LRR): A - Western MVC | Lat: 45.4690 | Long: -122.3070 | Datum: City of Portland Datum
Soil Map Unit Name: Wollent silt loam | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ___	No X	**Is the Sampled Area within a Wetland?**	**Yes ___ No x**
Hydric Soil Present?	Yes ___	No X		
Wetland Hydrology Present?	Yes ___	No X		

Remarks: Plot taken on north side of Beaver Creek channel

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1. Thuja plicata	15	X	FAC
2. Alnus rubra	40	X	FAC
3.			
4.			
	55	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1. Ilex aquifolium	20	X	FACU
2. Sambucus racemosa	5		FACU
3. Rubus spectabilis	5		FAC
4. Prunus avium	5		FACU
5.			
	35	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1. Rubus ursinus	50	X	FACU
2. Polystichum munitum	20	X	FACU
3. Ranunculus repens	15		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	85	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1. Hedera helix	5	X	FACU
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 30

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 6 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	75	x 3 =	225
FACU species	105	x 4 =	420
UPL species	0	x 5 =	0
Column Totals:	180 (A)		645 (B)

Prevalence Index = B/A = 3.58

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: Plot taken on terrace about 5 vertical feet above bottom of stream channel in mixed tree grove. Homeowner has been removing Ilex aquifolium and other invasive species in this area.

SOIL

Sampling Point: Plot 6

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 3/3	100					Silt loam	Friable

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

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

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

Remarks: Stream is narrower and more deeply cut into the terrace than at Plot 7. No evidence of stream overtopping. Water elevation is approximately 5 vertical feet below plot elevation.

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

Project/Site: Bull Run Filtration Project | City/County: Multnomah | Sampling Date: 1/28/ 2022
Applicant/Owner: Portland Water Bureau | State: OR | Sampling Point: Plot 7
Investigator(s): TB / ACS | Section, Township, Range: T1S R4E Section 22BC TL 1300
Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): none | Slope (%): 0
Subregion (LRR): A - Western MVC | Lat: 45.4690 | Long: -122.3070 | Datum: City of Portland Datum
Soil Map Unit Name: Wollent silt loam | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks: Plot taken on south side of Beaver Creek channel near Cotterell Road.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	60	X	FAC
2.			
3.			
4.			
	60	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1. Rubus spectabilis	10	X	FAC
2.			
3.			
4.			
5.			
	10	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1. Polystichum munitum	10	X	FACU
2. Dactylis glomerata	T		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	10	= Total Cover	

Woody Vine Stratum (Plot size: 5)		
1.		
2.		
	0	= Total Cover

% Bare Ground in Herb Stratum 90

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: Plot taken on terrace above stream channel. Evidence of removal of heavy Rubus armeniacus (FAC) cover in this area. Too early for regrowth to show but was dominant previously.

SOIL

Sampling Point: Plot 7

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	10YR 4/2	100					Silt loam	Friable
12-18+	10YR 4/2	89	10YR 4/4	10	C	M	Silt loam	
			7.5YR 2/1	1	C	M		Small Mn masses

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

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

Remarks: Barely meets Indicator F3.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

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

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

Remarks: Wetted channel is variably 5 to 8 feet wide in this area. Plot taken approximately 3 vertical feet above channel bottom. No saturation at 18 inches; mole activity nearby suggests terrace is generally dry even in winter.

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

Project/Site: Bull Run Filtration Project City/County: Multnomah Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau State: OR Sampling Point: Plot 8
Investigator(s): TB / ACS Section, Township, Range: T1S R4E Section 23 TL 1400
Landform (hillslope, terrace, etc.): Toe of slope Local relief (concave, convex, none): Flat Slope (%): 2%
Subregion (LRR): A - Western MVC Lat: 45.4615 Long: -122.2844 Datum: City of Portland Datum
Soil Map Unit Name: Cazadero silty clay loam, 0-8% NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	___	No	X
Hydric Soil Present?	Yes	X	No	___
Wetland Hydrology Present?	Yes	___	No	X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks: Plot taken near an excavated pond.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1. Agrostis stolonifera	80	X	FAC
2. Dactylis glomerata	20	X	FACU
3. Hypochaeris radicata	T		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	80	x 3 =	240
FACU species	20	x 4 =	80
UPL species		x 5 =	
Column Totals:	100 (A)		320 (B)

Prevalence Index = B/A = 3.20

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: Near excavated pond

SOIL

Sampling Point: Plot 8

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-10	10YR 4/2	100					Silty clay loam	
10-18	10YR 4/2	88	10YR 4/4	10	C	M	Silty clay loam	
			10YR 2/1	2	C	M		Mn masses

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks: Friable soil

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes ___ X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

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

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

Remarks: Upslope of Plot 8a.

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

Project/Site: Bull Run Filtration Project City/County: Multnomah Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau State: OR Sampling Point: Plot 8a
Investigator(s): TB / ACS Section, Township, Range: T1S R4E Section 23C
Landform (hillslope, terrace, etc.): Toe of slope Local relief (concave, convex, none): Flat Slope (%): 2%
Subregion (LRR): A - Western MVC Lat: 45.4615 Long: -122.2844 Datum: City of Portland Datum
Soil Map Unit Name: Cazadero silty clay loam, 0-8% NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes	X	No	**Is the Sampled Area within a Wetland?** **Yes X No**
Wetland Hydrology Present?	Yes	X	No	

Remarks: Plot taken in an undisturbed area at the interface of a mature Douglas fir/bigleaf maple forest and to the south and a large agricultural field to the north. Residential use to the east up to Lusted Road. This plot was taken at the bottom end of an excavated ditch.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5'r)			
1. Agrostis stolonifera	85	X	FAC
2. Dactylis glomerata	15		FACU
3. Hypochaeris radicata	T		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

fs

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes X No

Remarks: Near excavated pond

SOIL

Sampling Point: Plot 8a

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-10	10YR 4/2	100					Silty clay loam	
10-18	10YR 4/2	88	10YR 4/4	10	C	M	Silty clay loam	
			10YR 2/1	2	C	M		Mn masses

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks: Friable soil

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes 16 No ___ Depth (inches): ___

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

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

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

Remarks: Likely near the upper extent of wetland hydrology.

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

Project/Site: Bull Run Filtration Project | City/County: Multnomah | Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau | State: OR | Sampling Point: Plot 9
Investigator(s): TB / ACS | Section, Township, Range: T1S R4E Section 23C
Landform (hillslope, terrace, etc.): Toe of slope | Local relief (concave, convex, none): Flat | Slope (%): 2%
Subregion (LRR): A - Western MVC | Lat: 45.4615 | Long: -122.2844 | Datum: City of Portland Datum
Soil Map Unit Name: Cazadero silty clay loam, 0-8% | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ___	No X	**Is the Sampled Area within a Wetland?**	**Yes ___ No X**
Hydric Soil Present?	Yes ___	No X		
Wetland Hydrology Present?	Yes ___	No X		

Remarks: Plot taken in an undisturbed area at the interface of a mature Douglas fir/bigleaf maple forest and to the south and a large agricultural field to the north. Residential use to the east up to Lusted Road.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer macrophyllum	50	X	FACU
2.			
3.			
4.			
	50	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15'r)			
1. Sambucus racemosa	20	X	FACU
2. Rubus spectabilis	5		FAC
3. Oemleria cerasiformis	5		FACU
4.			
5.			
	30	= Total Cover	
Herb Stratum (Plot size: 5'r)			
1. Tellima grandiflora	30	X	FACU
2. Polystichum munitum	10	X	FACU
3. Rubus armeniacus	5		FAC
4. Ranunculus repens	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50	= Total Cover	
Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 50

fs

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	15	x 3 =	45
FACU species	115	x 4 =	460
UPL species	0	x 5 =	0
Column Totals:	130 (A)		505 (B)

Prevalence Index = B/A = 3.88

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: Forest edge, near transition to drive aisle adjacent to agricultural uses.

SOIL

Sampling Point: Plot 9

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 3/2	100					Silty clay loam	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes ___ X Depth (inches): _____

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

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

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

Remarks: No surface indicators

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

Project/Site: Bull Run Filtration Project | City/County: Multnomah | Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau | State: OR | Sampling Point: Plot 9a
Investigator(s): TB / ACS | Section, Township, Range: TS1 R4E Section 23C TL 1400
Landform (hillslope, terrace, etc.): Toe of slope | Local relief (concave, convex, none): Flat | Slope (%): 2%
Subregion (LRR): A - Western MVC | Lat: 45.4615 | Long: -122.2844 | Datum: City of Portland Datum
Soil Map Unit Name: Cazadero silty clay loam, 0-8% | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes	X	No	**Is the Sampled Area within a Wetland?** **Yes X No**
Wetland Hydrology Present?	Yes	X	No	

Remarks: Plot taken in an undisturbed area at the interface of a mature Douglas fir/bigleaf maple forest and to the south and a large agricultural field to the north. Residential use to the east up to Lusted Road. This plot was taken at the bottom end of an excavated ditch.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15'r)			
1. Rubus spectabilis	2		FAC
2.			
3.			
4.			
5.			
	2	= Total Cover	
Herb Stratum (Plot size: 5'r)			
1. Ranunculus occidentalis	80	X	FACW
2. Dactylis glomerata	20	X	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	80	x 2 =	160
FAC species	2	x 3 =	6
FACU species	20	x 4 =	80
UPL species	0	x 5 =	0
Column Totals:	102 (A)		246 (B)

Prevalence Index = B/A = 2.41

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes X No ___

Remarks: Bottom of ditch where it fans out at the toe of slope.

SOIL

Sampling Point: Plot 9a

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-18	10YR 4/2	78	10YR 4/4	20	C	M	Silty clay loam	"bullseye" Fe concentration around black Mn masses
			10YR 2/1	2	C	M		

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks: Friable soil

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present?	Yes	___	No	X	Depth (inches):	___
Water Table Present?	Yes	X		___	Depth (inches):	12
Saturation Present? (includes capillary fringe)	Yes	X	No	___	Depth (inches):	9

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

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

Remarks: Ditch is vegetated and shows no evidence of flowing water.

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

Project/Site: Bull Run Filtration Project City/County: Multnomah Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau State: OR Sampling Point: Plot 10
Investigator(s): TB / ACS Section, Township, Range: 1S 3E 23C TL 1500
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): concave Slope (%): 10%
Subregion (LRR): A - Western MVC Lat: 45.4620 Long: -122.2858 Datum: City of Portland Datum
Soil Map Unit Name: Cazadero silty clay loam, 0-8 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	___	No	X
Hydric Soil Present?	Yes	___	No	X
Wetland Hydrology Present?	Yes	___	No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks: Plot taken at the upper end of a swale that drains downslope to the north.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1. Anthoxanthum odoratum	80	X	FACU
2. Lotus corniculatus	20		FAC
3. Schedonorus arundinaceus	10		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	110	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

fs

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species	30	x 3 =	90
FACU species	80	x 4 =	320
UPL species		x 5 =	
Column Totals:	110 (A)		410 (B)

Prevalence Index = B/A = 3.73

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: Top of swale

SOIL

Sampling Point: Plot 10

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/2	100					Silt loam	
12-18	10YR 4/2	90	10YR 4/4	10	C	M	Silt loam	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks: Friable soil; weakly hydric

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

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

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

Remarks: Above upper extent of wetland hydrology at top of draw. No saturation or water table.

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

Project/Site: Bull Run Filtration Project | City/County: Multnomah | Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau | State: OR | Sampling Point: Plot 10a
Investigator(s): TB / ACS | Section, Township, Range: 1S 3E 23C TL 1500
Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): concave | Slope (%): 10%
Subregion (LRR): A - Western MVC | Lat: 45.4620 | Long: -122.2858 | Datum: City of Portland Datum
Soil Map Unit Name: Cazadero silty clay loam, 0-8 percent slopes | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes	X	No	**Is the Sampled Area within a Wetland?** **Yes X No**
Wetland Hydrology Present?	Yes	X	No	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1. Anthoxanthum odoratum	40	X	FACU
2. Schedonorus arundinaceus	30	X	FAC
3. Lotus corniculatus	20	X	FAC
4. Juncus effusus	10		FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

fs

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes X No ___**

Remarks: Below plot 10 near the upper extent of the swale, in the bottom of the swale cross-section.

SOIL

Sampling Point: Plot 10a

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-14	10YR 4/2	88	10YR 4/3-4/6	10	C	M	Silt loam	
			7.5YR 2/1	2	C	M		Mn masses

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks: Friable soil

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): 8

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

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

Remarks: Seep in topographic draw. Wetland boundary established where soils indicators dropped below 10 inches.

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

Project/Site: Bull Run Filtration Project City/County: Multnomah Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau State: OR Sampling Point: Plot 11
Investigator(s): TB / ACS Section, Township, Range: 1S 3E 23C TL 1500
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): concave Slope (%): 10%
Subregion (LRR): A - Western MVC Lat: 45.4620 Long: -122.2858 Datum: City of Portland Datum
Soil Map Unit Name: Cazadero silty clay loam, 0-8 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present? Yes X No ___
Hydric Soil Present? Yes X No ___
Wetland Hydrology Present? Yes X No ___

Is the Sampled Area within a Wetland? Yes X No ___

Remarks: Sideslope of draw

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5'r)			
1. Poa pratensis	70	X	FAC
2. Holcus lanatus	20	X	FAC
3. Ranunculus repens	5		FAC
4. Lotus corniculatus	5		FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

fs

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

SOIL

Sampling Point: Plot 11

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-8	10YR 4/2	90	10YR 4/4	5	C	M	Silt loam	
			10YR 4/1	5	D	M		
8-18	10YR 4/2	78	10YR 4/4	10	C	M	Silty clay loam	
			10YR 4/1	10	D	M		
			2/5YR 5/4	2	C			Fe concs

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): surface

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

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

Remarks: Seep in topographic draw.

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

Project/Site: Bull Run Filtration Project | City/County: Multnomah | Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau | State: OR | Sampling Point: Plot 11a
Investigator(s): TB / ACS | Section, Township, Range: 1S 3E 23C TL 1500
Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): concave | Slope (%): 10%
Subregion (LRR): A - Western MVC | Lat: 45.4620 | Long: -122.2858 | Datum: City of Portland Datum
Soil Map Unit Name: Cazadero silty clay loam, 0-8 percent slopes | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks: Higher ground above draw

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	80	X	FAC
2.			
3.			
4.			
	80	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1. Poa pratensis	50	X	FAC
2. Schedonorus arundinaceus	25	X	FAC
3. Anthoxanthum odoratum	10		FACU
4. Holcus lanatus	10		FAC
5. Ranunculus repens	5		FAC
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks:

SOIL

Sampling Point: Plot 11a

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-5	10YR 4/2	100					Silt loam	
5-15	10YR 4/2	96	7.5YR 4/3	2	C	M	Silt loam	
			10YR 4/4	2	C	M		

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

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

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

Remarks: Above seepage zone.

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

Project/Site: Bull Run Filtration Project | City/County: Multnomah | Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau | State: OR | Sampling Point: Plot 12
Investigator(s): TB / ACS | Section, Township, Range: 1S 3E 23C TL 1500
Landform (hillslope, terrace, etc.): Swale | Local relief (concave, convex, none): concave | Slope (%): 10%
Subregion (LRR): A - Western MVC | Lat: 45.4620 | Long: -122.2858 | Datum: City of Portland Datum
Soil Map Unit Name: Bull Run silt loam, 8 – 30% | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes	X	No	**Is the Sampled Area within a Wetland?** **Yes X No**
Wetland Hydrology Present?	Yes	X	No	

Remarks: Near bottom of swale.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1. Ranunculus repens	80	X	FAC
2. Holcus lanatus	15		FAC
3. Schedonorus arundinaceus	5		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes X No ___**

Remarks:

SOIL

Sampling Point: Plot 12

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-5	10YR 4/2	100					Silty clay loam	
5-10	10YR4/2	80	10YR 5/8	15	C	M	Silty clay loam	
			10YR 5/3	5	C	M		
			7.5YR 2/1	<1				Soft Mn
								masses

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: Rock

Depth (inches): 10

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present?	Yes	___	No	X	Depth (inches): ___
Water Table Present?	Yes	___	No	X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes	X	No	___	Depth (inches): 8

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

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

Remarks: Plot taken above low-flow channel in swale.

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

Project/Site: Bull Run Filtration Project | City/County: Multnomah | Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau | State: OR | Sampling Point: Plot 12a
Investigator(s): TB / ACS | Section, Township, Range: 1S 3E 23C TL 1500
Landform (hillslope, terrace, etc.): Side slopes | Local relief (concave, convex, none): none | Slope (%): 10%
Subregion (LRR): A - Western MVC | Lat: 45.4620 | Long: -122.2858 | Datum: City of Portland Datum
Soil Map Unit Name: Cazadero silty clay loam, 8-15 percent slopes | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	___	No	X
Hydric Soil Present?	Yes	___	No	X
Wetland Hydrology Present?	Yes	___	No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks: Plot taken on swale sideslope, above influence of water in swale.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	50	X	FAC
2.			
3.			
4.			
	50	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1. Polystichum munitum	30	X	FACU
2. Oxalis oregana	20	X	FACU
3. Dactylis glomerata	15	X	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	65	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1. Rubus ursinus	20	X	FACU
2.			
	20	= Total Cover	

% Bare Ground in Herb Stratum 20

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 20 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species	50	x 3 =	150
FACU species	85	x 4 =	340
UPL species		x 5 =	
Column Totals:	135 (A)		490 (B)

Prevalence Index = B/A = 3.63

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: Rubus growing along ground is acting as a groundcover.

SOIL

Sampling Point: Plot 12a

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 5/3	100					Silt loam	
10-18	10YR5/3	85	10YR 4/6	15	C	M	Silt loam	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

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

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

Remarks: Plot taken well above influence of water in swale.

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

Project/Site: Bull Run Filtration Project | City/County: Multnomah | Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau | State: OR | Sampling Point: Plot 13
Investigator(s): TB / ACS | Section, Township, Range: 1S 3E 23C TL 1500
Landform (hillslope, terrace, etc.): Swale | Local relief (concave, convex, none): concave | Slope (%): 2%
Subregion (LRR): A - Western MVC | Lat: 45.4620 | Long: -122.2858 | Datum: City of Portland Datum
Soil Map Unit Name: Cazadero silty clay loam, 8-15 percent slopes | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes X No ___	**Is the Sampled Area within a Wetland?** **Yes X No ___**
Hydric Soil Present?	Yes X No ___	
Wetland Hydrology Present?	Yes X No ___	

Remarks: Near bottom of swale at second crossing

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5'r)			
1. Ranunculus repens	75	X	FAC
2. Oenanthe sarmentosa	15		OBL
3. Lysichiton americanum	5		OBL
4. Phalaris arundinacea	5		FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes X No ___**

Remarks:

SOIL

Sampling Point: Plot 13

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	100					Silty clay loam	
4-20	10YR 3/2	80	10YR 4/4	15	C	M	Silty clay loam	
			10YR 4/1	5	D	M		

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present?	Yes	___	No	X	Depth (inches): ___
Water Table Present?	Yes	X	No	___	Depth (inches): 20
Saturation Present? (includes capillary fringe)	Yes	X	No	___	Depth (inches): 8

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

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

Remarks: Plot taken above low-flow channel in swale bottom, in wider wetland margin above low-flow channel.

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

Project/Site: Bull Run Filtration Project | City/County: Multnomah | Sampling Date: 4/7/2020
Applicant/Owner: Portland Water Bureau | State: OR | Sampling Point: Plot 13a
Investigator(s): TB / ACS | Section, Township, Range: 1S 3E 23C TL 1500
Landform (hillslope, terrace, etc.): Swale slope | Local relief (concave, convex, none): concave | Slope (%): 5%
Subregion (LRR): A - Western MVC | Lat: 45.4620 | Long: -122.2858 | Datum: City of Portland Datum
Soil Map Unit Name: Cazadero silty clay loam, 8-15 percent slopes | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	___	No	X
Hydric Soil Present?	Yes	___	No	X
Wetland Hydrology Present?	Yes	___	No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks: Near bottom of swale at second crossing, above Plot 13.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	25	X	FAC
2.			
3.			
4.			
	25	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1. Oemleria cerasiformis	5	X	FACU
2.			
3.			
4.			
5.			
	5	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1. Ranunculus repens	35	X	FAC
2. Lapsana communis	30	X	FACU
3. Poa sp.	20	X	FAC
4. Polystichum munitum	15		FACU
5. Schedonorus arundinaceus	5		FAC
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1. Rubus laciniatus	5	X	FACU
2.			
	5	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 6 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: Higher ground on the slope of the swale, above influence of water in low flow channel.

SOIL

Sampling Point: Plot 13a

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	10YR 3/2	100					Silty clay loam	
12-18	10YR 3/2	80	10YR 4/2	5	D	M	Silty clay loam	
			10YR 4/6	10	C	M		
			7.5YR 2/1	<1				Mn masses

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks: Borderline hydric.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

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

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

Remarks: Plot taken above low-flow channel in swale bottom. No saturation at 18 inches.

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

Project/Site: Bull Run Filtration Project City/County: Multnomah Sampling Date: 3/5/2021
Applicant/Owner: Portland Water Bureau State: OR Sampling Point: Plot 14
Investigator(s): TB / ACS Section, Township, Range: T1S R4E Section 26 TL 5000
Landform (hillslope, terrace, etc.): Draw Local relief (concave, convex, none): Concave Slope (%): 5%
Subregion (LRR): A - Western MVC Lat: 45.4560 Long: -122.2904 Datum: City of Portland Datum
Soil Map Unit Name: Cottrell silty clay loam, 2 to 8% slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks: Plot taken above ditch beside farm access road.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1. Acer macrophyllum	40	X	FACU
2.			
3.			
4.			
	40	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1. Agrostis stolonifera	50	X	FAC
2. Lapsana communis	T		FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1. Rubus armeniacus	10	X	FAC
2.			
	10	= Total Cover	

% Bare Ground in Herb Stratum 40

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes X No ___

Remarks: Plot taken adjacent to unvegetated roadside ditch. Acer macrophyllum forest to east.

SOIL

Sampling Point: Plot 14

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 3/3	100					Silt loam	
12-18	5YR 4/3	100					Silty clay loam	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks: Near the upper extent of mapped hydric soil polygon. No redox features or other hydric soil indicators observed.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes ___ No X Depth (inches): 16

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): 14

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

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

Remarks: Adjacent to ditch. Ditch is approximately 1 foot wide, widening to 3 feet at the north end. Shallow flowing water in ditch. Water is collected in a ditch inlet and exported from site, likely in the nursery drainage network. Ditch is jurisdictional based on observation of flowing water during the early part of the growing season in a mapped hydric soil.

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

Project/Site: Bull Run Filtration Project | City/County: Multnomah | Sampling Date: 10/19/2021
Applicant/Owner: Portland Water Bureau | State: OR | Sampling Point: Plot 15
Investigator(s): TB / ACS | Section, Township, Range: T1S R4E Section 22DD TL 400
Landform (hillslope, terrace, etc.): Hillslope | Local relief (concave, convex, none): none | Slope (%): 5%
Subregion (LRR): A - Western MVC | Lat: 45.4561 | Long: -122.3003 | Datum: City of Portland Datum
Soil Map Unit Name: Wollent silt loam | NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? Yes ___ No X

Remarks: Nursery. Area used to grow Picea pungens (FAC). Local topography slopes gently to the west.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1. Picea pungens	20	X	FAC
2.			
3.			
4.			
	20	= Total Cover	

Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	

Herb Stratum (Plot size: 5'r)			
1. Lolium perenne	60	X	FAC
2. Hypochaeris radicata	25	X	FACU
3. Taraxacum officinale	5		FACU
4. Plantago lanceolata	5		FACU
5. Trifolium repens	5		FAC
6.			
7.			
8.			
9.			
10.			
11.			
	105	= Total Cover	

Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes X No ___

Remarks: Field of Picea pungens grown as a nursery crop. Understory is a mix of weedy pioneer species and species planted for cover cropping and erosion control. Vegetation weakly hydric. Would not pass Prevalence Index.

SOIL

Sampling Point: Plot 15

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-12	7.5YR 3/3	100					Silty clay loam	Friable
12-24	7.5YR 3/3	95	7.5YR 4/3	5	D	M	Silty clay loam	Friable

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

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

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

Remarks: No saturation or water table observed to a depth of 24 inches. Plot located outside of drive aisle to avoid compacted soil. No apparent swale or other landform that would collect hydrology. Visual observation of roadside ditch on adjacent property exhibited no evidence of surface saturation or ponding at the present time.

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

Project/Site: Bull Run Filtration Project City/County: Multnomah Sampling Date: 10/19/2021
Applicant/Owner: Portland Water Bureau State: OR Sampling Point: Plot 16
Investigator(s): TB / ACS Section, Township, Range: T1S R4E Section 21A TL 900
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): none Slope (%): 10%
Subregion (LRR): A - Western MVC Lat: 45.4760 Long: -122.3190 Datum: City of Portland Datum
Soil Map Unit Name: Cornelius silt loam, 8 to 30% slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes		No	X
Wetland Hydrology Present?	Yes		No	X

Is the Sampled Area within a Wetland? **Yes** ___ **No** X

Remarks: Plot in road right-of-way near a discharge point for water collected from nursery drainage system. Water enters this excavated low spot through a large PVC stand pipe and is subsequently recollected by an area drain. The drain appears to export water north, to a tributary of Beaver Creek.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5'r)			
1. Geranium molle	10	X	NL
2. Cardamine oligosperma	5	X	FAC
3. Unid grass seedlings	5	X	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	20	= Total Cover	
Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 80

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: Excavated ditch used to manage drainage from nursery fields. Mostly unvegetated.

SOIL

Sampling Point: Plot 16

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	7.5YR 3/3	100					Silt loam	Friable
8-18	7.5YR 3/3	95	7.5YR 4/4	5	C	M	Silt loam	Friable

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

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

Remarks: Cornelius silt loam is non-hydric. Redox features here are likely an artifact of the discharge of drainage system water into this area prior to export via the area drain and culvert under Lusted Road.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

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

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

Remarks: No saturation or water table observed to a depth of 18 inches. No evidence of ponding, though ponding possible based on the invert elevations of the culvert and area drain relative to the bottom of this pocket.

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

Project/Site: Bull Run Filtration Project City/County: Multnomah Sampling Date: 1/28/2022
Applicant/Owner: Portland Water Bureau State: OR Sampling Point: Plot 17
Investigator(s): TB / ACS Section, Township, Range: T1S R4E Section 21A TL 900
Landform (hillslope, terrace, etc.): Roadside ditch Local relief (concave, convex, none): Concave Slope (%): 3%
Subregion (LRR): A - Western MVC Lat: 45.4769 Long: -122.3265 Datum: City of Portland Datum
Soil Map Unit Name: Wollent silt loam NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes		No	**Is the Sampled Area within a Wetland?** **Yes** ___ **No** ___
Wetland Hydrology Present?	Yes		No	

Remarks: ROUTINE OFFSITE METHOD: Data taken from right-of-way. No subsurface sampling.
Roadside ditch in mapped hydric soil at low point of ditch along Altman Drive. Indistinct swale leads to ditch, visible on aerial photo. Ditch inlet conveys water from east into drainage system on west side of Altman Drive.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 15'r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15'r)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5'r)			
1. Agrostis stolonifera	30	X	FAC
2. Poa pratensis	20	X	FAC
3. Taraxacum officinale	15		FACU
4. Epilobium ciliatum	5		FAC
5. Cardamine oligosperma	10		FAC
6. Unidentified forb seedlings	20	X	FAC
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 5)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: Excavated ditch. Vegetation community meets Dominance test but fails Prevalence Index. Lack of FACW and wetter species suggests ditch does not experience prolonged wet conditions.

SOIL

Sampling Point: Plot 17

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

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

Remarks: Plot taken in isolated lobe of hydric soil.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Water Table Present? Yes ___ No ___ Depth (inches): N/A

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): N/A

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

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

Remarks: Plot taken at low point of ditch along Altman Road. Roadway runoff and local sheet flow enter the ditch. An area drain collects water and pipes it under the road to the west. Water does not daylight on the west side of the road. Ditch is well vegetated and shows no evidence of standing or flowing water, suggesting water entering this area does not persist and is conveyed directly rather than forming prolonged anaerobic conditions. Consequently, we believe this plot does not meet the wetland hydrology parameter.

APPENDIX C

Ground Level Photographs

Photopoint 1: Below embankment along Dodge Park Boulevard. Steep slope down to agricultural field. Water collects along the slope and converges to this point, where water is collected in a culvert and exported.

Photopoint 2: Culvert discharging from under Dodge Park Boulevard flows briefly at the surface before entering another culvert system. The break is to allow water from along the embankment to drain into the daylighted area and drain from the area.

Photopoint 3: Headwater of Beaver Creek discharging from Cottrell Road culvert.

Photopoint 4: Headwater of Beaver Creek. No evidence of flow outside of stream channel. Plot 7 is just outside frame to the left; Plot 6 is in the tree grove in the background of the picture.

Photopoint 5: Near Plot 6, looking downstream at Beaver Creek. Sideslopes are steeper here than near Cottrell Road.

Photopoint 6: Headwater of Beaver Creek, east of Cottrell Road looking south. Water flows in from the left, collecting in the pond in the background. High flows travel through a small swale in the foreground and conveyed under Cottrell Road.

Photopoint 7: Looking southwest at a farm access road that passes between the two ponds (Waters 2 and 3 on Figure 5c). A concrete culvert conveys water from left to right under the road.

Photopoint 8: Water 3, downstream of access road culvert on Figure 5c. Water sources include backflow from stream and discharge into the pond from the vertical sideslopes created by excavation.

Photopoint 9: Looking at Plots 8 and 8a (Figure 5c). Herbaceous wet area.

Photopoint 10: Head of draw characterized by Plots 10/10a and 11/11a. No defined channel in swale.

Photopoint 11: Unnamed tributary part of Water 3, downstream Water 2 (Figure 5c).

Photopoint 12: Old water control structure on Water 3, downstream of ponds.

Photopoint 13: Lusted Road property, downstream of confluence of draw and tributary.

Photopoint 14: Driveway culvert at low end of drainage.

Photopoint 15: Roadside ditch/Water 4; Figure 5d. Low end of farm access road ditch during rainstorm. Plot 14 taken above ditch at edge of tree grove. Ditch inlet obscured by debris.

Photopoint 16: Southern end of ditch. Water flows in from upslope and sheet flow from adjacent farm access road.

Photopoint 17: Roadside ditch on east side of Altman Drive, looking south. Vegetation is consistent along ditch. Green aerial signature is a drive aisle lacking evidence of flowing water. Water is captured in ditch inlet and flows west into drainage system. Plot 17 taken at ditch inlet (Routine OFFSITE)

Photopoint 18: Opposite side of Altman Drive from Photopoint 17. Water from ditch above does not daylight, but is captured in a drainage system under the property west of Altman Drive.

Photopoint 19: Plot 15 lies in an area of active nursery activity within the proposed filtration facility site. Soil was friable and well drained, and lacking indicators of wetland hydrology.

Photopoint 20: Plot 16 was taken in the low spot next to the stand pipe and area drain. Roadside ditch that drains into a small basin. Water is collected into the area drain and exported under Lusted Road to Beaver Creek.

APPENDIX D

Aerial Photograph

Bull Run TREATMENT PROJECTS | Filtration

Appendix D. Aerial Photo

Study Area | Tax Lots

1 inch = 0.25 Miles

0 500 1,000 2,000 3,000 4,000 Feet

N

Coordinate System: NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

APPENDIX E

Literature Cited

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Attachment 2

Habitat Evaluation Procedures

Citation: 870 FW 1
FWM Number: 241
Date: Mar 20, 1996
Originating Office: Division of Environmental Review

1.1 Purpose. The purpose of this chapter is to provide policy, standards, and guidance for application of the Habitat Evaluation Procedures (HEP) in the Fish and Wildlife Service.

1.2 Objectives. The application of HEP will implement standardized procedures for evaluating project impacts, on both terrestrial and inland aquatic habitats, and for comparing alternative plans or projects.

1.3 Description. HEP is a habitat-based approach for assessing environmental impacts of proposed water and land resource development projects. The method can be used to document the quality and quantity of available habitat for selected wildlife species. The procedures provide information for two general types of wildlife habitat comparisons: the relative value of different areas at the same point in time; and the relative value of the same areas at future points in time. By combining the two types of comparisons, the impact of proposed or anticipated land and water use changes on wildlife habitat can be quantified.

1.4 Application. HEP may be used to assess impacts of Federal water and land resource projects or programs, as required by the Fish and Wildlife Coordination Act such as projects conducted by the U.S. Army Corps of Engineers or the Bureau of Reclamation, or licensed by the Federal Energy Regulatory Commission; as well as planning studies of the Natural Resources Conservation Service, Bureau of Land Management, and U.S. Forest Service. In addition, HEP can be applied to the planning activities of Federal agencies, particularly when the Service is involved as a cooperating agency under the Council on Environmental Quality's Regulations for implementing the National Environmental Policy Act.

1.5 Responsibilities.

A. The Assistant Director - Ecological Services establishes HEP policy, standards, and guidance. The Assistant Director is assisted by the Division of Habitat Conservation which considers all comments concerning effectiveness of policy and standards for meeting objectives and recommends or makes appropriate changes through the Assistant Director.

B. Regional Directors are, where appropriate, responsible for utilizing HEP in accordance with the provisions of this chapter.

1.6 The Habitat Evaluation Procedures.

A. HEP was developed in 1980 in response to the need to document the nonmonetary value of fish and wildlife resources. HEP evolved from an assessment method developed in Missouri (Daniels and Lamaire 1974) and is based on the fundamental assumption that habitat quality and quantity can be numerically described. Numerical description permits options and alternatives to be compared when numerical changes are the essence of impact assessment.

B. HEP is a species-habitat approach to impact assessment; and habitat quality for selected evaluation species is documented with an index, the Habitat Suitability Index (HSI). This value is derived from an evaluation of the ability of key habitat components to supply the life requisites of selected species of fish and wildlife. Evaluation involves using the same key habitat components to compare existing habitat conditions and optimum habitat conditions for the species of interest. Optimum conditions are those associated with the highest potential densities of the species within a defined area. The HSI value obtained from this comparison thus becomes an index to carrying capacity for that species.

C. The index ranges from 0.0 to 1.0, and for operational purposes in HEP, each increment of change must be identical to any other. For example, a change in HSI from 0.1 to 0.2 must represent the same magnitude of change as a change from 0.2 to 0.3, and so forth. Therefore, HSI must be linearly related to carrying capacity. This is an operational restriction imposed by the use of HSI in HEP. However, it is a restriction easily complied with; if the relationship between HSI and carrying capacity is unknown, it is assumed to be linear. If the relationship is nonlinear, it is converted to a linear function.

D. HEP attempts to incorporate concepts from both the population and habitat theories by evaluating habitat quality for specific species. HSI values are obtained for individual species through use of documented habitat suitability models employing measurable key habitat variables (e.g., percent canopy closure). The HSI values are multiplied by area of available habitat to obtain Habitat Units (HU's) for individual species. These values are used in the HEP system for comparative purposes. No aggregation of species' HSI (or HU's) occurs.

E. Many potential users tend to consider the HSI value as synonymous with the entire HEP system. This is not the case. HEP can be compared to a bookkeeping ledger; both passively display and document values obtained from other sources. HEP is a data management system; it is the data it

manages, i.e., the index of quality and the quantity of available habitat, which are of interest in impact assessment.

1.7 Attributes and Limitations of the HEP.

A. Various forms are used in HEP to display and document HSI, area, and HU's for each evaluation species. Comparisons can be made either between two areas at one point in time, or for one area for several points in time, for any proposed action. However, the ability to document data and ultimately compare alternatives is not unique to the HEP system.

B. The differences in quality (HSI) and quantity (area) between existing habitat conditions (baseline) and various projected future sets of conditions document project-related impacts for selected evaluation species. HEP currently does not provide guidance for performing future projections; therefore, projected impacts are no better than the user's ability to predict future conditions.

C. HEP can be applied at any level of assessment. However, data requirements and costs increase as more species are considered and their respective habitat models become more complex. HSI models not only provide an index value of quality, but also document which habitat variables were considered and their respective values. The level of detail for such "models" must fit the user's objectives for impact assessment.

D. The identification of differing types and magnitudes of impacts is dependent on the validity and sensitivity of the HSI models used to generate data for HEP. As with other approaches, the results of an impact assessment employing HEP are no better than the reliability of resource data used.

E. HU's serve not only as the principal units of comparison in HEP, but also as a standard vehicle of communication, integrating both quality and quantity of habitat. Changes in HU's represent potential impacts from proposed actions. Such changes are annualized in order to be comparable with the action agencies' benefit/cost analyses. Applications of annualized HU's include impact assessments, compensation studies, and human use analyses. In such analyses, one HU lost for a species must be directly comparable to one HU gained for that species. The latter association explains the requirement for a linear relationship between HSI and carrying capacity.

F. HEP is a species-based assessment methodology. It is applicable only for the species evaluated and does not directly relate that species with other ecosystem components. HEP conceptually addresses only the issues of species populations and habitat. However, the degree to which these indicators are addressed by HEP is dictated by the HSI models. Through improved HSI models, it may be possible to more completely treat the remaining issues of biological integrity and environmental values.

G. In summary, the HU data developed are the essence of the HEP methodology. The identified changes in habitat quality and quantity provide the basis for biologists to compare alternatives for the evaluation species selected. HEP is a convenient means of documenting and displaying, in standard units, the predicted effects of proposed actions. It is a tool available to resource managers who must make knowledgeable decisions.

1.8 Conduct of Evaluations.

A. General. The HEP may be used as a basic tool for evaluating project impacts on fish and wildlife resources and as a basis for formulating subsequent recommendations for mitigation, including fish and wildlife resources management planning, except for cases where:

(1) Time constraints are such that applying HEP would not be possible;

(2) Adequate funds (transfer or otherwise) are not available;

(3) The project size or impacts are expected to be relatively insignificant; or

(4) The project is not deemed appropriate for application of HEP.

B. Interdisciplinary Planning Teams. Maximum effort will be made to conduct HEP evaluations using interdisciplinary planning teams consisting of biologists from the Service, the Federal action agency, the appropriate State fish and wildlife agency, and any other affected agency or party.

C. Secondary Impacts. In reviewing projects or other proposals, and whenever practicable, the planning team will evaluate the total impact of the development, including any part located on uplands and any secondary fish and wildlife impacts.

D. Endangered/Threatened Species. The consideration of endangered and threatened species in project planning is required by Section 7 of the Endangered Species Act of 1973, as amended, and related regulations. Thus, to avoid any possibility of confusion with the consultation requirements of Section 7 of the Endangered Species Act, no federally-listed endangered or threatened species should be used as an evaluation species in a HEP study.

E. Documentation. Each HEP will include documentation of study objectives, assumptions, level of acceptance for Habitat Suitability Index (HSI) models and compensation objectives and goals, as appropriate. This documentation will be included as an integral part of any FWCA report based on a HEP evaluation.

1.9 Handbook.

A. The HEP handbook is issued by the Assistant Director - Ecological Services. It contains specific and detailed guidance on applying and implementing HEP, and consists of three chapters:

Habitat as a Basis for Environmental Assessment (formerly 101 ESM) September, 15, 1980.

Habitat Evaluation Procedures (formerly 102 ESM) March 31, 1980.

Standards for the Development of Habitat Suitability Index Models (formerly 103 ESM) April 10, 1981.

Attachment 3a

Habitat Evaluation Procedures Methodology and Representative Wildlife Species (Updated)

The USFWS developed Habitat Evaluation Procedures (HEP) for analyzing the impacts of development on water and land resources (USFWS 1980). The HEP methodology assesses the quality and quantity of available habitat for representative wildlife species. Using HEP, the relative value of habitat at a site before and after a project can be quantified and compared to determine the impact of land use changes.

In the absence of specific habitat assessment methodology requirements by Multnomah County, HEP was determined to be an appropriate method for comparing the relative quality and quantity of habitat for a range of wildlife species in the project area. No site-specific species presence/absence data are required, and habitat suitability can be evaluated based on the vegetation communities present and land use cover types (e.g., forest land, grassland, etc.).

Standard HEP methods rely on existing habitat models that rate habitat suitability according to a few optimal characteristics; however, this Plan applies a modified HEP approach where habitat suitability is ranked according to expected use of habitats by selected wildlife species that are known or suspected to occur in the project area and vicinity. Originally eight species were chosen to represent a range of behaviors, life histories, and habitat needs: little brown bat, bobcat, Roosevelt elk, downy woodpecker, red-legged frog, red-tailed hawk, white-crowned sparrow, and western bumble bee. This update adds five additional species: bald eagle, northern spotted owl, Oregon slender salamander, short-eared owl, and streaked-horned lark.

Under the HEP evaluation the value of a habitat for a selected species or the value of a community can be described using a Habitat Suitability Index (HSI). This HSI value (which ranges from 0 to 1.0) is multiplied by the area of available habitat to obtain Wildlife Habitat Units (WHUs). The area of pre- and post-project wildlife habitats adjacent to the Filtration Facility Site was calculated using aerial imagery and geographic information systems (GIS). The area of the pre- and post-project habitats at the Filtration Facility Site was calculated using surveyed parcel boundaries and computer-aided design (CAD).

HSIs for this analysis were formulated according to anticipated use / expected habitat suitability of the different habitat types present in the project area both pre- and post-project. Scores were generated based on best professional judgment and the author's understanding of the foraging and breeding requirements of the selected species. Conservative assumptions were made for the HSI assignments; meaning, pre-construction conditions were assumed to be at least somewhat favorable for the species if there was any justification or likelihood of occurrence. Refer to the descriptions below for a summary of the habitat needs for each species. Habitat quality was categorized using the following scale:

0 No or negligible habitat use and/or no habitat suitability.

0.1 Very low and/or degraded habitat suitability.

0.3 Some to moderately low habitat use and/or marginal habitat suitability.

0.7 Moderately high habitat use and/or moderately high habitat suitability.

1.0 High habitat use and/or high habitat suitability.

Habitat use was divided into foraging habitat and breeding habitat to capture a range of uses for the different habitat types. For example, the use / quality of foraging habitat for the little brown bat over the nursery land (pre-project conditions) was judged to be moderately high (0.7), whereas breeding habitat was judged to be zero (0) due to a lack of suitable hollow trees and/or structures that could be used by breeding females. A few large trees and a couple snags are present in the upland forest edge, and the potential breeding habitat for the wooded areas on the Filtration Facility Site are accounted for under the forest category. With a quantity of 89 acres of nursery land at the Filtration Facility Site, the resulting WHU would be 63 [(0.7 x 90 acres) + (0 x 90 acres)]. By tallying the total WHU pre- and post-project, the gain or loss of WHUs was determined to assess project impacts and inform mitigation measures. An overall gain in WHUs post-project would be interpreted as a gain in habitat suitability for the selected wildlife species, whereas an overall loss of WHUs would indicate that additional habitat mitigation measures may be needed.

Habitat requirements for representative wildlife species and the habitat evaluation criteria used in the HEP analysis are provided below. The focus of the habitat descriptions is on foraging and breeding habitat requirements of each of the eight species.

Little Brown Bat

Little brown bats (*Myotis lucifugus*) can be found in several different types of habitat throughout Oregon, although they appear to prefer forests and wooded areas (Maser 1998). Bats in the *Myotis* genus are the most common bats in Oregon (ODFW 2025b). Little brown bats are expected to occur in the project vicinity.

Bats are primarily insectivores that feed at dusk over grasslands, meadows, water bodies, forest edges, woodlands and riparian forests. Diet includes flies, midges, moths, and beetles. Areas with a high abundance of insects are essential for suitable foraging habitat and often include ponds, streams, rivers and lakes on-site or nearby. Water bodies also provide sources of drinking water needed by bats. Trees, especially native trees, support a variety of insects and are important sources of food for bats. Bats are expected to forage for insects over the fields, pastures, waterbodies, and forests in the project area.

Little brown bats migrate to winter hibernation sites, which typically have high humidity and remain above freezing. They breed in the fall and have delayed fertilization. Young are born in the spring or early summer and can fly after 3 weeks of age. Suitable breeding habitat for little brown bat includes hollow trees, snags, rock crevices, caves, bridges and human-made structures such as attics, barns and bat boxes. Attics are a preferred location for maternal colonies, as are hollow trees. Although they are known to use human structures for breeding, wooded areas are considered suitable breeding habitat for the purposes of the HEP analysis. Bats will also use

constructed boxes for roosting and for establishing maternal colonies. Boxes should be mounted on a high pole or high on a structure and be situated in at least partial sun.

Summary of good or suitable foraging habitat: Areas with a high abundance of insects such as water bodies with vegetation (ponds, streams, rivers, lakes), wooded areas with native trees, native grasslands and meadows. Very low to no pollutants.

Summary of good or suitable breeding habitat: Undisturbed hollow trees, snags, and human-made structures such as attics, barns and bat boxes. Bats may also use rock crevices, caves, and bridges as breeding sites.

	Little Brown Bat – Habitat Suitability Criteria	
Rating	**Foraging Habitat**	**Breeding Habitat**
0	No or negligible foraging habitat use/suitability is assumed to include paved areas, other hard surfaces and soils/areas with relatively high levels of pollutants. Because insects feed on plants, hard surfaces do not support (typically) the life requirements of insects which are critical food sources for bats.	No or negligible breeding habitat use/suitability for bats include: parking lots, pastures, and agricultural areas that lack trees, snags or buildings that might support material breeding colonies. Assumes high levels of disturbance and habitat fragmentation.
0.1	Very low and/or degraded foraging habitat for bats includes simplified or fragmented habitats such as lawns, parks and areas with extensive bare soil or pavement (with limited amounts of vegetated cover). Where present, only a few plant species dominate the landscape.	Very low and/or degraded breeding habitat use/suitability for bats assumes trees or snags are present, but the size and specific suitability is unknown or likely not very suitable. Assumes relatively high levels of disturbance and habitat fragmentation.
0.3	Some to moderately low foraging habitat use/suitability assumes more suitability than the lowest category, but not as much as the moderately high category. Fewer than 10 different plant species are present (assumes a somewhat simplified vegetation composition).	Some to moderately low breeding habitat use/suitability assumes some trees and/or buildings are present and the suitability is more than very low, but less than moderately high. Assumes moderately low to moderately high levels of human disturbance.
0.7	Moderately high use / high foraging habitat suitability assumes insect abundance is more than some but not the highest amount. Periodic pesticide/herbicide use such as spot-spraying is assumed. More than 10 different plant species of different bloom periods are present. Water bodies present nearby.	Moderately high use / high breeding habitat suitability assumes at least one suitable maternal breeding colony structure is present, including either a bat box, large hollow tree or attic. Assumes low to moderately low levels of human disturbance.
1.0	High use and/or high suitability assumes an abundance of insects; water bodies present on-site, and very low to no pesticide use.	High use and/or high suitability assumes more than one large, hollow tree is present and/or more than one bat box. The highest breeding habitat suitability assumes that human disturbance is relatively low to negligible.

Bobcat

Bobcat (*Lynx rufous*) are found throughout Oregon in many different habitat types: montane forest, meadows, riparian areas, brushy/shrubby areas, rural communities, and occasionally suburban communities that border natural areas. Bobcat are presumed to be present in the project vicinity, in large part due to the relatively close proximity of the Sandy River and its extensive riparian forests.

As strict carnivores, the bobcat diet consists mainly of small mammals and birds (ODFW 2025c). Some sources indicate that birds are a small portion of their diet and primary food items includes ground squirrels, pocket gophers, meadow mice, white-footed mice, brush rabbits, cottontails, hares and wood rats (Ingles 1965). They will occasionally hunt larger prey such as fawn, especially in the winter.

Bobcats use a variety of features as den sites, including hollow trees, large brush or log piles, or areas under logs. The average litter size for bobcat is three kittens. No breeding habitat for bobcat is presumed present on nursery lands because of the managed character of the terrain and lack of undisturbed natural features such as large brush piles, log piles, hillocks and berms with concealed crevices that could potentially serve as den sites.

Summary of good or suitable foraging habitat: Areas with abundant prey (small mammals, including mice, shrews, voles, moles and gamebirds). Low to no pollutants (e.g. rodenticides).

Summary of good or suitable breeding habitat: Protected areas including log piles/large downed wood/rotted logs, hollows, dense brushy areas, rock crevices, and concealed caves. Suitable denning habitat is undisturbed and unfragmented.

	Bobcat – Habitat Suitability Criteria	
Rating	**Foraging Habitat**	**Breeding Habitat**
0	No or negligible foraging habitat use/suitability is assumed to include paved areas, other hard surfaces and soils with high levels of pesticide/herbicide use that do not support a prey-base of small mammals.	No or negligible breeding habitat use/suitability for bobcats includes: parking lots, meadows, pastures, and agricultural areas devoid of understory diversity and hiding spots such as thick brush, crevices, log piles, etc.
0.1	Very low and/or degraded foraging habitat assumes limited vegetation cover and a preponderance of paved areas or simplified/fragmented habitats such as lawns, parks with little to no understory/brushy areas. Assumes road rights-of-ways may provide a prey base but the risk of vehicle strikes reduces the quality of foraging habitat.	Very low and/or degraded breeding habitat use/suitability assumes den sites may be present but the suitability is unknown or assumed compromised due to relatively high disturbance and fragmentation.
0.3	Some to moderately low foraging habitat use/suitability assumes more suitability than the lowest category, but not as much as the moderately high category. Small mammals are assumed present but understory cover is sparse and/or patchy and fragmented which reduces their ability to successfully ambush prey.	Some to moderately low breeding habitat use/suitability assumes den sites are present and suitability is more than very low, but less than moderately high. Assumes moderately low to moderately high levels of human disturbance.
.7	Moderately high use / high foraging habitat suitability assumes prey abundance is more than some but not the highest amount. Periodic pesticide use such as spot-spraying is assumed.	Moderately high use / high breeding habitat suitability assumes at least one suitable denning site is present and assumes low to moderately low levels of human disturbance.
1.0	High use and/or high suitability assumes the presence of abundant prey (small mammals, including mice, shrews, voles, moles and some gamebirds). Very low to no pollutants.	High use and/or high suitability assumes the presence of more than one undisturbed log pile/large downed wood/rotted log, hollow trees, dense brushy areas, rock crevices, and concealed caves. Assumes human disturbance is low to negligible.

Roosevelt Elk

Roosevelt elk (*Cervus canadensis roosevelti)* are found primarily on the western slopes of the Coast Range and the Cascade and Blue Mountain Ranges. Roosevelt elk are one of two subspecies of elk found in Oregon, with an estimated population of 59,000 in the state (ODFW 2025d). Foraging habitat consists of pastures, meadows, wetlands, woodlands, dense forests, and riparian habitat. They are strict herbivores that feed on twigs, shrubs, deciduous leaves, grasses, forbs, lichen, and fungi. Suitable foraging habitat also includes access to water sources.

The breeding season or "rut" typically extends from October to December (ODFW 2025d). Gestation lasts about 255 days. Because mating occurs in relatively large groups, breeding habitat is considered a mixture of open habitats with adjacent dense forests and away from human disturbance (including dogs). Elk tend to avoid areas where the risk of harassment and predation is high. Evidence suggests they prefer slopes or hillsides that offer protection from the elements and conceal them from human activity. Roosevelt elk are darker in color than other elk subspecies and the largest in terms of body size, with bulls generally weighing 700–1,100 pounds. Bulls will defend approximately a dozen or more females and keep 2- to 3-year old males away from the herd. Adult bulls join groups of cows and calves only during the rutting season. Cows are at least 2 years old when they give birth to a calf in the spring; twins are a possibility (Maser 1998). Elk calves can stand and nurse within 30 minutes of birth. Predators of newborn calves or sick/injured elk included coyotes, dogs, bears, bobcats, and humans.

Elk have been observed in the project vicinity, although they are presumed to have been deterred from foraging on the Filtration Facility Site during daylight hours when nursery operations were running. Statements from neighbors in the record indicate that deer and elk regularly crossed the Filtration Facility Site when it was a nursery. Roosevelt elk may possibly be confused with a deer; however, elk are much larger with a heavy mane and larger antlers with the points coming from a single beam unlike those of a mule deer (Ingles 1965). A remnant fence exists along the eastern boundary of the Filtration Facility Site and could be a hazard to wildlife and/or a minor impediment to wildlife movement. Elk and deer are often in conflict with homeowners in agricultural or rural communities due to their habitat of browsing in gardens and on landscaping.

Summary of good or suitable foraging habitat: Plentiful mix of cover and browse (e.g. variety of native understory plants as well as native trees). Includes suitable access to water sources. Low to no pesticide/herbicide use.

Summary of good or suitable breeding habitat: Open meadows and grasslands interspersed with woods and dense forested areas. Suitable breeding habitat is undisturbed and the risk of harassment and predation is low to negligible.

	Roosevelt Elk – Habitat Suitability Criteria	
Rating	**Foraging Habitat**	**Breeding Habitat**
0	No or negligible foraging habitat use/suitability is assumed to include paved areas, other hard surfaces	No or negligible breeding habitat use/suitability includes: parking lots, meadows, pastures, and agricultural land that

	and soils with pesticide/herbicide use that do not support a mix of grasses and deciduous shrubs or trees.	lacks brushy or wooded areas for cover and where the risk of harassment and predation is high.
0.1	Very low and/or degraded foraging habitat assumes sparse or limited supply of deciduous understory/brushy areas and/or the browse present has minimal nutritional sources required by elk. Assumes road rights-of-ways may provide some browse but the risk of collisions with vehicles reduces the quality of foraging habitat.	Very low and/or degraded breeding habitat use/suitability assumes the minimum mix of grassland and wooded/shrubby cover is present, but the size and specific suitability is unknown or likely not very suitable. Assumes relatively high levels of disturbance and habitat fragmentation.
0.3	Some to moderately low foraging habitat use/suitability assumes more suitability than the lowest category, but not as much as the moderately high category. Some cover and deciduous shrubs/trees are present; albeit somewhat simplified and lacking high diversity.	Some to moderately low breeding habitat use/suitability assumes some meadowland/grassland and cover is present and the suitability is more than very low, but less than moderately high. Assumes moderately low to moderately high levels of human disturbance.
0.7	Moderately high use / high foraging habitat suitability assumes more diverse understory plants and mix of native grasses/forbs. Adequate cover is present, but may occasionally include intermittent human presence.	Moderately high use / high breeding habitat suitability assumes an adequate balance of open grassland and dense understory/forestland is present. Assumes low to moderately low levels of human disturbance.
1.0	High use and/or high suitability assumes a plentiful mix of cover and browse (e.g. variety of native understory plants as well as native trees). Includes suitable access to water sources. Low to no pesticide/herbicide use.	High use and/or high suitability assumes the presence of meadows and grassy areas interspersed with woods and dense forested areas. Suitable breeding habitat is undisturbed and the risk of harassment and predation is low to negligible.

Downy Woodpecker

The downy woodpecker (*Picoides pubescens*) is a small, black and white woodpecker native to western Oregon. They nest in cavities in snags and trees and typically select a new cavity each breeding season. The downy woodpecker excavates its own cavity in dead and dying wood approximately 8 to 50 feet above ground (USFWS 1983). They require dead or partially dead trees that are at least 6 inches in diameter at breast height (6 dbh) (USFWS 1983) for breeding habitat. Downy woodpecker nesting habitat consists of mixed deciduous/coniferous woodlands and forests, and riparian forests.

Their diet consists largely of insects (beetles, ants, and caterpillars) although they will eat fruit, seeds, and sap from sapsucker holes. Downy woodpeckers typically feed by digging into bark with their bills to extract insects and will occasionally flycatch to capture insects on the wing (USFWS 1983). Suitable foraging habitat consists of hedgerows, thickets, riparian habitat, and forests. The male and female will incubate for approximately 12 days and young fledge after 20 to 25 days (Erlich et al. 1988).

Downy woodpeckers are year-round residents in the wooded areas and rural residential yards surrounding the Filtration Facility Site.

Summary of good or suitable foraging habitat: Areas with a high abundance of insects such as upland forests, riparian forests, and wooded areas with native trees. Downy woodpeckers may also forage in grasslands and meadows adjacent to forests, but generally prefer wooded areas. Very low to no pollutants.

Summary of good or suitable breeding habitat: Protected cavities and nooks in hollow trees, snags or dead tree limbs. Standing dead or dying trees with cavities are at least 6 inches in diameter at breast height (dbh). Assumes human disturbance is low to negligible.

	Downy Woodpecker – Habitat Suitability Criteria	
Rating	**Foraging Habitat**	**Breeding Habitat**
0	No or negligible foraging habitat use/suitability is assumed to include paved areas and other hard surfaces with limited to no insect populations. Will	No or negligible breeding habitat use/suitability includes: habitats that lack dead or partially dead standing trees that are > 6" dbh.
0.1	Very low and/or degraded foraging habitat assumes that only sparse groundcover is present (i.e. no trees or shrubs) or only sparse amounts of shrubs/trees. Includes areas with a preponderance of ornamental landscaping.	Very low and/or degraded breeding habitat use/suitability assumes that only one or two dead or partially dead standing trees > 6 inches dbh are present but the protected / undisturbed character of the cavity is unknown or assumed marginal in quality.
0.3	Some to moderately low foraging habitat use/suitability assumes more suitability than the lowest category, but not as much as the moderately high category. Assumes a somewhat simplified vegetation composition.	Some to moderately low breeding habitat use/suitability assumes a few suitable cavities in dead or dying trees are present. Assumes moderately low to moderately high levels of human disturbance.
0.7	Moderately high use / high foraging habitat suitability assumes insect abundance is adequate but not the highest amount. Periodic pesticide/herbicide use is assumed. More than 10 different plant species of different bloom periods are present.	Moderately high use / high breeding habitat suitability assumes several suitable protected cavities or nooks in dead or dying trees are present. Assumes low to moderately low levels of human disturbance.
1.0	High use and/or high suitability assumes areas with a high abundance of insects such as upland forests, riparian forests, and wooded areas with native trees are present. Also assumes the presence of native grasslands/meadows mixed with wooded areas. Low to no pesticide/herbicide use.	High use and/or high suitability assumes the presence of many protected cavities and nooks in hollow trees, snags or dead tree limbs are present. Standing dead or dying trees with cavities are at least 6 inches in diameter at breast height (dbh). Assumes human disturbance is low to negligible.

Northern Red-legged Frog

Red-legged frogs (*Rana aurora*) are a state sensitive / strategy species in Oregon that use streamside vegetation, riparian forests, upland forests and woodlands, as well as dense brush and logs. Red-legged frogs spend many months on land and are able to venture far from ponds (1 to 2 miles) as long as the temperature is not too hot and dry. Foraging habitat consists of natural, dense vegetation with abundant downed wood, leaf litter, and humus for insect productivity. Red-legged frogs are insectivores and the presence of invasive species such as English ivy, English holly – reduce the abundance and diversity of invertebrate prey required by the red-legged frog. The waxy leaves of ivy and holly are inedible to insects and degrade the abundance/availability of food resources. These nuisance plant species threaten the long-term health of the upland forest.

The northern red-legged frog is the largest native pond-breeding amphibian in Oregon. Suitable breeding ponds are at least 2 to 3 feet deep or deeper with aquatic vegetation for oviposition sites and inundation through the spring. Suitable ponds or slow-moving water for breeding habitat needs to have persistent water for at least 5 months. In early spring, adult females lay eggs in jelly-filled sacs that take on the appearance of a grape cluster in shallow still water or slow-moving water. Tadpoles hatch after a few weeks and juvenile frogs disperse into adjacent habitats 2 months later,

typically by June or early July. Ideally, breeding ponds have low abundance of predacious fish and the non-native bullfrog, but there is evidence red-legged frogs can tolerate these predators at breeding sites. Stormwater ponds are generally not considered suitable breeding habitat due to the potential presence of toxins and fluctuating water levels.

The small pond(s) located on the property where the raw pipeline is proposed and the small patch of riparian habitat adjacent to the headwaters of Johnson Creek in the southwest corner of the Filtration Facility Site provide suitable habitat Northern red legged frogs. The headwater stream(s) of Johnson Creek are located off-site. Downed wood is important as refugia for native amphibians such as the red-legged frog and can provide essential thermal protection during the warm summer months.

Summary of good or suitable foraging habitat: Areas with high native plant species in the groundcover, shrubs and trees near suitable breeding ponds (connectivity between breeding ponds and suitable foraging habitat is essential). Suitable foraging habitat also includes moist, sheltered features like rotting logs and brush/log piles. Very low to no pollutants.

Summary of good or suitable breeding habitat: Ponds or slow-moving bodies of water that are inundated for at least 5 months from late winter to spring (February through June). Water is least 2 to 3 feet deep or deeper with aquatic vegetation. Cool water temperatures with sun exposure required. Adequate natural cover (grasses, shrubs and trees) should be adjacent to breeding ponds and water bodies for dispersal.

	Northern Red-legged Frog – Habitat Suitability Criteria	
Rating	**Foraging Habitat**	**Breeding Habitat**
0	No or negligible foraging habitat use/suitability is assumed to include paved areas, other hard surfaces and soils with pesticide/herbicide with no or low insect abundance.	No or negligible breeding habitat use/suitability includes: parking lots, meadows, pastures, and agricultural areas that lack ponds.
0.1	Very low and/or degraded foraging habitat assumes at least one breeding pond is within 2 miles but native or natural vegetation are groundcover is separated by roads or barriers that prevent dispersal.	Very low and/or degraded breeding habitat use/suitability assumes at least one pond is present but water is less than 2 feet deep and/or dries up within five months.
0.3	Some to moderately low foraging habitat use/suitability assumes more natural conductivity between breeding ponds and forested areas and thickets. Assumes a roadway is a partial barrier, meaning crossings could occur during moist seasons with low traffic.	Some to moderately low breeding habitat use/suitability assumes at least one pond with adequate depth and adequate duration of inundation is present but existing vegetation is low to moderately low.
0.7	Moderately high use / high foraging habitat suitability assumes a relatively high diversity of native groundcover, shrubs and trees and moderate to low invasive plant species. English ivy may be present but is not abundant.	Moderately high use / high breeding habitat suitability assumes one or more seasonal ponds are present within 2 miles of adequate foraging habitat. Mature forest and wooded areas link the breeding ponds.
1.0	High use and/or high suitability assumes a diversity of native groundcover, shrubs and tree species. Very low to pesticide use. Assumes low invasive plant species cover, less than 20% cover.	High use and/or high suitability assumes sufficiently deep water is present for at least five months, with adequate sun exposure and emergent vegetation for egg laying. A substantial amount (more than 40 acres approximately) of forest is adjacent to the breeding habitat.

Red-tailed Hawk

The red-tailed hawk (*Buteo jamaicensis*) is a bird of prey often seen perched on telephone poles or fences in the open countryside and along roadsides. Red-tailed hawks are adapted to suburban and urban areas, but are most commonly associated with rural terrain, including grasslands, agricultural land, woodlands, riparian areas, and mature forests. They use elevated perches such as trees (living and dead), telephone poles and human-made structures to scan for prey, such as voles, mice, squirrels, and rabbits. Rodents constitute a large portion of the red-tailed hawk diet, although they will take songbirds, pigeons, reptiles (snakes), amphibians and invertebrates.

Red-tailed hawks build large stick nests in the canopy of mature deciduous or coniferous trees. Both adults will incubate eggs, which require approximately 30 days to hatch. The young fledge after about a month and a half and remain with their parents for another several weeks until fall migration. While some red-tailed hawks are residents in western Oregon, many migrate several hundreds of miles to wintering grounds. Females return to previous nest territories in subsequent breeding years (Ehrlich et al. 1988).

Red-tailed hawks were commonly observed soaring above the Filtration Facility Site during 2021 surveys and in subsequent site visits. They are expected to hunt in the fields and commercial nursery land, although the prey base in the commercial nursery areas is expected to be limited due to pest control. No active red-tailed hawk nests have been observed during site visits, but they are likely breeding in the wooded areas along the forested slope east of the Filtration Facility Site and potentially in the riparian habitat of Johnson Creek.

Summary of good or suitable foraging habitat: Elevated perches interspersed throughout open grassy areas and meadows with abundant prey (small mammals, birds, and reptiles). Will also eat carrion. Low to no pollutants (e.g. rodenticides).

Summary of good or suitable breeding habitat: Mature stands of tall trees with substantial limbs and leaf cover for concealing platform nests. May use structures and ledges in urban areas.

	Red-tailed hawk – Habitat Suitability Criteria	
Rating	**Foraging Habitat**	**Breeding Habitat**
0	No or negligible foraging habitat use/suitability is assumed to include paved areas, other hard surfaces and soils with pesticide/herbicide use that do not support a prey base of small mammals and birds. No reptiles or amphibians are present.	No or negligible breeding habitat use/suitability includes: parking lots, meadows, pastures, and agricultural areas that lack stands of mature canopy trees.
0.1	Very low and/or degraded foraging habitat assumes a high amount of paved areas or simplified/fragmented habitats with very low abundance of small mammals, birds and reptiles. Relatively high use of pesticides/rodenticides. Few to no elevated perches are present.	Very low and/or degraded breeding habitat use/suitability assumes a few canopy trees are present, but the habitat is highly fragmented which exposes platform nests to predation (crows, etc.).
0.3	Some to moderately low foraging habitat use/suitability assumes more suitability than the lowest category, but not as much as the moderately high category. Assumes road rights-of-ways provide some to	Some to moderately low breeding habitat use/suitability assumes a few to several canopy trees are present and suitability is more than very low, but less than moderately

Rating	Red-tailed hawk – Habitat Suitability Criteria	
	Foraging Habitat	**Breeding Habitat**
	moderately low levels of prey including carrion (roadkill). Risk of vehicle strikes reduces the quality of foraging habitat. Few to several hunting perches are present.	high. Assumes moderately low to moderately high levels of human disturbance.
0.7	Moderately high use / high foraging habitat suitability assumes prey abundance is more than some but not the highest amount. Periodic pesticide use such as spot-spraying is assumed. Several to many hunting perches are present.	Moderately high use / high breeding habitat suitability assumes several to many stands of canopy trees are present and interspersed with grasslands/meadows with adequate prey base. Assumes low to moderately low levels of human disturbance.
1.0	High use and/or high suitability assumes the presence of abundant elevated perches interspersed throughout open grassy areas and meadows with high populations of small mammals and birds. Low to no pollutants (e.g. rodenticides). Many hunting perches are present.	High use and/or high suitability assumes the presence of many and abundant mature stands of tall trees with substantial limbs and leaf cover for concealing platform nests. Assumes abundant prey base nearby.

White-crowned Sparrow

The white-crowned sparrow (*Zonotrichia leucophrys*) is a small songbird of thickets, fields, shrubland, open wooded lands, gardens, and parks. The female builds a cup nest made of grass, twigs, and leaves either on the ground or in low shrubs and thickets. Up to five or six eggs are laid in the nest, and the young hatch about 12 days after the last egg has been laid. Nestlings are fed a diet of insects, and adults also consume seeds and berries. The young fledge 7 to 12 days after hatching (Ehrlich et al. 1988) and require parental care for another few weeks.

Several white-crowned sparrow pairs were observed exhibiting nesting behaviors during the spring/summer of 2024 at the Filtration Facility prior to construction mobilization. Potential nesting cover consisted of blackberry brambles, Canada thistle patches, red clover, and dense, tufted grasses among the fallow nursery fields. During previous nursery operations at the Filtration Facility Site, some level of use by white-crowned sparrows is assumed for the HEP analysis but not at the level observed prior to 2024 construction because observations were made 2 years after nursery operations ceased and is not representative of typical commercial nursery land conditions.

Summary of good or suitable foraging habitat: Areas with a high abundance of insects, seeds and fruit such as native grasslands, meadows and forest edges. High diversity of native grasses and forbs. Very low to no pollutants / pesticide use.

Summary of good or suitable breeding habitat: Undisturbed thickets, shrubs, and tufts of grass/forbs that are not see-through (e.g. provide dense protective cover), within open fields, brushy areas and mixed habitats.

Rating	White-crowned Sparrow – Habitat Suitability Criteria	
	Foraging Habitat	**Breeding Habitat**
0	No or negligible foraging habitat use/suitability is assumed to include paved areas, other hard surfaces	No or negligible breeding habitat use/suitability includes: parking lots, meadows, pastures, and agricultural areas that

Rating	White-crowned Sparrow – Habitat Suitability Criteria	
	Foraging Habitat	**Breeding Habitat**
	lacking vegetation. These areas do not support insect populations or seed and fruit-bearing plants. Very high levels of human disturbance and pesticide/herbicide use.	lack grassy patches or ornamental plants. Very high levels of human presence and urbanization. This category can also include dense, closed forests that lack openings or clearings.
0.1	Very low and/or degraded foraging habitat assumes high amounts of paved and ruderal areas with very limited natural cover. Where vegetation is present, only a few plant species dominate the landscape. Assumes relatively high levels of pesticide/herbicide use.	Very low and/or degraded breeding habitat use/suitability assumes either a relatively high level of canopy closure in a forest or relatively high levels of paved and cleared areas that have limited to no nesting substrate, such as dense shrubs or tufts of grasses/forbs. Assumes a relatively high level of human disturbance or habitat fragmentation which increases the risk of predation.
0.3	Some to moderately low foraging habitat use/suitability assumes more suitability than the lowest category, but not as much as the moderately high category. Assumes a mix of native and ornamental plant are present although the vegetation structure may be somewhat simplified.	Some to moderately low breeding habitat use/suitability assumes some nesting cover or substrate is present and the suitability is more than very low, but less than moderately high. Assumes moderately low to moderately high levels of human disturbance.
0.7	Moderately high use / high foraging habitat suitability assumes insect abundance is adequate but not the highest amount. Periodic pesticide/herbicide use is assumed. Some to many different plant species and structures are present.	Moderately high use / high breeding habitat suitability assumes an adequate mix of open grassland, brushy areas and forest edges with several suitable nest substrate options. Assumes low to moderately low levels of human disturbance.
1.0	High use and/or high suitability assumes the presence of areas with a high abundance of insects, seeds and fruit such as native grasslands, meadows and forest edges. Diversity of native grasses and forbs with a few patches of bare ground. Very low to no pollutants / pesticide use.	High use and/or high suitability assumes an abundance of undisturbed thickets, shrubs, and tufts of grass/forbs that are not see-through (e.g. provide dense protective cover), within open fields, brushy areas and mixed habitats.

Native Bumble Bee – Western Bumble Bee

The western bumble bee (*Bombus occidentalis)* is an important pollinator of crops and flowering plants (forbs, shrubs, grasses), and was once common throughout Oregon, Washington, northern California, interior western states, and western Canada. Western bumble bees feed on a variety of nectar sources and are considered generalist foragers (Xerces Society 2025). Western bumble bees are declining due to disease, pesticide/herbicide use, and habitat loss.

Bumble bees breed in colonies consisting of a queen and related family members that assist in defending the nest, providing food and rearing offspring. Little is known about the types of burrows needed by bumble bees to successfully reproduce, but recent evidence suggests they will use abandoned rodent burrows and construct nests up to 3 feet below ground (Xerces Society 2023, USFWS 2025b). Bumble bees may also excavate their own nesting burrows in suitable soils. Six bumble bee nesting burrows recently discovered by the Xerces Society in a 2023 Pacific Northwest study were found in the following habitats: young lodgepole pine forest recently thinned forest to reduce fire risk, along a forest / meadow edge; in an open area with tall grasses and shrubs, and in a meadow near a lake (Xerces Society 2023).

Summary of good or suitable foraging habitat: Areas with a diversity of flowering plants that provide abundant nectar sources. Bloom periods are varied to support feeding over multiple seasons. Very low to no pollutants / pesticide use.

Summary of good or suitable breeding habitat: Abandoned rodent burrows or soils suitable for excavating deep burrows (may extend up to 3 feet deep). Extensive natural cover including a mosaic of grassy areas with patches of shrubs/trees. May include areas of bare soils.

	Western Bumble Bee – Habitat Suitability Criteria	
Rating	**Foraging Habitat**	**Breeding Habitat**
0	No or negligible foraging habitat use/suitability is assumed to include paved areas, other hard surfaces and soils with very high levels of pesticide/herbicide use that do not provide nectar sources. Includes parking lots.	No or negligible breeding habitat use/suitability includes: parking lots, meadows, pastures, and agricultural areas that lack burrowing habitat or nooks for nesting.
0.1	Very low and/or degraded foraging habitat assumes a limited composition of grasses/forbs and other nectar sources. Relatively high levels of pesticide/herbicide use. Can also include dense interior forests or tree plantations with little to no groundcover.	Very low and/or degraded breeding habitat use/suitability assumes that at least one abandoned rodent burrow may be present but its depth and protective cover are unknown or assumed to be marginal.
0.3	Some to moderately low foraging habitat use/suitability assumes more suitability than the lowest category, but not as much as the moderately high category. Assumes a mix of plants (may be ornamental shrubs) are present although the vegetation structure may be somewhat simplified. Assumes some pesticide/herbicide use.	Some to moderately low breeding habitat use/suitability assumes some nesting burrows and/or substrate soils for excavation are present and the suitability is more than very low, but less than moderately high.
0.7	Moderately high use / high foraging habitat suitability assumes the supply of nectar sources is adequate but not the highest amount. Periodic pesticide/herbicide use is assumed. Some to many different plant species and structures are present.	Moderately high use / high breeding habitat suitability assumes a balanced mix of open grassland, brushy areas and forest edges with many potential abandoned rodent burrows and/or well-drained, suitable soils for excavation.
1.0	High use and/or high suitability assumes a diversity of native flowering plants as nectar sources. Bloom periods are varied to support feeding over multiple seasons. Very low to no pollutant s / pesticide use.	High use and/or high suitability assumes the presence of many abandoned rodent burrows or soils suitable for excavating deep burrows (may extend up to 3 feet deep). Extensive natural cover including a mosaic of grassy areas with patches of shrubs/trees.

Bald Eagle

The bald eagle is found throughout North America (with the exception of southern Mexico) near open water including lakes, reservoirs, rivers and coastal areas. The bald eagle was removed from the federal list of endangered species in 2007 due to population recovery in the lower 48 states (it was never listed as threatened in Alaska). The suitability ratings presented below are adapted from Martin et al. (1988) and incorporate the following key habitat components: proximity to prey base, quality of nesting and perching habitat, and amount of human disturbance.

Bald eagles build large stick nests near the tops of living trees, often within 1 mile of waterbodies and with a viewshed of the surrounding landscape. Bald eagles select nest sites with low levels of human disturbance (pedestrians are the most disruptive), although they can tolerate certain types

of disturbance such as traffic noise when the activity is concealed. Their diet consists primarily of fish, although they also prey on ducks, geese, as well as small to medium mammals, reptiles and amphibians. According to Martin et al. (1988), foraging habitat should include rivers/lakes/reservoirs within 1 km (0.67 miles) of a suitable perch tree or nest site.

The updated HEP analysis indicates minimal to no change to potential bald eagle habitat values pre- and post-construction. This is largely due to the fact that bald eagles are birds of large landscapes with breeding territories that can range from 2.5 to 15 square kilometers, which is about 10 to 80 times larger than the total acreage of the entire project. Removal of mature trees from road rights-of-way would not adversely affect a bald eagle's ability to find appropriate perch trees in the project area. The project in the long-term would improve bald eagle habitat by expanding riparian and upland forests that would provide potential perching or nesting trees.

Potential nesting habitat was assumed to be present for the bald eagle in the mature forest along the eastern perimeter of the filtration facility site, with a ranking of "moderately low to some" due to the pre-construction human activity in the area, including intensive agriculture uses historically on and surrounding the filtration facility site. The filtration facility activity will be concentrated on 37 acres of the larger filtration facility site, will have limited employee presence, and as addressed above, has been specifically designed to limit noise and light impacts. Therefore, the addition of the filtration facility is not expected to lower the potential suitability of any mature trees in the mature forest as potential nesting sites.

The modified HEP for the bald eagle also assumes the nursery land (pre-construction) would have potentially provided limited winter foraging habitat, because waterfowl presence was a possibility (although not in large numbers due to the widespread use of tall stakes for the ornamental plants that would often discourage ducks and geese from foraging in the fields). For the purposes of the HEP, the savanna, because of its relatively small size compared to the nursery land, is not assumed to provide foraging opportunities for the bald eagle, which hunts more frequently along large bodies of water, and will only occasionally to infrequently take small to medium mammals. The results conservatively assume a reduction in the potential for winter foraging habitat for the eagle at the filtration facility site.

Summary of foraging (wintering) habitat: good or suitable foraging habitat includes abundant sources of prey such as waterfowl or fish in large bodies of open water (lakes, reservoirs and rivers etc.) within 1 km or 0.67 miles of a suitable perch or nest site. Their diet consists primarily of fish, although they also prey on ducks, geese, as well as small to medium mammals, reptiles and amphibians.

Summary of breeding habitat: good or suitable breeding habitat includes mature forests with one or more living trees that can support large platform nests and that have a commanding view of the surrounding landscape. They typically nest within 1 mile of large waterbodies.

	Bald eagle – Habitat Suitability Criteria	
Rating	**Foraging Habitat (Wintering habitat)**	**Breeding Habitat**
0	No or negligible foraging habitat use/suitability is assumed to include paved areas, small ponds that lack fish/waterfowl; other hard surfaces and soils/areas that lack prey. No trees present for perching.	No or negligible breeding habitat use/suitability includes: parking lots, pastures, fields and agricultural areas that lack trees.
0.1	Very low prey base within five miles of potential nest/perch site. Potential perch structures are shrubs or young trees with no view of large waterbodies or fields of prey (waterfowl).	Very low and/or degraded breeding habitat use/suitability are young trees, no screening present.
0.3	Moderately low to minimal prey base within five miles of potential nest/perch site. Nearby water sources may be frozen over late into the nesting cycle without alternative food sources.	Some to moderately low breeding habitat use/suitability assumes some trees are present and the suitability is more than very low, but less than moderately high. Assumes moderately low to moderately high levels of human disturbance.
0.7	Assumes moderate prey availability within three miles of potential nest/perch site. Alternative food sources may be within five miles of nest or perch.	Moderately high use / high breeding habitat suitability assumes several suitable nest sites are available in wooded areas forest. Assumes low to moderately low levels of human disturbance.
1.0	Abundant prey base (ungulate carrion, fish of several species, waterfowl, small mammals) available throughout the year within three miles of potential nest/perch site.	High use and/or high suitability assumes the presence of many suitable nest trees within a relatively large tract of forest. Assumes human disturbance is low to negligible. If human disturbance is present, people are in vehicles (> 0.1 to 0.25 mile away) and/or concealed from view.

Northern Spotted Owl

The northern spotted owl (NSO) occurs from southern British Columbia down to Northern California and is found in forests west of the Cascade Range in Oregon and Washington. The species is considered state and federally threatened due to habitat loss and fragmentation from timber harvest and has recently experienced habitat displacement from the barred owl, a similar but more aggressive species tolerant of habitat fragmentation and human disturbance.

They require large tracts of forest for breeding and foraging, typically coniferous forest but will use deciduous trees. Northern spotted owls have been displaced from lower elevation forests due to habitat loss/fragmentation and barred owls (M. Reed, personal communication with S. Hartung, March 2025), as well as higher predation rates from Corvids. NSO are intolerant of high temperatures due to their thick plumage (Ehrlich et al., 1988).

Although the breeding habitat for the NSO does not occur at or near the project area, this species is included in an updated modified HEP because of the possible chance that juvenile spotted owls may use forests in the vicinity during dispersal. Spotted owls primarily eat small mammals like flying squirrels, woodrats, and various rodents. They also prey on small birds, including other owls, and occasionally take amphibians, reptiles, and insects.

Size and shape of forest patches are important for the NSO. Essential features of breeding habitat include:

- 70 acres of suitable habitat is the minimum area for nest sites in Oregon by law, although biologically their home ranges during breeding are on average much larger and are fairly variable (~300 - 1000 acres). Suitable habitat includes: "A stand of trees with moderate to high canopy closure (60 to 80%); a multi-layered, multi-species canopy dominated by large overstory trees (greater than 30 inches in diameter at breast height); a high incidence of large trees with various deformities (e.g., large cavities, broken tops, and other evidence of decadence); numerous large snags; large accumulations of fallen trees and other woody debris on the ground; and sufficient open space below the canopy for owls to fly.

- Stands which do not exhibit at least two of the characteristics listed in the above paragraph of this section are not suitable habitat. The general home range size outside of nesting season for NSO is highly variable but generally very large: 600 -8,000+ acres.

- While NSO does have the potential to occur very intermittently in late-successional forest patches in the vicinity of the project area, it is highly unlikely. Such occurrences would most likely be infrequent use by hatch-year immature birds during dispersal period in late fall. Despite the rare occurrence of NSO in the project area, no sustained breeding or foraging habitat is available for NSO and this species is not a reasonable focal species for the habitat analysis.

The updated HEP assumes that moderately low quality to some foraging habitat for dispersing juvenile spotted owls is present in the upland forest and riparian on-site and vicinity. As these habitats will be protected and expanded as part of the project, no adverse effects to the NSO would result from project operation. Over time, the tree plantings within the upland forest enhancement area will increase the amount of potential dispersal habitat for the NSO on the project site. Additionally, the removal of invasive ivy and holly from the existing upland forest at the filtration facility edge will improve the health of the existing foraging habitat.

Summary of foraging/dispersal habitat: good or suitable foraging habitat includes large tracts of forested areas with a high abundance of flying squirrels, tree squirrels, and tree voles. They hunt in gaps in the forest and prey upon small rodents, and will also eat insects and reptiles. Dispersing juveniles may seek more fragmented habitat including riparian corridors in rural wood lots where they prey upon rodents, tree squirrels, rabbits, etc.

Summary of breeding habitat: good or suitable breeding habitat includes cavities or abandoned platform nests in trees within steep coniferous forests at high elevations. They may use scrapes or ledges in rocky canyons. Require large tracts of mature forest (several hundreds of acres).

	Northern spotted owl – Habitat Suitability Criteria	
Rating	**Foraging / Dispersal Habitat**	**Breeding Habitat**
0	No or negligible foraging/dispersal habitat use/suitability is assumed to include paved areas, other hard surfaces and soils/areas.	No or negligible breeding habitat use/suitability includes: parking lots, pastures, and agricultural areas that lack trees.

	Northern spotted owl – Habitat Suitability Criteria	
Rating	**Foraging / Dispersal Habitat**	**Breeding Habitat**
0.1	Very low and/or degraded foraging habitat includes simplified or fragmented habitats such as lawns, parks and areas with extensive bare soil or pavement (with limited amounts of vegetated cover).	Very low and/or degraded breeding habitat use/suitability assumes trees are present, but the size and specific suitability is unknown or likely not very suitable. Assumes relatively high levels of disturbance and habitat fragmentation.
0.3	Some to moderately low foraging habitat use/suitability assumes more suitability than the lowest category, but not as much as the moderately high category. Strips of trees may provide some foraging habitat, but it is not ideal.	Some to moderately low breeding habitat use/suitability assumes some trees are present and the suitability is more than very low, but less than moderately high. Assumes moderately low to moderately high levels of human disturbance.
0.7	Moderately high use / high foraging habitat suitability assumes small rodent abundance is more than some but not the highest amount. Larger patches of woods.	Moderately high use / high breeding habitat suitability assumes several suitable nest sites are available in relatively large tracts of forest. Assumes low to moderately low levels of human disturbance.
1.0	High use and/or high suitability assumes an abundance of prey in a large tract of forest.	High use and/or high suitability assumes the presence of many protected cavities and nooks in conifers within a large tract of forest (> 70 acres). Assumes human disturbance is low to negligible.

Oregon Slender Salamander

The Oregon slender salamander is found in the north Oregon Cascade Range and foothills, occurring west of the crest from the Columbia River to Highway 58, and occurring east of the crest from the Columbia River to the Warm Springs Indian Reservation. The Oregon slender salamander is a lungless amphibian that breathes through its skin and spends its entire lifecycle in forested habitats. Unlike many amphibians, it does not require ponds or slow moving water for egg-laying.

The diet of Oregon slender salamanders consists of a variety of invertebrates, such as springtails, mites, flies, spiders, snails, beetles, centipedes and earthworms (Clayton and Olson, 2009). For breeding, the Oregon slender salamander requires abundant down logs/rotting stumps in moist late-successional or second growth forests. Suitable breeding habitat can also include younger forests with an abundance of down wood and moist microsites. Wood recruitment (i.e. standing dead trees and dead/dying limbs or trees) is essential to maintain breeding sites. Suitable breeding habitat is undisturbed and unfragmented. Intensively managed forests on a short harvest rotation are considered population "sinks" where mortality exceeds reproductive rates (Vesely et al. 1999).

The Oregon Slender Salamander (OSS) is mapped as occurring in mature forest land over a mile east of the filtration facility site (ORBIC 2025), and is not known to occur on the FFS. However, for the purposes of the updated HEP analysis, it is assumed to potentially be present in the mature forest and riparian forest. It has an affinity for deep and moist forest floors with abundant down wood and rotting stumps. It is a fully terrestrial salamander that breathes through its skin and seeks cool and moist environments. The suitability of the mature forest was assumed to be low to moderately low (0.3) for both foraging and breeding. The filtration facility will not have a direct impact on the mature forest habitat. Salamanders within the existing upland forest areas would not be expected to be adversely affected by noise or light from the facility due to noise and light

controls discussed in the record, vegetative cover, and topography. While the Oregon slender salamander would likely benefit from the invasive holly and ivy removal within the upland forest on the filtration facility, the value was not adjusted. Placing down wood in the riparian forest increases the value of that habitat from limited (0.1) to low/moderately low (0.3).

Summary of foraging habitat: good or suitable foraging habitat includes areas with abundant leaf litter, down wood, moss, rotting stumps and sloughed bark under tree canopy cover. The typical diet includes springtails, mites, flies, spiders, snails, beetles, centipedes and earthworms. Low to no pollutants.

Summary of breeding habitat: good or suitable breeding habitat includes abundant down logs/rotting stumps in moist late-successional or second growth forests. Suitable breeding habitat can also include younger forests with an abundance of down wood and moist microsites. Suitable breeding habitat is undisturbed and unfragmented.

	Oregon slender salamander – Habitat Suitability Criteria	
Rating	**Foraging Habitat**	**Breeding Habitat**
0	No or negligible foraging habitat use/suitability is assumed to include paved areas, other hard surfaces and soils with high levels of pesticide/herbicide use that do not contain a variety of invertebrates and that lack woody debris.	No or negligible breeding habitat use/suitability for Oregon slender salamander includes: parking lots, meadows, pastures, and agricultural areas devoid of understory diversity such as thick brush, crevices, log piles, etc.
0.1	Very low and/or degraded foraging habitat assumes limited woody debris with relatively open tree canopy. Assumes low levels of canopy cover with drier understories due to fragmentation or edge effect.	Very low and/or degraded breeding habitat use/suitability assumes down wood and microsites may be present but the suitability is unknown or assumed compromised due to relatively high disturbance and small diameter of trees or past land use disturbance.
0.3	Some to moderately low foraging habitat use/suitability assumes more suitability than the lowest category, but not as much as the moderately high category. Insects are assumed present but understory cover may be sparse and/or patchy and fragmented.	Some to moderately low breeding habitat use/suitability assumes den sites are present and suitability is more than very low, but less than moderately high. Assumes moderately low to moderately high levels of human disturbance.
.7	Moderately high use / high foraging habitat suitability assumes prey abundance is more than some but not the highest amount. Periodic pesticide use such as spot-spraying is assumed, but at lower levels than the lower habitat categories.	Moderately high use / high breeding habitat suitability assumes at relatively high abundance of down wood and moist micro sites. Assumes low to moderately low levels of human disturbance.
1.0	High use and/or high suitability assumes the presence of abundant insects and a high frequency of down wood. Very low to no pollutants.	High use and/or high suitability assumes abundant down wood of a variety of tree sizes within late-successional forest or a younger forest with extensive down wood. Assumes human disturbance is low to negligible.

Short-eared Owl

The short-eared owl occurs throughout many parts of the United States and Canada and may occur year-round in Oregon according to the Cornell University Bird Lab. Other sources indicate that it occurs year-round east of the Cascades, but only occurs in winter west of the Cascades in Oregon. This habitat assessment assumes the short-eared owl may be found in suitable habitats year-round in the project area.

The diet of the short-eared owl consists primarily of small mammals like voles and mice. They will also eat other small mammals, birds, and occasionally insects. Short-eared owls are known to follow fluctuations in prey base. Nests are usually built on dry sites, and often on small knolls, ridges or hummocks. Short-eared owls prefer grasslands for nesting and will also use hayland, areas with low perennials and occasionally areas with grain stubble.

The short-eared owl is assumed to have potentially used the filtration facility site for foraging and limited breeding pre-construction as it is a bird of grasslands, fields and agricultural areas that preys on rodents. To be conservative, and despite the anticipated high use of rodenticides/pesticides, the nursery land is assumed to have provided low to moderately low quality foraging habitat (0.3). The nursery land is assumed to have provided very limited breeding habitat (0.1), but not a zero, for the short-eared owl, because the terrain is within the preferred type of habitat for this species even though the regular disruption by nursery activity would greatly diminish the likelihood of nesting success. The savanna is assumed to provide more opportunities for foraging and breeding habitat for the short-eared owl, although the acreage will be smaller than the pre-construction nursery land.

Summary of foraging habitat: good or suitable foraging habitat includes large grassy areas such as pastures, savannas, prairies, marshes, tundra and agricultural areas. Its diet consists of mice, voles, shrews, and moles.

Summary of breeding habitat: good or suitable breeding habitat includes undisturbed grasslands, meadows, savannas, fields, marshes and tundra. They build a “scrape” on the ground within herbaceous cover that is relatively undisturbed by humans or predators.

	Short-eared owl Sparrow – Habitat Suitability Criteria	
Rating	**Foraging Habitat**	**Breeding Habitat**
0	No or negligible foraging habitat use/suitability is assumed to include paved areas, other hard surfaces lacking vegetation. These areas do not support rodent populations. Very high levels of human disturbance and pesticide/herbicide use.	No or negligible breeding habitat use/suitability includes: parking lots or meadows, pastures, and agricultural areas with very high levels of human presence. This category can also include dense, closed-canopy forests and shrubland.
0.1	Very low and/or degraded foraging habitat assumes high amounts of paved and ruderal areas with very limited natural cover. Where vegetation is present, there is limited rodent availability. Assumes relatively high levels of pesticide/herbicide use.	Very low and/or degraded breeding habitat use/suitability assumes either a relatively high level of canopy closure in a forest or relatively high levels of paved and cleared areas that have limited to no undisturbed nesting substrate, such as dense shrubs or tufts of grasses/forbs in road ROWs. Assumes a relatively high level of human disturbance or habitat fragmentation which increases the risk of predation.

	Short-eared owl Sparrow – Habitat Suitability Criteria	
Rating	**Foraging Habitat**	**Breeding Habitat**
0.3	Some to moderately low foraging habitat use/suitability assumes more suitability than the lowest category, but not as much as the moderately high category.	Some to moderately low breeding habitat use/suitability assumes some nesting cover or substrate is present and the suitability is more than very low, but less than moderately high. Assumes moderately low to moderately high levels of human disturbance.
0.7	Moderately high use / high foraging habitat suitability assumes rodent abundance is adequate but not the highest amount. Periodic pesticide/herbicide use is assumed.	Moderately high use / high breeding habitat suitability assumes presence of open grassland, fields, savannas etc. with low to moderately low levels of human disturbance.
1.0	High use and/or high suitability assumes a high abundance of rodents in grasslands, meadows and savannas. Very low to no pollutants / pesticide use.	High use and/or high suitability assumes an abundance of undisturbed fields, meadows, savannas, etc.

Streaked-horned Lark

The basic ecology of the streaked horned lark (SHLA) is summarized in the survey memo attached to Exhibit S.32 and may be found in the Federal Register. The streaked horned lark is a rare subspecies of the more common lark and, in Oregon, is restricted to only a handful of locations in the Willamette Valley where grassland fires and grazing animals historically kept shrub and tree densities low to negligible and therefore reduced the availability of perching sites for potential predators. They also historically used floodplain habitats along the Columbia River prior to dam building and flood control. The nearest known location of breeding streaked horned larks is at the Portland International Airport, located 15 to 20 miles northwest of the project area.

According to Beason (1995), horned larks of all subspecies, including the rare streaked horned lark, "require treeless expanses with a significant proportion of flat, bare ground, often characterized by sparse weedy annual vegetation, the seeds of which provide the bulk of their winter food." Streaked horned larks lay eggs in a "scrape" or slight depression on the ground within large expanses of open grassland and meadows (> 100 acres) with relatively sparse or patchy groundcover. Ideal terrain is flat (i.e. no undulating hills) with few to no shrubs/trees with relatively low-statured grasses or weedy forbs (generally less than 1.5 to 2 feet in height).

While breeding habitat is not located at the filtration facility site or in the finished water pipeline alignments (S.22, Exhibit 3)); limited wintering (foraging) habitat was assumed to be present for the SHLA and was analyzed as part of the updated HEP. The filtration facility site was assumed to provide very low (0.1) wintering habitat for the SHLA because of the limitations of the numerous tall stakes used to support ornamental plants and presence of tall features like the Pleasant Valley water towers interrupting the open landscape context. Some sections of the 94-acre facility were tilled or harvested exposing bare soils that are preferred by wintering SHLA; however, it is expected that the abundance of grass and weed seeds was typically low due to limited use of cover crops and annual plants within the nursery land. Post-construction value of SHLA is expected to also be very low quality (0.1) but the acreage of availability will only consist of about 20 acres of the savanna habitat in the southeast corner of the site on a slight slope that is adjacent to a nursery operation to the south. The filtration facility site would only be potentially suitable for wintering

SHLA for about two years post-construction, which is consistent with the ephemeral and ever-changing quality of wintering habitat for SHLA throughout the Willamette Valley (Moore 2005).

Summary of foraging/wintering habitat: good or suitable wintering habitat for streaked horned larks is ephemeral and includes the following factors: expansive agricultural fields with residual harvest, seeds from annual plants and/or larvae of various insects (Moore 2005). Includes recently tilled fields and sparsely vegetated grassland in open landscapes. Wooded areas and shrubby thickets are avoided.

Summary of breeding habitat: good or suitable breeding habitat includes extensive, open grassland and meadows (> 100 acres) with relatively sparse or patchy groundcover. Ideal terrain is flat (i.e. no undulating hills) with few to no shrubs/trees with relatively low-statured grasses or weedy forbs.

	Streaked horned lark – Habitat Suitability Criteria	
Rating	**Foraging (Winter) Habitat**	**Breeding Habitat**
0	No or negligible wintering habitat use/suitability is assumed to include shrubland or forests, or agricultural areas that are completely bare with no seeds from residual harvest or annual plants.	No or negligible breeding habitat use/suitability includes: parking lots or meadows, pastures, and agricultural areas with very high levels of human presence and/or trees along the perimeter. This category can also include dense, closed-canopy forests and shrubland.
0.1	Very low and/or degraded wintering habitat assumes high amounts of paved areas or shrubby/forested areas. Also includes little to no seed/food availability where open ground is available. Assumes relatively high levels of pesticide/herbicide use.	Very low and/or degraded breeding habitat use/suitability assumes either a relatively high level of canopy closure in a forest or relatively high levels of paved and cleared areas that have limited to no patchy undisturbed nesting substrate. Assumes a relatively high level of human disturbance or trees along the perimeter which increases the risk of predation. Includes commercial nursery land with vertical stakes that can be used by predators such as the American kestrel.
0.3	Some to moderately low wintering habitat use/suitability assumes more suitability than the lowest category, but not as much as the moderately high category.	Some to moderately low breeding habitat use/suitability assumes some nesting cover or substrate is present and the suitability is more than very low, but less than moderately high. Assumes moderately low to moderately high levels of human disturbance.
0.7	Moderately high use / high wintering habitat suitability assumes seed/food abundance is adequate but not the highest amount. Periodic pesticide/herbicide use is assumed.	Moderately high use / high breeding habitat suitability assumes presence of open grassland, fields, savannas etc. with low to moderately low levels of human disturbance.
1.0	High use and/or high suitability for wintering habitat assumes a high abundance of seeds/food in bare or sparsely vegetated ground in open landscapes. Very low to no pollutants / pesticide use.	High use and/or high suitability of breeding habitat assumes a very large tracts of flat grassland with few to no shrubs; occurs within the Willamette Valley. Corvallis Airport is the ideal reference site for breeding habitat.

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Attachment 3b

TABLE 1
PRE-CONSTRUCTION HSIS FOR THE FILTRATION FACILITY SITE, PIPELINES, INTERTIE, AND CARPENTER LANE PROPERTIES - 13 FOCAL SPECIES FOR THE MODIFIED HEP ANALYSIS

	Filtration Facility Site - Nursery Land		Finished Pipelines - Road Rights-of-Way		Filtration Facility Site - Upland Forest		Raw Pipeline - Mixed Woodland		Filtration Facility Site - Riparian Habitat		Intertie (Nursery Land)		Carpenter Lane Properties (Lawn)	
	F	B	F	B	F	B	F	B	F	B	F	F	F	B
Little brown bat	0.7	0	0.3	0	1	0.7	1	0.3	1	0.1	0.7	0	0.3	0
Bobcat	0.3	0	0.1	0	1	0.1	0.3	0	0.3	0	0.3	0	0.1	0
Elk	0.3	0	0.3	0	0.7	0	0.7	0.3	1	0	0.1	0	0.1	0
Downy woodpecker	0.1	0	0.3	0.1	1	0.7	1	0.3	0.3	0.1	0.1	0	0.1	0
Red-legged frog	0	0	0	0	0.1	0	1	0.7	0.1	0	0	0	0	0
Red-tailed hawk	0.3	0	0.3	0	0.3	1	0.7	0.3	0.3	0.1	0.3	0	0.1	0
White-crowned sparrow	0.7	0.3	0.3	0.3	0.3	0.3	1	0.7	0.3	0.1	0.7	0.3	0.3	0.1
Native bumble bee	0.3	0.1	0.1	0	0.3	0.3	0.3	1	0.3	0.1	0.3	0.1	0.1	0
Bald eagle	0.1	0	0	0	0	0.3	0	0	0	0.1	0	0	0	0
Northern spotted owl	0	0	0	0	0.7	0	0.3	0	0.3	0	0	0	0	0
Ore. slender salamander	0	0	0	0	0.3	0.3	0	0	0.1	0.1	0	0	0	0
Short-eared owl	0.1	0	0.1	0	0	0	0.1	0	0	0	0.1	0	0	0
Streaked horned lark	0.1	0	0	0	0	0	0	0	0	0	0.1	0	0	0

NOTES: F – foraging habitat; B – breeding habitat.

TABLE 2
PRE-CONSTRUCTION WILDLIFE HABITAT UNITS (WHUS) FOR THE FILTRATION FACILITY SITE, PIPELINES, INTERTIE, AND CARPENTER LANE PROPERITES - 13 FOCAL SPECIES FOR THE MODIFIED HEP ANALYSIS

	Filtration Facility Site - Nursery Land (89.2 acres)		Finished Pipelines - Road Rights-of-Way (16.9 acres)		Filtration Fac. Upland Forest (5.8 acres)		Raw Pipe - Mixed Woodland (4.0 acres)		Filtration Fac. Riparian Habitat (0.2 acre)		Intertie (0.5 acre)		Carpenter Lane Properties (1.5 acre)		WHUs (117.1 acres)
	F	B	F	B	F	B	F	B	F	B	F	B	F	B	
Little brown bat	62.44	0.00	5.06	0.00	5.80	4.06	4.00	1.20	0.20	0.02	0.35	0.00	0.45	0.00	
Bobcat	26.76	0.00	1.69	0.00	5.80	0.58	1.20	0.00	0.06	0.00	0.15	0.00	0.15	0.00	
Elk	26.76	0.00	5.06	0.00	4.06	0.00	2.80	1.20	0.20	0.00	0.05	0.00	0.15	0.00	
Downy woodpecker	8.92	0.00	5.06	1.69	5.80	4.06	4.00	1.20	0.06	0.02	0.05	0.00	0.15	0.00	
Red-legged frog	0.00	0.00	0.00	0.00	0.58	0.00	4.00	2.80	0.02	0.00	0.00	0.00	0.00	0.00	
Red-tailed hawk	26.76	0.00	5.06	0.00	1.74	5.80	2.80	1.20	0.06	0.02	0.15	0.00	0.15	0.00	
White-crowned sparrow	62.44	26.76	5.06	5.06	1.74	1.74	4.00	2.80	0.06	0.02	0.35	0.15	0.45	0.15	
Native bumble bee	26.76	8.92	1.69	0.00	1.74	1.74	1.20	4.00	0.06	0.02	0.15	0.05	0.15	0.00	
Bald eagle	8.92	0.00	0.00	0.00	0.00	1.74	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	
Northern spotted owl	0.00	0.00	0.00	0.00	4.06	0.00	1.20	0.00	0.06	0.00	0.00	0.00	0.00	0.00	
Ore. slender salamander	0.00	0.00	0.00	0.00	1.74	1.74	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	
Short-eared owl	8.92	0.00	1.69	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.05	0.00	0.00	0.00	
Streaked horned Lark	8.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	
WHUs	**267.60**	**35.68**	**30.37**	**6.75**	**33.06**	**21.46**	**25.60**	**14.40**	**0.80**	**0.14**	**1.35**	**0.20**	**1.65**	**0.15**	**439.20**

NOTES: F – foraging habitat; B – breeding habitat.

TABLE 3
POST-CONSTRUCTION HSIS FOR THE PLANNED FILTRATION FACILITY SITE, PIPELINES, AND INTERTIE - 13 FOCAL SPECIES FOR THE MODIFIED HEP ANALYSIS

	Filtration Facility Site – Former Nursery Land (outside the facility fence)*		Filtration Facility Site – Former Nursery Land (inside fence, but not hard surfaces)		Finished Pipeline - Road Rights-of-Way		Filtration Facility Site - Upland Forest		Raw Pipeline - Mixed Woodland		Filtration Facility Site - Riparian Habitat		Intertie (Hard Surfaces and Landscaping)		Carpenter Lane Properties (Hedgerow & Shrub/Tree Planting)	
	F	**B**	**F**	**B**	**F**	**B**	**F**	**B**	**F**	**B**	**F**	**B**	**F**	**B**	**F**	**B**
Little brown bat	**1 (+)**	**0.7 (+)**	0.3	0	0.3	0	1	0.7	1	0.3	1	**0.7 (+)**	**0.1 (-)**	0	0.3	0
Bobcat	0.3	0	**0 (-)**	0	0.1	0	1	**0.3 (+)**	0.3	0	0.3	0	**0 (-)**	0	0.3	0
Elk	0.3	0	**0 (-)**	0	**0 (-)**	0	0.7	0	0.7	0.3	1	0	0.1	0	**0.3 (+)**	0
Downy woodpecker	0.1	0	**0 (-)**	0	**0.1 (-)**	**0 (-)**	1	0.7	1	0.3	0.3	0.3	0.1	0	**0.3 (+)**	0
Red-legged frog	**0.3 (+)**	0	0	0	0	0	**0.3 (+)**	0	1	0.7	**0.3 (+)**	0	0	0	0	0
Red-tailed hawk	**1 (+)**	0	**0 (-)**	0	0.3	0	0.3	1	0.7	0.3	0.3	0	**0.1 (-)**	0	0.1	0
White-crowned sparrow	**1 (+)**	**1 (+)**	0.3	**0 (-)**	**0.1 (-)**	**0.1 (-)**	0.3	0.3	1	0.7	0.3	0.1	**0.3 (-)**	0.3	0.3	**0.7 (+)**
Native bumble bee	**1 (+)**	**0.3 (+)**	0.1	**0 (-)**	0.1	0	**0.7 (+)**	0.3	0.3	1	**0.7 (+)**	0.1	0.3	**0 (-)**	**0.3 (+)**	0
Bald eagle	0 **(-)**	0	0	0	0	0	0	0.3	0	0	0	0.1	0	0	0	0
Northern spotted owl	0	0	0	0	0	0	0.3	0	0.3	0	0.3	0	0	0	0	0
Ore. slender salamander	0	0	0	0	0	0	0.3	0.3	0.1	0.3	0.3	0.3	0	0	0	0
Short-eared owl	0.3	0.1	0	0	0.1	0	0	0	0.1	0	0	0	0	0	0	0
Streaked horned Lark	0.1	0	0 **(-)**	0	0	0	0	0	0	0	0	0	0 **(-)**	0	0	0

NOTES: F – foraging habitat; B – breeding habitat. Changes to expected wildlife use of adjacent habitats (HSIs) are shown in bold with either a (+) or (-), depending on if the value increased or decreased compared to pre-construction conditions.

*Includes Savanna / Oak Woodland habitat; Wooded/Shrubby Buffer; Grassland; and some managed Landscaping areas

TABLE 4
POST-CONSTRUCTION WILDLIFE HABITAT UNITS (WHUS) FOR THE PLANNED FILTRATION FACILITY SITE, PIPELINES, AND INTERTIE - 13 FOCAL SPECIES FOR THE MODIFIED HEP ANALYSIS

	Filtration Facility Site – Former Nursery (38.6 acres outside the fence)*		Filtration Facility Site – Former Nursery (23.3 acres inside the fence, excludes hard surfaces)		Finished Pipeline - Road Rights-of-Way (16.9 acres)		Filtration Facility Site - Upland Forest (6.8 acres)		Raw Pipeline - Mixed Woodland (4.0 acres)		Filtration Facility Site - Riparian Habitat (1.9 acres)		Intertie (0.5 acres)		Carpenter Lane Properties (Hedgerow & Shrub/Tree Planting)		WHUs (93.2 acres)
	F	B	F	B	F	B	F	B	F	B	F	B	F	B	F	B	
Little brown bat	38.60	27.02	6.99	0.00	5.06	0.00	6.80	4.76	4.00	1.20	1.90	1.33	0.05	0.00	0.45	0.00	
Bobcat	11.58	0.00	0.00	0.00	1.69	0.00	6.80	2.04	1.20	0.00	0.57	0.00	0.00	0.00	0.45	0.00	
Elk	11.58	0.00	0.00	0.00	1.69	0.00	4.76	0.00	2.80	1.20	1.90	0.00	0.05	0.00	0.45	0.00	
Downy woodpecker	3.86	0.00	0.00	0.00	1.69	0.00	6.80	4.76	4.00	1.20	0.57	0.19	0.05	0.00	0.45	0.00	
Red-legged frog	11.58	0.00	0.00	0.00	0.00	0.00	2.04	0.00	4.00	4.00	0.57	0.00	0.00	0.00	0.00	0.00	
Red-tailed hawk	38.60	0.00	0.00	0.00	5.06	0.00	2.04	6.80	2.80	1.20	0.57	0.19	0.05	0.00	0.15	0.00	
White-crowned sparrow	38.60	38.60	6.99	0.00	5.06	5.06	2.04	2.04	4.00	2.80	0.57	0.19	0.15	0.15	0.45	1.05	
Native bumble bee	38.60	11.58	2.33	0.00	5.06	0.00	4.76	2.04	1.20	4.00	1.33	0.19	0.15	0.00	0.45	0.00	
Bald eagle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.04	0.00	0.00	0.00	0.19	0.00	0.00	0.00	0.00	
Northern spotted owl	0.00	0.00	0.00	0.00	0.00	0.00	4.76	0.00	1.20	0.00	0.57	0.00	0.00	0.00	0.00	0.00	
Ore. slender salamander	0.00	0.00	0.00	0.00	0.00	0.00	2.04	2.04	0.00	0.00	0.57	0.57	0.00	0.00	0.00	0.00	
Short-eared owl	11.58	3.86	0.00	0.00	1.69	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Streaked horned Lark	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
WHUs	**206.58**	**81.06**	**16.31**	**0.00**	**26.99**	**5.06**	**42.84**	**26.52**	**25.60**	**15.60**	**9.12**	**2.85**	**0.50**	**0.15**	**2.85**	**1.05**	**463.08**

NOTES:

F – foraging habitat; B – breeding habitat.

*Includes Savanna / Oak Woodland habitat; Wooded/Shrubby Buffer; Grassland; and some managed Landscaping areas

Pre- and post-construction effects on wildlife in the vicinity of the planned Filtration Facility Site are presented in the tables above. Changes to anticipated wildlife use of adjacent habitats (HSIs) compared to pre-construction conditions are shown **in bold** with either a (+) or (-), depending on if the value increased or decreased.

TABLE 5
PRE-CONSTRUCTION HSIS FOR THE AREA WITHIN 1,000 FEET OF THE FILTRATION FACILITY SITE - 13 FOCAL SPECIES FOR THE MODIFIED HEP ANALYSIS

	Nursery Land/Rural Residences/Pastures		Upland Forest		Riparian Forest	
	F	B	F	B	F	B
Little brown bat	0.7	0	1	0.7	1	0.7
Bobcat	0.3	0	1	0.1	0.3	0
Elk	0.3	0	1	0	1	0
Downy woodpecker	0.1	0	1	1	0.7	0.7
Red-legged frog	0	0	1	0	1	0.1
Red-tailed hawk	0.3	0	1	1	0.3	0
White-crowned sparrow	0.7	0.3	0.7	0.7	0.3	0.1
Native bumble bee	0.1	0.1	0.7	0.7	0.7	0
Bald eagle	0.1	0	0	0.3	0	0.1
Northern spotted owl	0	0	0.3	0	0.3	0
Ore. slender salamander	0	0	0.3	0.3	0.1	0.1
Short-eared owl	0.1	0	0	0	0	0
Streaked horned Lark	0.1	0	0	0	0	0

TABLE 6
PRE-CONSTRUCTION WILDLIFE HABITAT UNITS FOR THE AREA WITHIN 1,000 FEET OF THE FILTRATION FACILITY SITE - 13 FOCAL SPECIES FOR THE MODIFIED HEP ANALYSIS

	Nursery Land/Rural Residential/Pastures (~ 190 acres)		Upland Forest (~ 85 acres)		Riparian Forest (~ 25 acres)		WHUs (300 acres)
	F	B	F	B	F	B	
Little brown bat	133.00	0.00	85.00	59.50	30.00	21.00	
Bobcat	57.00	0.00	85.00	8.50	9.00	0.00	
Elk	57.00	0.00	85.00	0.00	30.00	0.00	
Downy woodpecker	19.00	0.00	85.00	85.00	21.00	21.00	
Red-legged frog	0.00	0.00	85.00	0.00	30.00	3.00	
Red-tailed hawk	57.00	0.00	85.00	85.00	9.00	0.00	
Song sparrow	133.00	57.00	59.50	59.50	9.00	3.00	
Native bumble bee	19.00	19.00	59.50	59.50	21.00	0.00	
Bald eagle	19.00	0.00	0.00	25.50	0.00	3.00	
Northern spotted owl	0.00	0.00	25.50	0.00	9.00	0.00	
Ore. slender salamander	0.00	0.00	25.50	25.50	3.00	3.00	
Short-eared owl	19.00	0.00	0.00	0.00	0.00	0.00	
Streaked horned Lark	19.00	0.00	0.00	0.00	0.00	0.00	
WHUs	**532.00**	**76.00**	**680.00**	**408.00**	**171.00**	**54.00**	**1,921.00**

TABLE 7
POST-CONSTRUCTION HSIS FOR THE AREA WITHIN 1,000 FEET OF THE FILTRATION FACILITY SITE - 13 FOCAL SPECIES FOR THE MODIFIED HEP ANALYSIS

	Nursery Land		Upland Forest		Rip Forest	
	F	B	F	B	F	B
Little brown bat	0.7	0	1	0.7	1	0.7
Bobcat	0.3	0	1	0.1	0.3	0
Elk	0.3	0	1	0	1	0
Downy woodpecker	0.1	0	1	1	0.7	0.7
Red-legged frog	0	0	1	0	1	**1 (+)**
Red-tailed hawk	0.3	0	1	1	0.3	0
White-crowned sparrow	0.7	0.3	0.7	0.7	0.3	0.1
Native bumble bee	0.1	0.1	0.7	0.7	0.7	0
Bald eagle	0.1	0	0	0.3	0	0.1
Northern spotted owl	0	0	0.3	0	0.3	0
Ore. slender salamander	0	0	0.3	0.3	0.1	0.1
Short-eared owl	0.1	0	0	0	0	0
Streaked horned Lark	0.1	0	0	0	0	0

TABLE 8
POST-CONSTRUCTION WILDLIFE HABITAT UNITS FOR THE AREA WITHIN 1,000 FEET OF THE FILTRATION FACILITY SITE - 13 FOCAL SPECIES FOR THE MODIFIED HEP ANALYSIS

	Nursery Land/Rural Residential/Pastures (~ 184 acres)		Upland Forest (~ 87 acres)		Riparian Forest (~ 27 acres)		WHUs (300 ac)
	F	B	F	B	F	B	
Little brown bat	130.20	0.00	87.00	60.90	27.00	18.90	
Bobcat	55.80	0.00	87.00	8.70	8.10	0.00	
Elk	55.80	0.00	87.00	0.00	27.00	0.00	
Downy woodpecker	18.60	0.00	87.00	87.00	18.90	18.90	
Red-legged frog	0.00	0.00	87.00	0.00	27.00	27.00	
Red-tailed hawk	55.80	0.00	87.00	87.00	8.10	0.00	
Song sparrow	130.20	55.80	60.90	60.90	8.10	2.70	
Native bumble bee	18.60	18.60	60.90	60.90	18.90	0.00	
Bald eagle	18.60	0.00	0.00	26.10	0.00	2.70	
Northern spotted owl	0.00	0.00	26.10	0.00	8.10	0.00	
Ore. slender salamander	0.00	0.00	26.10	26.10	2.70	2.70	
Short-eared owl	18.60	0.00	0.00	0.00	0.00	0.00	
Streaked horned Lark	18.60	0.00	0.00	0.00	0.00	0.00	
WHUs	**520.80**	**74.40**	**696.00**	**417.60**	**153.90**	**72.90**	**1,935.60**

Attachment 4

Attachment 4 - Tree Replacement Jurisdictional Comparison Table

The Portland Water Bureau is planting 3418 trees not including the additional trees to be planted at Cottrell Pond. The equivalent caliper of those trees is 2503 1" trees or 1252 2" caliper trees.

Tree Codes						
Jurisdiction	**No Net Loss**	**Trees replacement**	**Tree size**	**Details**	**Tree Replacement for PWB Project per Jurisdiction Code**	**link**
Redmond, Washington	yes	Significant trees - 6" dbh to 30", replacement standard is 1:1 Landmark trees - >30" dbh: replacement standard 3:1	2.5" caliper deciduous ; 6' height evergreen	21.72.080	344 trees 6"-29" dbh = 344 trees @ 2.5" caliper 16 trees >30" dbh = 48 trees @2.5" caliper Total= **392 2.5" caliper trees** **EXCEEDS CRITERIA**	http://online.encodeplus.com/regs/redmond-wa/doc-viewer.aspx?secid=1997#secid-1997
Port Orchard, Washington	yes	Replacement requirements apply to trees ≥18". Trees 18-22" 0.5:1; trees 22-28" 1:1; trees 28-36 2:1; trees greater than 36" 3:1 (Table 20.129.040)	1.5" caliper, 6' height	20.129	Conservative application: 23 18"-22" @ 0.5:1 = 12; 16 >22"-28" @ 1:1 = 16; 9 >28"-36" @ 2:1 = 18 6 >36" @ 3:1 = 18; **Total = 64 1.5" caliper trees** calculation based on most stringent standard using all trees >18" dbh, if the project were in this jurisdiction, it would only apply to a subset of trees as those in ROW are exempt **EXCEEDS CRITERIA**	https://www.codepublishing.com/WA/PortOrchard/html/PortOrchard20/PortOrchard20129.html
Portland, Oregon	no	Most applicable standards: "Development situations" ROW & City Trees: 6", tree for tree Private Trees: 12-20", replace tree for tree; >20", replace at inch for inch	2" caliper	11.50.040.C	Development situations: ROW & City Trees: 304 trees @1:1 = 304 Private Trees: 6 trees (12-20") @ 1:1 = 6, 0 trees >20" **310 2" caliper trees total** (or equivalent payment) **EXCEEDS CRITERIA**	https://www.portland.gov/code/11/all
Portland, Oregon	no	Conservative estimate (Tree Permits for removal with no associated development 11.40): Trees >3"; trees 3-12" replace at 1:1, Trees >12" replace at inch for inch Trees on ROW and City Property (11.50.040.C.2.a.b) 1:1 replacement for any tree >6"-<12" 1:1, 12-<20" 2:1, >20" 1 tree per inch dbh	Per 1" caliper	Chapter 11.40	Conservative Application (No Associated Development): 336 trees 3-12", cumulative dbh for trees over 12"= 1347"; total required 336+1347= **1683 total 1" caliper trees** **EXCEEDS CRITERIA**	https://www.portland.gov/code/11/all
Gresham, Oregon	no	9.1033 Tree Replacement: During Development; No exemption for utility ROW's. Trees under 24" 1:1; trees over 24: 1 caliper inch per 4 inches of tree removed (applies to trees larger than 8" dbh	2" caliper	9.1032 Tree Removal: During Development	262 trees 8-24"; tree 24" and over 530 inches/4= 133; 262+133= **395 total trees replaced with 2" caliper** **EXCEEDS CRITERIA**	https://www.greshamoregon.gov/development-code/

Attachment 5

Individual Plants

Managed Landscape Areas		
Botanical Name	**Common Name**	**Plant Size**
Trees		
Alnus rhombifolia	White Alder	1.5" Cal.
Calocedrus decurrens	Incense-Cedar	5' Height
Nyssa sylvatica	Tupelo	1.5" Cal.
Pinus contorta var. contorta	Shore Pine	5' Height
Pinus ponderosa var. benthamiana	Pacific Ponderosa	5' Height
Pseudotsuga menziesii	Douglas-fir	1.5" Cal.
Quercus garryana	Oregon White Oak	1.5" Cal.
Quercus garryana	Oregon White Oak	2" Cal.
Rhamnus purshinana	Cascara	1.5" Cal.
Thuja 'Hogan'	Hogan Western Red Cedar	8' Height
Thuja plicata	Western Red Cedar	5' Height
Thuja plicata	Western Red Cedar	8' Height
Sub-Trees (10-15')		
Acer circinatum	Vine Maple	15 Gal.
Amelanchier alnifolia	Wester Service Berry	15 Gal.
Large Shrubs (5-10')		
Garrya elliptica	Silk Tassle Tree	5 Gal.
Myrica californica	Pacific Wax Myrtle	5 Gal.
Rubus parviflora	Thimbleberry	1 Gal.
Viburnum trilobum	American Cranberry	1 Gal.
Small Shrubs (2' - 5')		
Cornus 'Kelseyi'	Kelsey's Dogwood	1 Gal.
Mahonia aquifolium 'Compacta'	Compact Oregon Grape	1 Gal.
Mahonia nervosa	Cascade Oregon Grape	1 Gal.
Mahonia 'Soft Caress'	Soft Caress Mahonia	5 Gal.
Philadelphus lewisii 'Snow Dwarf'	Dwarf Mockorange	1 Gal.
Polysticum munitum	Western Sword Fern	5 Gal.
Spiraea betulifolia var. 'Tor'	Birchleaf Spirea	1 Gal.
Vaccinium ovatum	Evergreen Huckleberry	5 Gal.
Herbaceous (perennials, ferns, grasses)		
Achillea 'Moonshine'	Moonshine Yarrow	1 Gal.
Aesclepias speciosus	Milkweed	1 Gal.
Aquilegia columbiana	Columbine	1 Gal.
Calamgrostis nutkatensis	Pacific Reedgrass	1 Gal.
Deschampsia 'Goldtau'	Gold Dew Tufted Hairgrass	1 Gal.
Helleborus argutifolia	Corsican Hellebore	1 Gal.
Iris douglasii	Douglas Iris	1 Gal.
Lupinus polyphullus	Big-Leaf Lupine	1 Gal.
Sidalcea campestris	Checker Mallow	1 Gal.
Tellima grandiflora	Fringecup	1 Gal.
Groundcover (12" or less)		
Arctostaphylos 'Vancouver Jade'	Vancouver Jade Bearberry	1 Gal.
Carex flacca	Grey Sedge	1 Gal.
Fragaria chiloensis	Beach Strawberry	1 Gal.
Mahonia repens	Cascade Oregon Grape	1 Gal.
Sedum spathifolium	broadleaf sedum	1 Gal.
Sedum oreganum	oregon sedum	1 Gal.

Unmanaged Landscape Areas		
Botanical Name	**Common Name**	**Plant Size**
Pinus contorta var. contorta	Shore Pine	5' Height
Pinus ponderosa var. willamettenesis	Willamette Valley Ponderosa Pine	5' Height
Pseudotsuga menziesii	Douglas Fir	5' Height
Quercus garryana	Oregon Oak	2" Cal.

Groundcover Mix - See sheet 00-LU-410 for layout details

Extended Area Groundcover				
Legend	**Botanical Name**	**Common Name**	**Plant Size**	**% Composition**
	Arctostaphylos 'Vancouver Jade'	Vancouver Jade Bearberry	1 Gal.	33%
	Carex flacca	Grey Sedge	1 Gal.	33%
	Fragaria chiloensis	Beach Strawberry	1 Gal.	34%

Screening Planting Mixes - See sheet 00-LU-410 for layout details

Screening Mix - Forested				
Legend	**Botanical Name**	**Common Name**	**Plant Size Unirrigated / Irrigated**	**% Composition**
	Trees			
	Abies grandis	Grand Fir	3' Ht. Bareroot / 6' Height	15%
	Acer macrophyllum	Bigleaf Maple	1.5" Cal. Bareroot / 1.5" Cal. B&B	5%
	Calocedrus decurrens	Incense Cedar	2' Ht. Bareroot / 6' Height	15%
	Larix occidentalis	Western Larch	3' Ht. Bareroot / 6' Height	5%
	Pinus ponderosa	Ponderosa Pine	3' Ht. Bareroot / 6' Height	10%
	Pseudotsuga menziesii	Douglas Fir	3' Ht. Bareroot / 6' Height	5%
	Rhamnus purshiana	Cascara	3' Ht. Bareroot / 1.5" Cal. B&B	5%
	Salix scouleriana	Scouler's Willow	3' Ht. Bareroot / 1.5" Cal. B&B	5%
	Shrubs			
	Mahonia aquifolium	Tall Oregon Grape	Bareroot	15%
	Oemleria ceracisformis	Osoberry	Bareroot	5%
	Polystichum munitum	Swordfern	Bareroot	5%
	Rubus parviflorus	Thimbleberry	Bareroot	5%
	Symphoricarpos albus	Snowberry	Bareroot	5%

Screening Mix - Shrubby				
Legend	**Botanical Name**	**Common Name**	**Plant Size Unirrigated / Irrigated**	**% Composition**
	Trees			
	Cornus nuttallii	Pacific Dogwood	1/2" Bareroot / 1.5" Cal. B&B	5%
	Pinus contorta var. contorta	Shore Pine	1/2" Bareroot / 8' Height	10%
	Shrubs			
	Amelanchier alnifolia	Serviceberry	5 Gal.	5%
	Corylus cornuta var californica	Western Hazelnut	5 Gal.	5%
	Holodiscus discolor	Oceanspray	5 Gal.	5%
	Garrya elliptica	Silk Tassel	5 Gal.	10%
	Mahonia aquifolium	Tall Oregon Grape	1Gal.	5%
	Myrica californica	Pacific Wax Myrtle	5 Gal.	10%
	Philadelphus lewisii	Mockorange	2 Gal.	5%
	Physocarpus capitatus	Pacific ninebark	2 Gal.	5%
	Ribes malvaceum	Chapparal Currant	1 Gal.	5%
	Rosa gymnocarpa	Baldhip Rose	1 Gal.	5%
	Sambucus racemosa	Red Elderberry	5 Gal.	5%
	Spiraea douglasii	Douglas spiraea	1 Gal.	5%
	Symphoricarpos albus	Snowberry	1 Gal.	5%
	Vaccinium ovatum	Evergreen Huckleberry	5 Gal.	5%
	Viburnum edule	Highbush cranberry	5 Gal.	5%

Planting Clusters - See sheet 00-LU-410 for layout details

Planting Clusters				
Legend	**Botanical Name**	**Common Name**	**Plant Size Unirrigated / Irrigated**	**% Composition**
A1	*Quercus garryana*	Oregon White Oak	1/2" Bareroot / 1.5" Cal. B&B	100%
A2	*Pinus ponderosa var. benthamiana*	Pacific Ponderosa Pine	1/2" Bareroot / 6' Ht. B&B	20%
	Quercus garryana	Oregon White Oak	1/2" Bareroot/ 1.5" Cal. B&B	80%
A3	*Amelanchier alnifolia*	Western Service Berry	1 Gal. Bareroot	5%
	Holodiscus discolor	Oceanspray	1 Gal. Bareroot	5%
	Mahonia aquifolium	Oregon Grape	1 Gal. Bareroot	10%
	Philadelphus lewisii	Mockorange	1 Gal. Bareroot	5%
	Physocarpus capitatus	Ninebark	1 Gal. Bareroot	5%
	Quercus garryana	Oregon Oak	1/2" Bareroot	30%
	Rosa gymnocarpa	Baldhip Rose	1 Gal. Bareroot	15%
	Symphoricarpos albus	Snowberry	1 Gal. Bareroot	15%
B1	*Mahonia aquifolium*	Oregon Grape	1 Gal. Bareroot	20%
	Rhamnus purshiana	Cascara	1/2" Bareroot	10%
	Salix scouleriana	Scouler's Willow	1/2" Bareroot	5%
	Sambucus cerulea	Blue elderberry	1 Gal. Bareroot	10%
	Symphoricarpos albus	Snowberry	1 Gal. Bareroot	50%
	Symphoricarpos mollis	Creeping Snowberry	1 Gal. Bareroot	5%
C1	*Mahonia aquifolium*	Tall Oregon Grape	1 Gal. Bareroot	20%
	Rosa gymnocarpa	Baldhip Rose	1 Gal. Bareroot	20%
	Rubus parviflorus	Thimbleberry	1 Gal. Bareroot	50%
	Symphoricarpos albus	Snowberry	1 Gal. Bareroot	10%

Type1 Seeding

Seeded Mowing Area			
Legend	**Botanical Name**	**Common Name**	**Percentage/PLS**
	Fleur de Lawn Blanche		PLS
	Lolium perenne	Perennial Ryegrass	40%
	Festuca trachyphylla	Hard Fescue	22%
	Festuca 'Quatro'	Quatro Tetraploid Sheep Fescue	20%
	Trifolium repens	White Clover	5%
	Achillea millefolium	White Yarrow	5%
	Lobularia maritima	Sweet Alyssum	5%
	Bellis perennis	Single White English Daisy	3%

Type 2 Seeding

Grassland Seeding - Bunchgrass Focused			
Legend	**Botanical Name**	**Common Name**	**Lbs/Acre**
	Grasses		
	Danthonia californica	California Oatgrass	6
	Deschampsia elongata	Slender Hairgrass	5
	Festuca occidentalis	Western Fescue	1
	Festuca roemeri	Roemer's Fescue	2
	Hordeum brachyantherum	Meadow Barley	1
	Koeleria macrantha	Prairie Junegrass	1
	Poa scabrella	Pine Junegrass	1
	Forbs		
	Achillea millefolium	Yarrow	0.5
	Anaphalis marginatacea	Pearly Everlasting	0.5
	Epilobium angustifolium	Fireweed	0.5
	Eriophyllum lanatum	Oregon Sunshine	1
	Geranium oreganum	Western Geranium	1
	Lupinus polyphyllus	Bigleaf Lupine	0.1
	Prunella vulgaris ssp lanceolata	Common Selfheal	1
	Sidalcea campestris	Meadow checkermallow	1
	Lomatium utriculatum	Common biscuitroot	1
	Lomatium macrocarpum	Bigseed Biscuitroot	1
	Solidago canadensis	Canada Goldenrod	0.25

Type 3 Seeding

Grassland Seeding - Color and Fire Resistance Focused			
Legend	**Botanical Name**	**Common Name**	**lbs/Acre**
	Danthonia californica	California Oatgrass	6
	Deschampsia elongata	Slender Hairgrass	5
	Festuca occidentalis	Western Fescue	1
	Festuca roemeri	Roemer's Fescue	2
	Hordeum brachyantherum	Meadow Barley	2
	Koeleria macrantha	Prairie Junegrass	1
	Poa scabrella	Pine Junegrass	2
	Forbs		
	Achillea millefolium	Yarrow	0.5
	Asclepias speciosa	Milkweed	0.5
	Anaphalis marginatacea	Pearly Everlasting	0.5
	Brodiaea coronaria	Brodiaea	0.5
	Epilobium angustifolium	Fireweed	0.25
	Eriophyllum lanatum	Oregon Sunshine	0.5
	Gaillardia aristata	blanket flower	0.5
	Geranium oreganum	Western Geranium	0.5
	Lomatium macrocarpum	*Bigseed Biscuitroot*	1
	Lupinus polyphyllus	*Bigleaf Lupine*	0.1
	Penstemon cardwellii	Cardwell's penstemon	0.25
	Prunella vulgaris ssp lanceolata	Common Selfheal	0.5
	Sidalcea campestris	Meadow checkermallow	0.5
	Solidago canadensis	Canada Goldenrod	0.5

See Sheet 00-LU-404 for stormwater plants

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No	Date	Description	Appd
CF	05/10/24	For Conformed Documents	MRG
Survey			

Revision

Stantec

Designed By	XXX	Design Mgr	XXX
Drawn By	XXX	Const Mgr	XXX
Checked By	XXX	CM/I Engr Mgr	XXX
Project Mgr	XXX	Date	05/10/24

Warning

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If this bar does not measure 1" then the drawing is not to scale

PORTLAND WATER BUREAU

FROM FOREST TO FAUCET

David W. Peters, Engineering Manager, PE No 16683

Date

CITY OF PORTLAND, OREGON 1851

Bull Run Filtration Facility

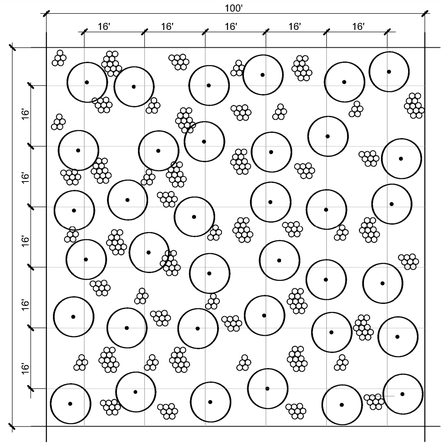
Land Use Plans

Plant Species and Sizes

SAP Project No W02229

1/4 Section -

Sheet No 00-LU-409



NOTES

1) Prior to installing plants, apply Grassland Seeding mix and establish for 45-days minimum.

2) Install trees at an overall density of 39 trees/10,000 s.f. (170/acre)

3) Install trees 10'-22' on-center; average 16' on-center.

4) Install shrubs at an overall density of 399 shrubs/10,000 s.f.

5) Install shrubs in groups of 3-12 plants per species. Space shrubs 1' min to 3' max on-center.

6) provide 5' minimum spacing between shrub groups and between a tree and shrubs group.

7) Spread species throughout the given planting area to avoid monocultures, a random 10,000 s.f. sample should contain all species.

8) Maintain a 1' diameter plant-free area around all stems and mulch with wood chip mulch to prevent weeds.

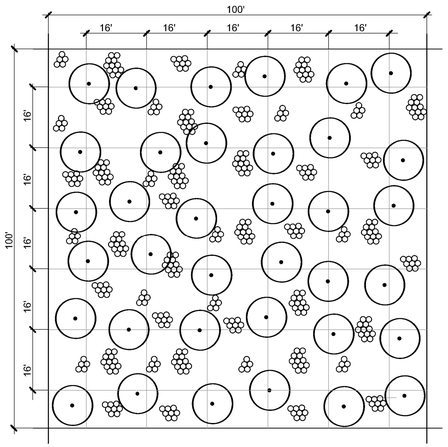
	Mitigation Planting			
Legend	Botanical Name	Common Name	Plant Size	Composition
	Trees			
	Abies grandis	Grand Fir	2' Ht. Bareroot	10/10,000 sf
	Acer macrophyllum	Bigleaf Maple	1/2" Bareroot	3/10,000 sf
	Calocedrus decurrens	Incense Cedar	2' Ht. Bareroot	3/10,000 sf
	Larix occidentalis	Western Larch	2' Ht. Bareroot	1/10,000 sf
	Pinus ponderosa	Ponderosa Pine	2' Ht. Bareroot	10/10,000 sf
	Pseudotsuga menziesii	Douglas Fir	2' Ht. Bareroot	3/10,000 sf
	Rhamnus purshiana	Cascara	1/2" Bareroot	6/10,000 sf
	Salix scouleriana	Scouler's Willow	1/2" Bareroot	3/10,000 sf
	Shrubs			
	Mahonia aquifolium	Tall Oregon Grape	Bareroot	57/10,000 sf
	Oemleria cerasiformis	Osoberry	Bareroot	28/10,000 sf
	Physocarpus capitatus	Pacific ninebark	Bareroot	57/10,000 sf
	Polystichum munitum	Swordfern	Bareroot	28/10,000 sf
	Rubus parviflorus	Thimbleberry	Bareroot	57/10,000 sf
	Rosa pisocarpa	Swamp Rose	Bareroot	57/10,000 sf
	Spiraea douglasii	Douglas Spiraea	Bareroot	57/10,000 sf
	Symphoricarpos albus	Snowberry	Bareroot	57/10,000 sf

TREE

SHRUB

Upland Forest Planting

NTS



NOTES

1) Prior to installing plants, survey planting area an remove invasives if located.

2) Install trees at an overall density of 39 trees/10,000 s.f. (170/acre)

3) Install trees 10'-22' on-center; average 16' on-center.

4) Install shrubs at an overall density of 399 shrubs/10,000 s.f.

5) Install shrubs in groups of 3-12 plants per species. Space shrubs 1' min to 3' max on-center.

6) provide 5' minimum spacing between shrub groups and between a tree and shrubs group.

7) Spread species throughout the given planting area to avoid monocultures, a random 10,000 s.f. sample should contain all species.

8) Maintain a 1' diameter plant-free area around all stems and mulch with wood chip mulch to prevent weeds. Overseed any bare soil patches with Grassland Seeding Mix.

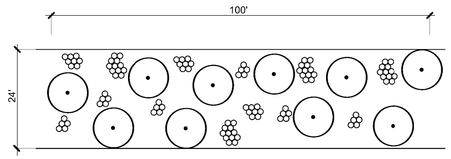
Botanical Name	Common Name	Planting Size	Composition
Trees			
Malus fusca	Western Crabapple	1/2" Bareroot	6/10,000 s.f.
Pseudotsuga menziesii	Douglas Fir	2' Ht. Bareroot	3/10,000 s.f.
Rhamnus purshiana	Cascara	1/2" Bareroot	20/10,000 s.f.
Salix scouleriana	Scouler's Willow	1/2" Bareroot	7/10,000 s.f.
Thuja plicata	Western Red Cedar	2' Ht. Bareroot	3/10,000 s.f.
Shrubs			
Cornus sericea	Redosier Dogwood	Bareroot	80/10,000 s.f.
Lonicera involucrata	Twinberry	Bareroot	80/10,000 s.f.
Physocapus capitatus	Ninebark	Bareroot	80/10,000 s.f.
Rosa pisocarpa	Swamp Rose	Bareroot	80/10,000 s.f.
Spiraea douglasii	Douglas Spirea	Bareroot	80/10,000 s.f.

TREE

SHRUB

Riparian Forest Planting

NTS



NOTES

1) Prior to installing plants, apply Grassland Seeding mix and establish for 45-days minimum.

2) Install trees at an overall density of 39 trees/10,000 s.f. (170/acre)

3) Install trees in a naturalistic manner, dispersed throughout the hedgerow. Min. 12', Max. 18' on-center.

4) Install shrubs at an overall density of 399 shrubs/10,000 s.f.

5) Install shrubs in groups of 3-12 plants per species. Space shrubs 1' min to 3' max on-center.

6) provide 5' minimum spacing between shrub groups and between a tree and shrubs group.

7) Spread species throughout the given planting area to avoid monocultures, a random 10,000 s.f. sample should contain all species.

8) Maintain a 1' diameter plant-free area around all stems and mulch with wood chip mulch to prevent weeds.

Hedgerow Planting			
Botanical Name	**Common Name**	**Plant Size**	**Composition**
Trees			
Rhamnus purshiana	Cascara	1/2" Bareroot	39/10,000 sf
Shrubs			
Mahonia aquifolium	Tall Oregon Grape	Bareroot	57/10,000 sf
Ribes malvaceum	Chapparal Currant	Bareroot	57/10,000 sf
Rosa gymnocarpa	Baldhip Rose	Bareroot	57/10,000 sf
Rosa nutkana	Nootka Rose	Bareroot	57/10,000 sf
Rubus parviflorus	Thimbleberry	Bareroot	57/10,000 sf
Spiraea douglasii	Douglas Spiraea	Bareroot	57/10,000 sf
Symphoricarpos albus	Snowberry	Bareroot	57/10,000 sf

TREE

SHRUB

Hedgerow Planting

NTS

REGISTERED
LANDSCAPE ARCHITECT
Jason Hirst
OREGON
02/20/2014
Expires: 02/28/26

No	Date	Description	Appd
CF	05/10/24	For Conformed Documents	MRG
Revision			
Survey			

Stantec

Designed By	XXX	Design Mgr	XXX
Drawn By	XXX	Const Mgr	XXX
Checked By	XXX	CM/I Engr Mgr	XXX
Project Mgr	XXX	Date 05/10/24	

Warning

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If this bar does not measure 1" then the drawing is not to scale

PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

David W. Peters, Engineering Manager, PE No 16683

Date

CITY OF PORTLAND OREGON 1851

Bull Run Filtration Facility

Land Use Plans

Planting Details

SAP Project No
W02229
1/4 Section
-
Sheet No
00-LU-411

Type 1 Seeding - Provide topsoil for Type C seeded areas

Legend	Seeded Mowing Area		
	Botanical Name	**Common Name**	**Percentage/PLS**
	Fleur de Lawn Blanche		PLS
	Lolium perenne	Perennial Ryegrass	40%
	Festuca trachyphylla	Hard Fescue	22%
	Festuca 'Quatro'	Quatro Tetraploid Sheep Fescue	20%
	Trifolium repens	White Clover	5%
	Achillea millefolium	White Yarrow	5%
	Lobularia maritima	Sweet Alyssum	5%
	Bellis perennis	Single White English Daisy	3%

Type 2 Seeding - Provide topsoil for Type C seeded areas

Grassland Seeding - Bunchgrass Focused			
Legend	**Botanical Name**	**Common Name**	**Lbs/Acre**
	Grasses		
	Danthonia californica	California Oatgrass	6
	Deschampsia elongata	Slender Hairgrass	5
	Festuca occidentalis	Western Fescue	1
	Festuca roemeri	Roemer's Fescue	2
	Hordeum brachyantherum	Meadow Barley	1
	Koeleria macrantha	Prairie Junegrass	1
	Poa scabrella	Pine Junegrass	1
	Forbs		
	Achillea millefolium	Yarrow	0.5
	Anaphalis marginatacea	Pearly Everlasting	0.5
	Epilobium angustifolium	Fireweed	0.5
	Eriophyllum lanatum	Oregon Sunshine	1
	Geranium oreganum	Western Geranium	1
	Lupinus polyphyllus	Bigleaf Lupine	0.1
	Prunella vulgaris ssp lanceolata	Common Selfheal	1
	Sidalcea campestris	Meadow checkermallow	1
	Lomatium utriculatum	Common biscuitroot	1
	Lomatium macrocarpum	Bigseed Biscuitroot	1
	Solidago canadensis	Canada Goldenrod	0.25

Type 3 Seeding - Provide topsoil for Type C seeded areas

Grassland Seeding - Color and Fire Resistance Focused			
Legend	**Botanical Name**	**Common Name**	**lbs/Acre**
	Danthonia californica	California Oatgrass	6
	Deschampsia elongata	Slender Hairgrass	5
	Festuca occidentalis	Western Fescue	1
	Festuca roemeri	Roemer's Fescue	2
	Hordeum brachyantherum	Meadow Barley	2
	Koeleria macrantha	Prairie Junegrass	1
	Poa scabrella	Pine Junegrass	2
	Forbs		
	Achillea millefolium	Yarrow	0.5
	Asclepias speciosa	Milkweed	0.5
	Anaphalis marginatacea	Pearly Everlasting	0.5
	Brodiaea coronaria	Brodiaea	0.5
	Epilobium angustifolium	Fireweed	0.25
	Eriophyllum lanatum	Oregon Sunshine	0.5
	Gaillardia aristata	blanket flower	0.5
	Geranium oreganum	Western Geranium	0.5
	Lomatium macrocarpum	*Bigseed Biscuitroot*	1
	Lupinus polyphyllus	*Bigleaf Lupine*	0.1
	Penstemon cardwellii	Cardwell's penstemon	0.25
	Prunella vulgaris ssp lanceolata	Common Selfheal	0.5
	Sidalcea campestris	Meadow checkermallow	0.5
	Solidago canadensis	Canada Goldenrod	0.5

Stormwater Seed Mixes - Provide topsoil for Type B stormwater facilities

See Details 311 and 312 on Sheet 06-L-931 for placement of seed mixes in stormwater areas. These seed mixes are only to be applied to stormwater areas that are depicted with the hatch patterns shown in the sheet legends.

Stormwater - Seed Mix			
Legend	**Botanical Name**	**Common Name**	**Lbs/Acre**
	Grasses		
	Danthonia californica	California Oatgrass	5
	Deschampsia cespitosa	Tufted Hairgrass	3
	Deschampsia elongata	Slender Hairgrass	3
	Hordeum brachyantherum	Meadow Barley	1
	Flowering Plants		
	Achillea millefolium	Yarrow	0.5
	Aesclepias speciosa	Milkweed	0.5
	Carex densa	Dense Sedge	1
	Carex unilateralis	Lateral Sedge	1
	Juncus patens	Slender Rush	1
	Juncus tenuis	Spreading Rush	1
	Lupinus latifolius	Broadleaf Lupine	0.1
	Potentilla gracilis	Graceful Cinqufoil	0.5

Stormwater Pond Bottom - Seed Mix			
Legend	**Botanical Name**	**Common Name**	**Lbs/Acre**
	Carex densa	Dense Sedge	0.25
	Carex pachystachya	Chamisso Sedge	0.5
	Carex scoparia	Broom Sedge	0.5
	Carex unilateralis	Bone-Sided Sedge	0.5
	Agrostis exerata	Spike bentgrass	1
	Danthonia californica	California Oatgrass	2
	Deschampsia cespitosa	Tufted Hairgrass	1
	Juncus tenuis	Slender Rush	0.1
	Achillea millefolium	Western Yarrow	0.25
	Epilobium densiflorum	Spike Primrose	0.1
	Grindelia integrifolia	Willamette Gumweed	0.1
	Lupinus rivularis	Riverbank Lupine	0.1
	Madia elegans	Common Madia	0.3
	Mimulus guttatus	Yellow Monkeyflower	0.1
	Plagiobothrys figuratus	Fragrant Popcorn Flower	0.1
	Sidalcea campestris	Checkermallow	0.5

REGISTERED LANDSCAPE ARCHITECT
0824
Justin Wrest
OREGON
02/20/2014
Expires: 02/28/26

No	Date	Description	Appd
CF	05/10/24	For Conformed Documents	MRG

Revision

Survey

Stantec
NNA Landscape Architecture

Designed By	JBH	Design Mgr	LSH
Drawn By	JSJ	Const Mgr	TG
Checked By	SR	CM/I Engr Mgr	JB
Project Mgr	MRG	Date 05/10/24	

Warning
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PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

David W. Peters, Engineering Manager, PE No 16683 — Date

CITY OF PORTLAND OREGON 1851

Bull Run Filtration Facility

Landscape

Planting Schedule - 1

SAP Project No W02229
1/4 Section -
Sheet No GEN-L-101
276 of 2434

Attachment 6

PORTLAND PLANT LIST

June 2016

Bureau of Planning and Sustainability
City of Portland, Oregon
1900 SW 4th Ave. Suite 7100, Portland, OR 97201

Adopted by Portland City Council November, 13, 1991 Effective December 13, 1991

Ordinance No. 164838

Amended May 26, 1993

Ordinance No. 166572; September 21, 1994

Ordinance No. 168154; March 19, 1997

Ordinance No. 171000; June 24, 1998; March 23, 2004; June 2009

Re-established as administrative rule by City Council February 10, 2010 Effective July 1, 2010

Ordinance No. 183534

Administrative rule update, Bureau of Planning and Sustainability April 13, 2011 Effective May 13, 2011

Ordinance No. 184521

Effective July 1, 2011

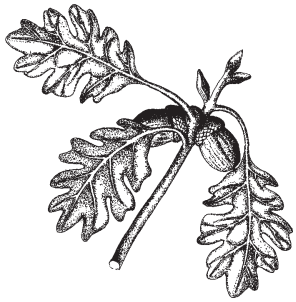
Ordinance No. 184524

Administrative rule update, Bureau of Planning and Sustainability Effective June 27, 2016

The Portland native plants policy was selected as a semifinalist for the **1993 Innovations in State and Local Government Awards** sponsored by the Ford Foundation and The JFK School of Government at Harvard University.

Bureau of Planning and Sustainability
City of Portland, Oregon
1900 SW 4th Ave. Suite 7100, Portland, OR 97201

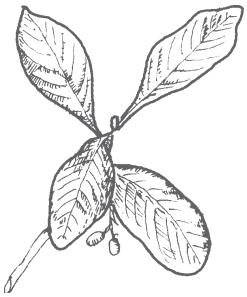
Contents



CONTENTS (continued)

1. Introduction

THE NATIVE PLANTS LIST AND THE NUISANCE PLANTS LIST



Indian plum

The City of Portland's environmental protection efforts include a focus on ensuring the continued viability and diversity of indigenous plant and animal communities, promoting the use of plants naturally adapted to local conditions, and educating citizens about the region's natural heritage and the values and uses of native plants.

A healthy native plant community serves many important functions:

- Provides habitat and food for native wildlife;
- Preserves critical habitat for rare, threatened and endangered animals and plants;
- Enhances air quality by trapping airborne particulates;
- Enhances water quality by filtering sediments (and pollutants attached to sediments) from runoff before the water enters streams;
- Stabilizes streambanks and hillside slopes by dissipating erosive forces;
- Enhances local microclimate, and reduces water and energy needs;
- Provides a place for native plants to continue to exist;
- Provides scenic and recreational and educational values, which, in turn, enhance Portland's livability. Native plants are part of the region's heritage.

The *Portland Plant List* is comprised of two lists and supporting information: the Native Plants List and the Nuisance Plants List. Both plant lists are integral to the City of Portland's natural resource protection program and invasive species management strategy. Only those plants on the Native Plants List are allowed to be planted within the City's Environmental Overlay Zone and the Pleasant Valley Natural Resources Overlay Zone. Native plants are also encouraged to be planted in the Greenway Overlay Zone.

The plants identified on the Nuisance Plants List are prohibited from being planted within the Environmental Overlay Zone, Greenway Overlay Zone, and the Pleasant Valley Natural Resources Overlay Zone. In addition, species on the Nuisance Plant List cannot be installed in City required landscaping areas. Plants — trees, shrubs, and groundcovers — on the Nuisance Plants List may be removed in the Environmental Overlay Zone, the Greenway Overlay Zone, and the Pleasant Valley Natural Resources Overlay Zone without a land use review. Plant removal methods that result in ground disturbance may require a permit or land use review when proposed within the Environmental Overlay Zone, Greenway Overlay Zone, and the Pleasant Valley Natural Resources Overlay Zone. Herbicide application may require a permit in the Greenway Overlay Zone.

In some situations in these overlay zones, tree removal may require a permit and tree replacement. Please consult the City of Portland *Zoning Code,*[1] other City codes,[2] and City staff for more detailed analysis of applicable requirements relating to removal and installation of plants on the Nuisance Plants List.

Certain species on the Nuisance Plants List are required to be removed if found on the property, regardless of whether a land use review or building permit is submitted. These plants are currently limited in distribution; however, they spread rapidly and they are very difficult to control once they become

established. These plants are identified in the *Portland Plant List* as the Nuisance Plants List, Required Eradication List. The requirements related to these plants are found in Portland City Code in Title 29, Property Maintenance Regulations, and the related administrative rule.

There are several useful definitions in this discussion. Some of these definitions are used in the *City of Portland Invasive Plants Strategy Report 2008*, and are revised for use in the *Portland Plant List*; other definitions are terms of use.

- **Native:** Species that were likely found historically (prior to European settlement) in the Portland area. Ecologically, many of these plants are exclusive food sources for native invertebrates; thus birds and other native animals that consume them rely upon this food source.
- **Ornamental:** Commercially sold non-native plants typically used in landscape areas.
- **Nuisance:** Species that threaten the health and safety of Portland citizens and/or degrade the habitat quality of natural areas.
- **Invasive:** Species that spread at such a rate that they cause harm to human health, the environment, and /or the economy. In natural areas, invasive plants are those species that displace native plants and become the dominant species in that vegetation layer. Invasive plants can halt successional processes by limiting the establishment and the growth patterns of native species. They can deprive native invertebrates of food sources, disrupting the food chain for native wildlife.
- **Weed:** A plant that grows where it is not wanted. Ecological weeds are pests in natural areas, agricultural weeds are pests in farmed areas, landscaping weeds are pests in landscaped areas, and so on.
- **Noxious weed:** A weed designated as noxious by the Oregon Department of Agriculture.

The Oregon Department of Agriculture (ODA) has a statewide noxious weed list, including both agricultural and ecological weeds. However, some of the invasive species degrading our natural areas are not on the ODA noxious weed list. Nursery sales are regulated by ODA under administrative rule (OAR 603-052-1200). This rule prohibits import, transport, propagation or sale of select "A" and "B" state listed noxious weeds and plants on the Federal Noxious Weed List (7 C.F.R. 360.200). The City of Portland does not have jurisdiction to regulate nursery sales or agricultural commodities in Oregon, but the City can regulate the types of vegetation planted. Some of the plants on the ODA Noxious Weed List are included in the City's Nuisance Plants List; these plants would remain subject to OAR 603. The City of Portland has made managing invasive plants a priority and has established programs, regulations, and policies accordingly. In addition, the City focuses efforts on education and outreach, working with the nursery and seed industry, and other actions to prevent the spread of invasive species.

A more localized list to characterize those species that threaten the health and safety of Portland citizens and natural areas is needed. When the first *Portland Plant List* was created, it contained, in addition to the list of native plants, a list of invasive species. For more information about the history of the *Portland Plant List*, see *Appendix A*.

The City of Portland recognizes that not all non-native plants are invasive. For example, there are many non-native, ornamental garden plants that don't spread rapidly, nor do they alter ecosystem processes. Our knowledge of what is and is not invasive changes over time. The potential for a plant to be invasive can sometimes be predicted using two factors — the level of invasiveness of the plants in areas with similar geologic and climate conditions, and the reproductive methods of the plants. Although invasive potential has not been evaluated for all

1 www.portlandonline.com/bps/index.cfm?c=29205

2 www.portlandonline.com/index.cfm?c=27891

ornamental plants, some plants included here represent obvious threats. Plants identified on the Nuisance Plants List currently can or do threaten the vitality of native ecosystems. "When an invasive species colonizes a new environment, it leaves behind the natural enemies such as predators or parasites that controlled its population growth in its original home. It can quickly expand, out-competing and overwhelming native species. Native species have not evolved the necessary survival strategies to fend off unfamiliar species or diseases" (Oregon Department of Fish and Wildlife, Conservation Strategy, February 2006).

Modification of the Portland Plant List

The information in the *Portland Plant List* will be updated periodically or as needed to reflect current scientifically accepted information about the characteristics and status of plants on the Native Plants List and the Nuisance Plants List. Changes may include but are not limited to: modification of language in the body of the document, the addition or removal of plants from any list, or a re-assignment of plant ranking.

Changes proposed to the *Portland Plant List* will be made through the City's administrative rule process. Administrative rules provide a streamlined process for reviewing and making changes to technical documents such as the *Portland Plant List*. The Bureau of Planning and Sustainability (BPS) will coordinate review of potential modifications to the *Portland Plant List*. The director of BPS, or their delegate, will make the final decision on the changes to the *Portland Plant List*. Potential modifications to the listed species and ranks will be reviewed by at least three or more knowledgeable persons with botany, biology, landscape architecture, or other qualified backgrounds. BPS will also inform key stakeholders of potential changes and provide reasonable opportunity for review and comment. The public can request changes to the list or changes to the ranks at any time by sending a written request to BPS. Potential amendments might be collected over a period of time and processed in batches, depending on the nature of the changes and resource availability.

The primary source for native plant determination is the five volume set, *Flora of the Pacific Northwest*, by Hitchcock and Cronquist. In some cases, the Oregon Vascular Plant Database (OSU Herbarium) samples, the Oregon Flora Project, and the Urbanizing Flora of Portland, Oregon 1806–2008 (Occasional Paper 3 of the Native Plant Society of Oregon, 2009) by J.A. Christy, A. Kimpo, Var. Marttala, P.K. Gaddis, and N.L. Christy, may also be used to determine whether plants are native to the Portland area.

How to Use the Lists

The Portland Plant List is divided into two sections: the Native Plants List (includes native plant communities, native plants in detail), and the Nuisance Plants List. These sections are summarized below.

Native Plants List

The Native Plants List has many uses, from public education and protection of our natural heritage to helping someone choose the most appropriate species for planting.

The Native Plants List is set up in several formats to assist the user. The plants are grouped into nine generalized "Native Plant Communities" for the City of Portland. Using the section "Native Plants in Detail," one can find appropriate plants for particular sites within a plant community.

The lists identify groundcovers (ferns, forbs, grasses, sedges, rushes, and other), shrubs, and trees. The Native Plants List includes the scientific name, the common name, and the associated habitat type. Of special note, arborescent shrubs are shrubs that resemble trees in growth, structure, or appearance but they are technically considered shrubs. Arborescent shrubs may not be used to meet, in any City title, the standards, criteria, or conditions of approval which require trees.

When considering development, particularly in forested areas, building materials and plant types should be evaluated. The Native Plants List indicates trees and shrubs that are "fire accelerants." Plants identified as *Fire Accelerant Y* are plants with higher than average flammable combustion potential due to flammability chemicals present within the leaves, needles, and stems. Plants identified as *Fire Accelerant N (neutral)* are plants with average flammable combustion potential (there are no chemicals present within the stems, leaves, and needles that make it less flammable or more flammable than average).

Native Plant Communities

The Native Plant Communities section describes the nine native plant communities found within the City of Portland. The lists include information about common and rare species.

Native Plants in Detail

The Native Plants in Detail section provides specific information on each of the native plants on the Native Plants List. The list divides the plants into the following subgroups: trees, shrubs, forbs, grasses, sedges and rushes, ferns, and others. For each group, the list includes the scientific (Latin) name of the species, common name, wetland indicator status, and life history characteristics. The life history characteristics include: information on flowering, light requirements, water requirements, and habitat type (wetland, riparian, forest, forested slopes, thicket, grass and rocky). Special lists are provided for groundcovers and vines, and native plants used as food by wildlife.

Nuisance Plants List

The plants on the Nuisance Plants List are invasive; they threaten the health and vitality of native habitats, humans, and cause economic harm to public and to private landowners. Planting of these plants should be avoided and removal encouraged. The Nuisance Plants List includes the common and scientific plant names, and assigns priority ranks of A, B, C, D, and W. The ranks were developed to educate the public about the distribution of and level of invasiveness of each species. In addition, these ranks help land managers prioritize actions when there are limited resources. The ranks apply to the named species only, and include any sub-species, varieties, or cultivars of these species, unless otherwise noted.

Taxa

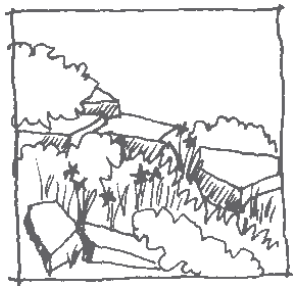
Plant names used in the *Portland Plant List* are taken primarily from Appendix III of *The Jepson Manual* (1993), and the five-volume set, *Flora of the Pacific Northwest* (1973), by Hitchcock and Cronquist. Other sources are *Flora of North America, Volume 2: Ferns and Gymnosperms* (Oxford University Press 1993), and research by the Carex Working Group and Barbara L. Wilson. Be aware that the names of some familiar species have been changed. Plant names can be determined online with the PLANTS database[3] and by the Oregon Flora Project.[4]

3 http://plants.usda.gov

4 www.oregonflora.org

2.8b ROCKY OUTCROPS, WET

Similar to Rocky Outcrops, Dry (see 8A), these places are characterized by rocky outcrops, cliffs, or small boulder fields, but the ground is moist or wet much of the year.



The plants that can exist here take advantage of moisture seeps or high groundwater accessible through cracks in the basalt. In protected, forested areas where the slope is north or east–facing, the ground remains cool year–round.

Because of the lack of soil cover, there are no trees and almost no shrubs. The plants that exist here take hold on rocks, in cracks and crevices, or along the edges where soil is thin. These plants can tolerate nutrient–poor conditions.

KEY	**Most common species appear in bold type**
	Italic type indicates species that rarely occur in this community within Portland

	Latin Name	Common Name
SHRUBS	Spiraea betulifolia var. lucida	Shiny–leaf Spiraea
HERBACEOUS, GRASSES, ETC.	**Adiantum aleuticum**	**Northern Maidenhair Fern**
	Dryopteris arguta	**Wood Fern**
	Acmispon americanus var. americanus	Spanish Clover
	Aquilegia formosa	Red Columbine
	Cardamine angulata	Angled Bittercress
	Cascadia nuttallii	Nuttall's Saxifrage
	Claytonia perfoliata	Miner's lettuce
	Collinsia parviflora	Small–flowered Blue–eyed Mary
	Collomia heterophylla	Varied–leaf Collomia

	Latin Name	Common Name
HERBACEOUS, GRASSES, ETC. (continuted)	Comandra umbellata var. californica	Bastard Toadflax
	Delphinium leucophaeum	Pale Larkspur
	Delphinium menziesii var. pyramidale	Menzies' Larkspur
	Elymus glaucus ssp. glaucus	Blue Wildrye
	Eriogonum nudum	Barestem Buckwheat
	Festuca roemeri	Roemer's Fescue
	Fritillaria affinis	Checker Lily
	Gilia capitata	Bluefield Gilia
	Heuchera glabra	Smooth Alumroot
	Heuchera micrantha	Smallflowered Alumroot
	Melica bulbosa	Oniongrass
	Micranthes integrifolia	Swamp Saxifrage
	Micranthes rufidula	Western Saxifage
	Mimulus alsinoides	Chickweed Monkeyflower
	Mimulus guttatus	Common Monkeyflower
	Montia linearis	Narrow–leaved Montia
	Montia parvifolia	Streambank Springbeauty
	Penstemon serrulatus	Cascade Penstemon
	Rubus ursinus	Pacific Blackberry
	Saxifraga mertensiana	Merten's Saxifrage
	Sedum oreganum	Oregon Stonecrop
	Sedum spathulifolium	Spatula–leaf Stonecrop
	Selaginella douglasii	Douglas' Selaginella
	Bolandra oregana	*Bolandra*
	Cystopteris fragilis	*Brittle Bladder Fern*
	Montia dichotoma	*Dwarf Montia*
	Nothochelone nemorosa	*Turtle Head*
	Orobanche uniflora	*Naked Broomrape*
	Sullivantia oregana	*Sullivantia*
	Zeltnera muehlenbergii	*Muhlenberg's Centaury*

3. Native Plants in Detail

This section provides illustrated descriptions of woody plants and tables summarizing the features of herbaceous plants historically found in the City of Portland. The list includes several plants known to occur within the Urban Growth Boundary or not more than ten miles from Portland. The plants are expected to occur within the City based on the presence of suitable habitat, the judgment of local botanical experts, the range of maps of the Oregon Flora Project, the publication Urbanizing Flora of Portland, Oregon 1806–2008, *or the range descriptions found in Hitchcock and Cronquist's* Flora of the Pacific Northwest *(1973).*

The plants are divided into the following groups:

Trees (with illustrations)

- Evergreens
- Deciduous
- Silhouettes (illustration)
- Priority Native Tree Sizes

Shrubs (with illustrations)

- Including tall arborescent shrubs, i.e. those equal to or greater than 15 ft. tall

Herbaceous

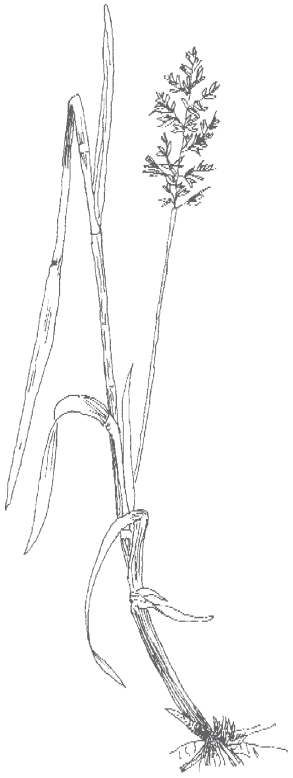
- Forbs
- Grasses
- Sedges, Rushes
- Ferns
- Other

The following additional special lists are also included:

- Groundcovers and Vines
- Native Plants Used as Food by Wildlife

Habitat Types

Habitat types are indicated for both the illustrated plant descriptions and in the tables. The habitat types are wetland, riparian, forest, forested slopes, thicket, grass and rocky. "Wetland" includes all forms of wetlands found in Portland. "Riparian" includes the riparian areas along the Willamette and Columbia Rivers, and other streams in Portland. "Forest" refers to upland forested areas with little or no slope. "Forested slopes" refers to steeply sloping upland forests such as the west hills and various buttes found in Portland. "Thicket" refers to edges of forests and meadows and includes hedgerows and clumps of vegetation that may be found in meadows. "Grass" refers to open areas or meadows. It may also include clearings in forested areas. "Rocky" refers to rocky upland areas, and may include outcrops and cliffs.



The information on habitat types is intended to provide general guidance for appropriate planting locations; certain plants, however, have highly specialized habitats which may make them appropriate for use only in specific areas of the city. For example, the Columbia River Willow (*Salix exigua* var. *columbiana*) normally occurs only along the mainstems of the Willamette and Columbia Rivers and is not appropriate for use in all "wetland" or "riparian" habitats throughout the city. For this reason, it may be helpful to consult with City staff, local botanists, or references such as those listed in the "Resources" section when preparing a planting plan.

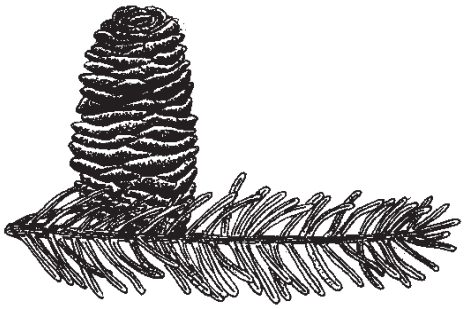
Sources of Native Plants

Native plants can be acquired through many nurseries in the Portland area. Occasionally, particularly for large orders or less common plants, growers will need time to propagate and raise plants before they are ready for installation. For this reason, growers may need advance notice of plant orders and project timelines should allow adequate time to fill such orders. For additional information about native plants, see the "Resources" section.

3.1 EVERGREEN TREES

Grand Fir *Abies grandis*

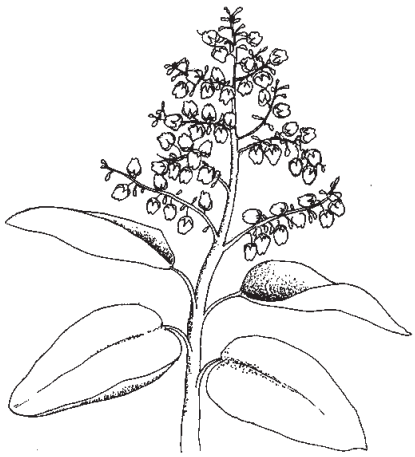
The Grand Fir is the only native fir that is common in the lower elevations (below 2500') of Western Oregon. Its needles are arranged in flat sprays on opposite sides of the twig, and when crushed have a tangerine—like fragrance. Grand Fir is able to reproduce in dense shade and young seedlings may be found growing in the understory of Douglas fir forests.



Mature height: 150 ft.	**Mature spread**: 40 ft.
10 yr. height: 30 ft.	**10 yr. spread:** 20 ft.
Growth rate: Medium	
Conditions: Full sun to full shade, moist to seasonally wet soil	
Relocate success: Medium	
Availability: High (bare root, container)	
Habitat type(s): Wetland, Riparian, Forest, Forest slope	

Pacific Madrone *Arbutus menziesii*

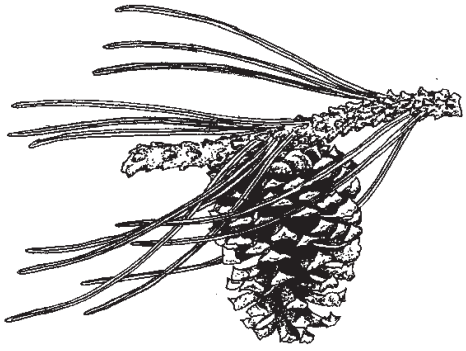
The only broadleaf evergreen among the native trees of the Pacific Northwest, the Pacific Madrone is commonly found in forest openings or edges. It has attractive, peeling bark and clusters of creamy white, fragrant, bell—shaped flowers in the spring. The red—orange berries appear in the fall and persist into the early winter. The berries were a food source for the Northwest Indians, and are attractive to many species of birds.



Mature height: 50 ft.	**Mature spread**: 50 ft.
10 yr. height: 6 ft.	**10 yr. spread:** 6 ft.
Growth rate: Very slow	
Conditions: Full sun, dry soil	
Relocate success: Low	
Availability: High (seed, container)	
Habitat type(s): Forest	

Willamette Valley Ponderosa Pine *Pinus ponderosa* var. *benthamiana*

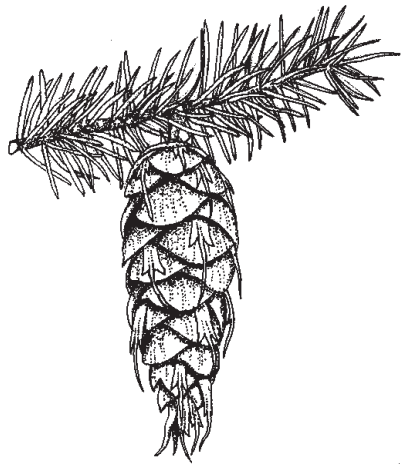
The name of this tree refers to the large size they attain at maturity. Ponderosa pines do best in sunny, dry locations and they are one of the most common evergreens in Eastern Oregon. While the bark on young trees is dark gray, with age it becomes orange and scaled like pieces in a jigsaw puzzle. The 6"–9" needles are arranged in bundles of three.



Mature height: 200 ft.	**Mature spread**: 30 ft.
10 yr. height: 50 ft.	**10 yr. spread:** 20 ft.
Growth rate: Fast	
Conditions: Full sun, dry soil	
Relocate success: Medium	
Availability: High (seed, container)	
Habitat type(s): Forest slope	

Douglas Fir *Pseudotsuga menziesii*

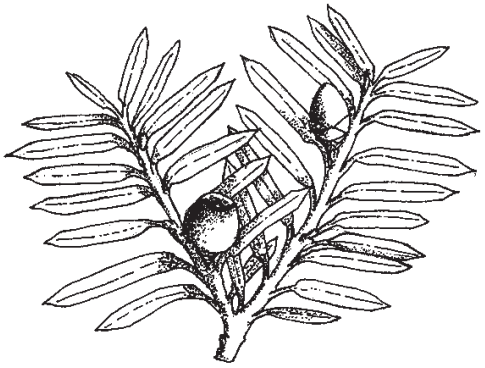
The Douglas Fir is the most common evergreen in the Pacific Northwest, where it had been widely harvested for timber and Christmas trees. A fast growing tree that requires some sunlight to reproduce, the Douglas fir can form dense stands in disturbed areas in only 50 years. The 3"–4" cone hangs down from the branches and has a very distinctive 3—pronged scale under each bract.



Mature height: 200 ft.	**Mature spread**: 60 ft.
10 yr. height: 40 ft.	**10 yr. spread:** 20 ft.
Growth rate: Very fast	
Conditions: Full to part sun, dry, moist or seasonally wet soil	
Relocate success: High	
Availability: High (seed, bare root, container)	
Habitat type(s): Forest, Forest slope	

Pacific Yew *Taxus brevifolia*

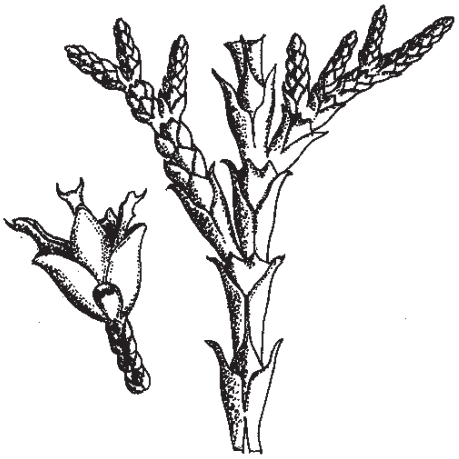
The Pacific Yew can be found as a small tree or a large shrub, usually in the shady understory of the canopy formed by taller trees. It tends to have an irregular shape with spreading, pendulous branches. Its 3/4" needles are flat with pointed tips and are dark green above and pale green below. The sparse fruit, which is attractive to birds, is a 1/4 fleshy red cup with a single dark seed inside.



Mature height: 40 ft.	**Mature spread**: 30 ft.
10 yr. height: 10 ft.	**10 yr. spread:** 10 ft.
Growth rate: Medium	
Conditions: Full sun to full shade, moist to seasonally wet soil	
Relocate success: Medium	
Availability: Medium (seed, container)	
Habitat type(s): Riparian, Forest, Forest slope	

Western Red Cedar *Thuja plicata*

Found mainly in the moist, lower elevations of the Pacific Northwest, Western Red Cedar can live to be 1000 years old. As the tree ages, its trunk becomes wide and fluted at the base, and tapers at the tip. Its stringy, reddish bark was used by the Northwest Indians for basketry and clothing. The branchlets are made up of flat sprays of overlapping scales, with tiny 1/2" cones that look like small rosebuds.



Mature height: 100 ft.	**Mature spread**: 30 ft.
10 yr. height: 30 ft.	**10 yr. spread:** 20 ft.
Growth rate: Medium	
Conditions: Full to part sun, moist to seasonally wet soil	
Relocate success: High	
Availability: High (seed, bare root, container)	
Habitat type(s): Wetland, Riparian, Forest, Forest slope	

Western Hemlock *Tsuga heterophylla*

The Western Hemlock is commonly found in the lower elevations below 3000' west of the Cascades. Young trees have attractive feathery foliage and the tip of the central leader often droops. The needles are short and vary in size from 1/4" to 3/4", with a white band on the underside. The light brown, papery cones are only about 1" long and may be produced in great quantities.

Mature height: 150 ft.	**Mature spread**: 40 ft.
10 yr. height: 40 ft.	**10 yr. spread:** 20 ft.
Growth rate: Fast	
Conditions: Full sun to full shade, moist to seasonally wet soil	
Relocate success: Medium	
Availability: High (seed, bare root, container)	
Habitat type(s): Riparian, Forest, Forest slope	

3. NATIVE PLANTS IN DETAIL

3.2 DECIDUOUS TREES

Bigleaf Maple *Acer macrophyllum*

With huge 8—12" leaves, the Bigleaf Maple is not easily confused with any other maple. In the spring 4—6" long clusters of many, small yellow flowers hang from the ends of the twigs. By mid—summer, these clusters are replaced with chains of large, fuzzy, double—winged samaras. When grown in the open, the Bigleaf Maple will form a broad, spreading canopy and a short stout trunk.

Mature height: 90 ft.	**Mature spread**: 75 ft.
10 yr. height: 35 ft.	**10 yr. spread:** 25 ft.
Growth rate: Fast	
Conditions: Full to part sun, moist to seasonally wet soil	
Relocate success: Medium	
Availability: High (seed, bare root, container)	
Habitat type(s): Forest, Forest slope	

Red Alder *Alnus rubra*

In areas where fire or logging has destroyed Douglas fir forests, Red Alder often colonizes in vigorous stands. Frequently flooded landscapes are also a favorite habitat for Red Alder. Since Red Alder cannot grow in deep shade, conifers usually replace the alders in time. Red alders have a smooth, gray bark that is often covered by large patches of a white lichen.

Mature height: 100 ft.	**Mature spread**: 40 ft.
10 yr. height: 40 ft.	**10 yr. spread:** 20 ft.
Growth rate: Very fast	
Conditions: Full to part sun, dry, moist to seasonally wet soil	
Relocate success: High	
Availability: High (seed, bare root, container)	
Habitat type(s): Riparian, Forest, Forest slope	

Western Flowering Dogwood *Cornus nuttallii*

Often found in the shade of conifers or in forest clearings, the Western Flowering Dogwood provides a beautiful display of large white blooms in mid—spring. What might be confused for petals are actually the creamy white bracts which surround the many tiny greenish true flowers in the center. Fall color for this tree ranges from orange to purple.

Mature height: 40 ft.	**Mature spread**: 20 ft.
10 yr. height: 20 ft.	**10 yr. spread:** 10 ft.
Growth rate: Medium	
Conditions: Part sun to full shade, moist to seasonally wet soil	
Relocate success: Low	
Availability: High (seed, container)	
Habitat type(s): Forest, Forest slope	

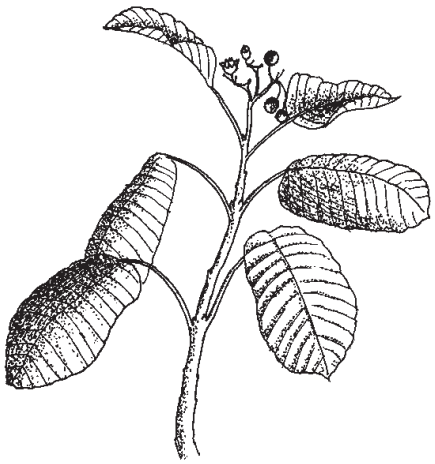
Suksdorf's Hawthorn *Crataegus gaylussacia*

Northwest natives had medicinal and utilitarian uses for many parts of the Suksdorf's hawthorn tree. The small, seedy fruits are appealing to birds, and the tree often grows in a multi—stemmed form that makes an ideal thicket for nests. The upland and wetland varieties are nearly identical and distinguished mainly by subtle differences in the clusters of small white flowers that appear in the spring.

Mature height: 35/45 ft.	**Mature spread**: 25 ft.
10 yr. height: 25 ft.	**10 yr. spread:** 15/25 ft.
Growth rate: Medium	
Conditions: Part sun to full shade, moist to seasonally wet soil OR Full sun to full shade, dry to seasonally wet soil	
Relocate success: High	
Availability: High (seed, bare root, container) OR Low (bare root, container)	
Habitat type(s): Wetland, Riparian OR Riparian, Forest, Forest slope, Thicket	

Cascara, Chitum *Frangula purshiana*

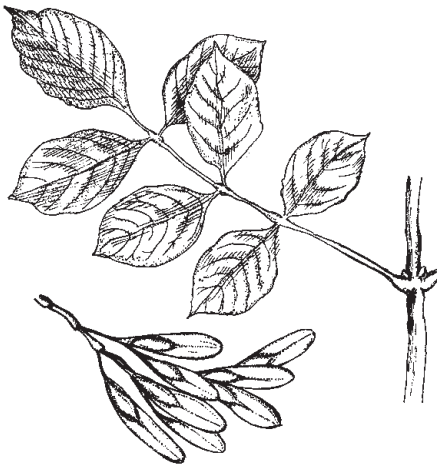
Since Cascara, chitum prefers a shady, moist condition, it is often found growing as an understory tree with Vine Maple and Red Alder. The 1/4" black berries, while not especially tasty for humans, are attractive to raccoons and a variety of birds. The bark was used medicinally by Northwest natives and continues to be harvested for its laxative properties.



Mature height: 30 ft.	**Mature spread**: 25 ft.
10 yr. height: 15 ft.	**10 yr. spread:** 10 ft.
Growth rate: Slow	
Conditions: Part sun to full shade, moist to seasonally wet soil	
Relocate success: Medium	
Availability: High (seed, bare root, container)	
Habitat type(s): Riparian, Forest, Forest slope	

Oregon Ash *Fraxinus latifolia*

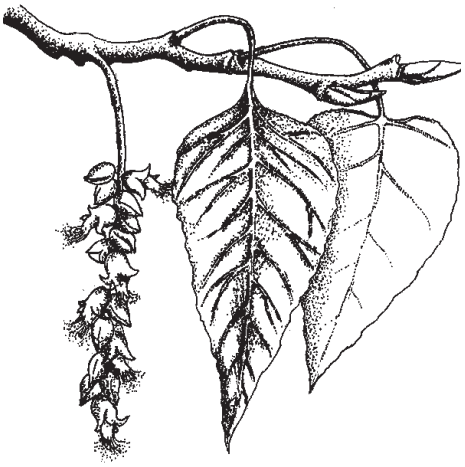
The Oregon Ash is often found growing in dense stands on soils that are very wet for part of the year. The seeds occur in clusters of single samaras on female trees, and are produced in especially large quantities at 3–5 year intervals. It is common for Oregon Ash leaves to display a brown, blotchy spotting by mid—summer. This condition does not seriously damage the tree.



Mature height: 75 ft.	**Mature spread**: 25 ft.
10 yr. height: 30 ft.	**10 yr. spread:** 15 ft.
Growth rate: Medium	
Conditions: Full to part sun, moist to seasonally wet soil	
Relocate success: Medium	
Availability: High (seed, bare root, container)	
Habitat type(s): Wetland, Riparian	

Black Cottonwood *Populus trichocarpa*

Many of the rivers in the Northwest are lined with stands of Black Cottonwood. This is the tallest native broadleaf trees, having a very thick, straight trunk with branches appearing only on the upper portion. The triangular leaves are glossy green on top and much paler underneath. In the early spring, the sticky, amber—colored buds have a sweet, spicy scent. In the late summer, cotton—like tufts of seed are spread by the wind.



Mature height: 175 ft.	**Mature spread**: 40 ft.
10 yr. height: 50 ft.	**10 yr. spread:** 20 ft.
Growth rate: Very fast	
Conditions: Full to part sun, dry, moist to seasonally wet soil	
Relocate success: High	
Availability: High (seed, bare root, container)	
Habitat type(s): Wetland, Riparian	

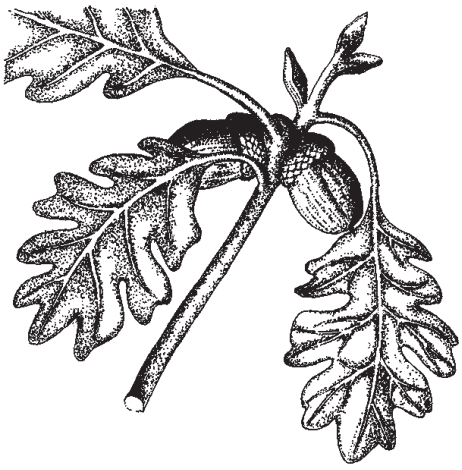
Bitter Cherry *Prunus emarginata*

The fragrant white flowers of the Bitter Cherry appear in the spring and are often visited by bees. The pollinated flowers develop into small (1/2") red fruits with a single, hard seed inside. The fruit is not palatable for humans, but is favorite of birds, particularly the Cedar Waxwing. The grey or reddish bark has many horizontal pores, and was used as a basket material by the Northwest natives.

Mature height: 30 ft.	**Mature spread**: 20 ft.
10 yr. height: 20 ft.	**10 yr. spread:** 15 ft.
Growth rate: Medium	
Conditions: Full to part sun, moist to seasonally wet soil	
Relocate success: Medium	
Availability: Medium (seed, container)	
Habitat type(s): Riparian, Forest slope, Thicket	

Oregon White Oak *Quercus garryana*

The broad, stout form of the Oregon White Oak is a common profile in the open grasslands and dry hillsides of the Northwest. It is a very long lived tree (500 years), and produces large acorns that provide food for many small animals, deer and woodpeckers. Old trees may have hollow branches or trunks that provide nesting sites for birds, squirrels and other small animals.



Mature height: 65 ft.	**Mature spread**: 45 ft.
10 yr. height: 10 ft.	**10 yr. spread:** 8 ft.
Growth rate: Very slow	
Conditions: Full sun, dry soil	
Relocate success: Low	
Availability: High (seed, container)	
Habitat type(s): Forest, Forest slope	

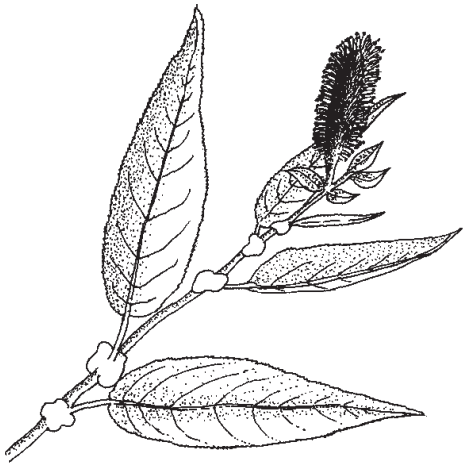
Pacific Willow *Salix lasiandra* var. *lasiandra*

One of the tallest native willows, Pacific Willow is found growing along rivers and stream where its roots can easily reach subsurface water. The leaves are dark and glossy above, and appear white underneath. The pale yellow female catkins are 3–4" long and appear in the spring when the tree begins to leaf out.

Mature height: 40 ft.	**Mature spread**: 30 ft.
10 yr. height: 30 ft.	**10 yr. spread:** 20 ft.
Growth rate: Fast	
Conditions: Full to part sun, moist, seasonally to perennially wet soil	
Relocate success: High	
Availability: High (seed, bare root, container)	
Habitat type(s): Wetland, Riparian	

Rigid Willow *Salix prolixa*

The Rigid Willow is found both as a broad, spreading shrub with thick branches or as a small tree that has a short trunk and heavy branches that form wide canopy. The yellowish green young branches are strong and pliable and make a valuable material for basket weaving. The leaves eventually become dark and glossy.



Mature height: 30 ft.	**Mature spread**: 20 ft.
10 yr. height: 15 ft.	**10 yr. spread:** 10 ft.
Growth rate: Fast	
Conditions: Full to part sun, Moist, seasonally wet to perennially wet soil	
Relocate success: High	
Availability: Low (bare root, container)	
Habitat type(s): Wetland, Riparian	

Scouler Willow *Salix scouleriana*

The Scouler Willow is native to many moist woodland and meadow areas of North America. Its young leaves are covered with many fine hairs which make them feel soft like felt. The leaves eventually become smooth and shiny, with only a few rust—colored hairs on the underside. Scouler Willow is able to resprout from fire damaged stumps and often reseeds itself in areas that have been recently burned.

Mature height: 40 ft.	**Mature spread**: 40 ft.
10 yr. height: 30 ft.	**10 yr. spread:** 30 ft.
Growth rate: Fast	
Conditions: Full to part sun, moist to seasonally wet soil	
Relocate success: High	
Availability: Medium (bare root, container)	
Habitat type(s): Wetland, Riparian, Forest	

3.3 NATIVE TREE LIST

Scientific Name	Common Name	Fire	Indicator Status	Habitat Type						
						Forest	F. Slope		Grass	Rocky
Abies grandis	Grand Fir	Y	FACU-	●	●	●	●			
Acer macrophyllum	Bigleaf Maple	N	FACU			●	●			
Alnus rubra	Red Alder	N	FAC		●	●	●			
Arbutus menziesii	Madrone	N				●				
Cornus nuttallii	Western Flowering Dogwood	N				●	●			
Crataegus gaylussacia	Suksdorf's hawthorn	N	FAC	●	●	●	●	●		
Frangula purshiana	Cascara, chitum	N	FAC-		●	●	●			
Fraxinus latifolia	Oregon Ash	N	FACW	●	●					
Pinus ponderosa var. *benthamiana*	Willamette Valley ponderosa pine	Y	FACU-			●	●			
Populus balsamifera ssp. *trichocarpa*	Black Cottonwood	N	FAC	●	●					
Populus tremuloides	Quaking Aspen	N		●	●					
Prunus emarginata	Bitter Cherry	N	FACU		●		●	●		
Pseudotsuga menziesii	Douglas Fir	Y	FACU			●	●			
Pyrus (see *Malus*)		N								
Quercus garryana	Oregon White Oak	N				●	●		●	
Salix lucida ssp. *lasiandra*	Pacific Willow	N	FACW+	●	●					
Salix prolixa	Rigid Willow	N	OBL	●	●					
Salix scouleriana	Scouler Willow	N	FAC	●	●	●				
Taxus brevifolia	Pacific Yew	Y	NI		●	●	●			
Thuja plicata	Western Red Cedar	Y	FAC	●	●	●	●			
Tsuga heterophylla	Western Hemlock	Y	FACU-		●	●	●			

KEY

**Fire Accelerant Y: plants with higher than average flammable combustion potential due to flammability chemicals present within the leaves, needles, and stems; Fire accelerant N (neutral): plants with average flammable combustion potential (There are no chemicals present within the stems, leaves, and needles that make it less flammable or more flammable than average).*

+ Riccardi, et al. In Press. Quantifying physical characteristics of wildland fuels in the Fuel Characteristic Classification System. Canadian Journal of Forest Research.

INDICATOR STATUS

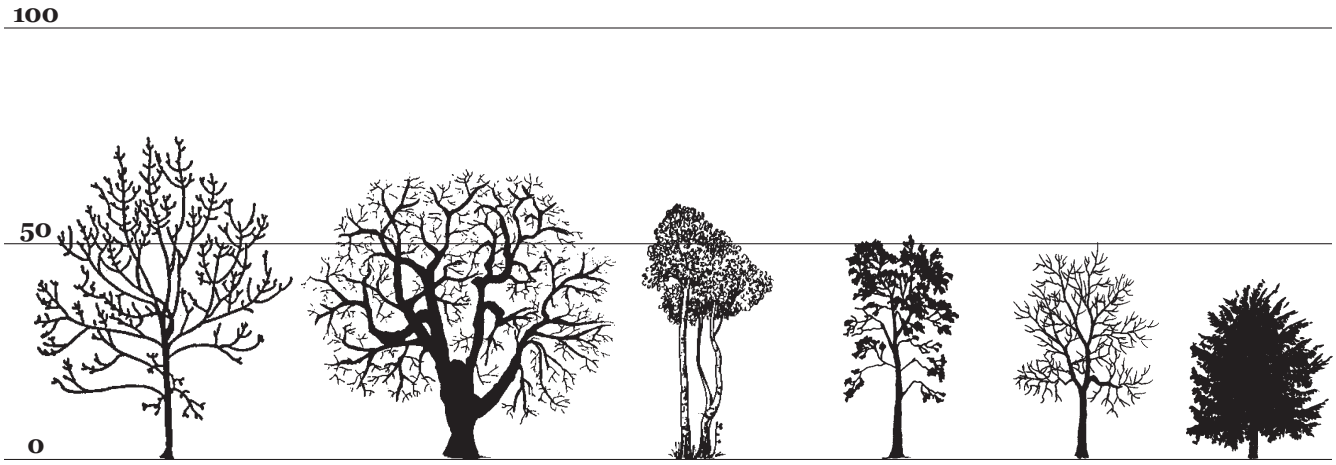
Obligate Wetland (OBL) *almost always occur in wetlands*
Facultative wetland (FACW) *occur in wetlands 67%–99% of the time*
Facultative (FAC) *equally likely to occur in wetlands or non-wetlands*
Facultative Upland (FACU) *occur wetlands only 1%–33% of the time*
Obligate Upland (UPL) *almost never, under natural conditions, occur in wetlands in the Northwest*
No indicator (NI) *no status*

● HABITAT TYPE

WETLAND *all forms of wetlands*
RIPARIAN *stream and river shorelines and bottomlands*
FOREST *flat or mildly rolling forests*
FOREST SLOPE *steeply sloping upland forests such as in the West Hills or East Buttes*
THICKET *forest edges, hedgerows, clumps of vegetation in meadows*
GRASS *open areas, meadows*
ROCKY *rocky upland areas and cliffs*

***A positive (+) sign** — the plant occurs more frequently in wetlands, at the higher end of the wetland status category range*
***A negative (–) sign** — the plant occurs less frequently in wetlands, at the lower end of the wetland status category range*

3.4 TREE SILHOUETTES



Fraxinus latifolia
Oregon Ash – 75'

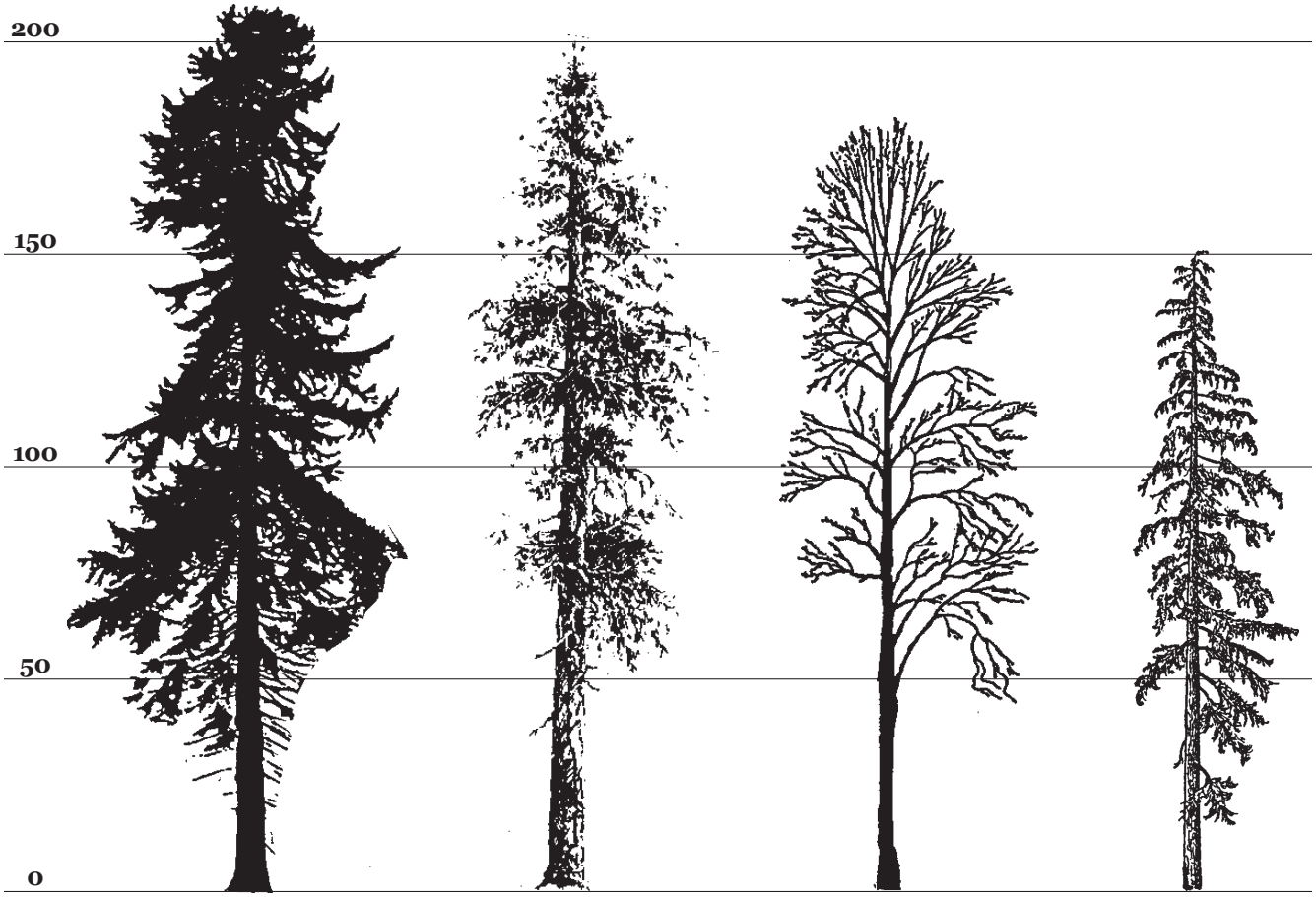
Quercus garryana
Oregon White Oak – 65'

Populus tremuloides
Quaking Aspen – 60'

Arbutus mensiesii
Madrone – 50'

Prunus emarginata
Bitter Cherry – 50'

Taxus brevifolia
Pacific Yew –

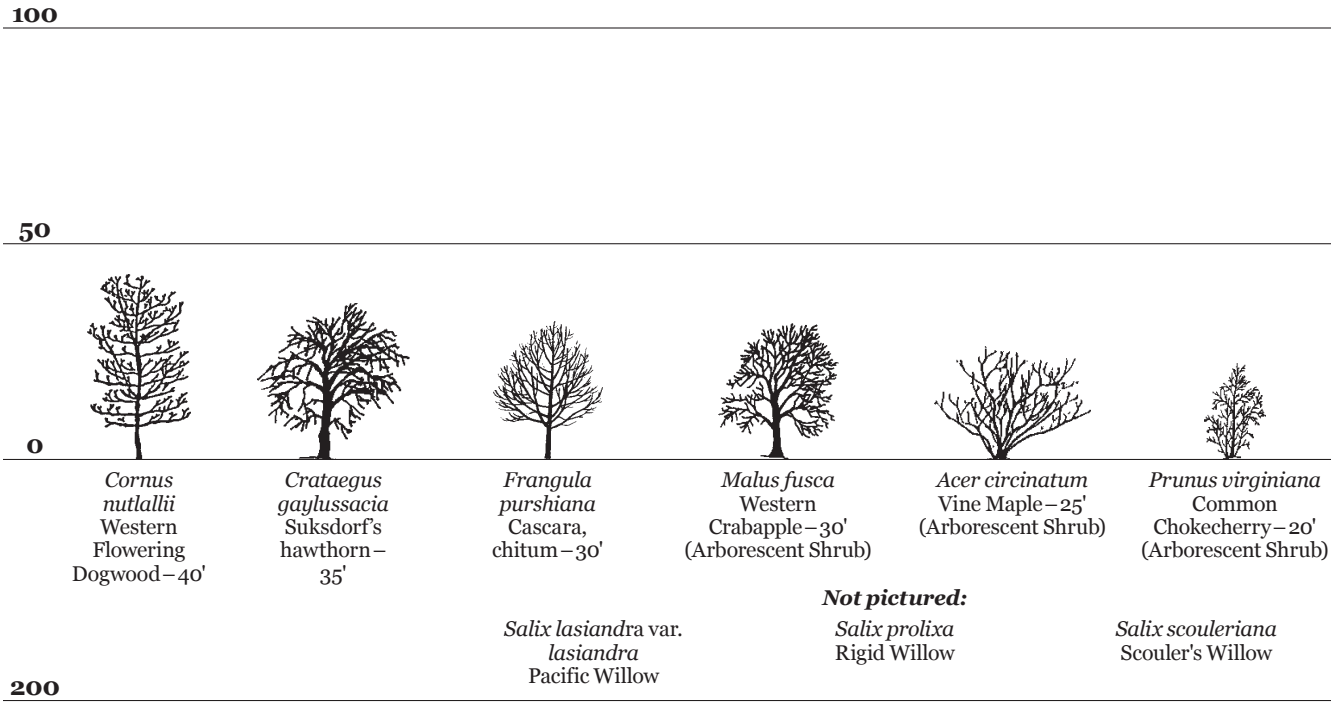


Pseudotsuga menziesii
Douglas Fir – 200'+

Pinus ponderosa var. *benthamiana*
Willamette Valley ponderosa pine – 200'

Populus trichocarpa
Black Cottonwood – 175'

Tsuga heterophylla
Western Hemlock – 150'



Cornus nutlallii
Western Flowering Dogwood – 40'

Crataegus gaylussacia
Suksdorf's hawthorn – 35'

Frangula purshiana
Cascara, chitum – 30'

Malus fusca
Western Crabapple – 30'
(Arborescent Shrub)

Acer circinatum
Vine Maple – 25'
(Arborescent Shrub)

Prunus virginiana
Common Chokecherry – 20'
(Arborescent Shrub)

Not pictured:

Salix lasiandra var. *lasiandra*
Pacific Willow

Salix prolixa
Rigid Willow

Salix scouleriana
Scouler's Willow

Abies grandis
Grand Fir – 150'

Thuja plicata
Western Red Cedar – 100'

Alnus rubra
Red Alder – 100'

Acer macrophyllum
Bigleaf Maple – 90'

3.5 PRIORITY NATIVE TREE SIZES

Portland's native trees grow at varying rates and reach different sizes at maturity. For example, some native trees, such as the Pacific yew or Oregon White Oak, might be considerably smaller but older than larger trees such as a Douglas fir. These differences should be taken in to consideration when developing priorities for the care, management, preservation and protection of native trees. When trees reach sizes noted as significant below, they should be prioritized for retention where practical. Smaller native trees may also be prioritized for preservation and protection, particularly when they are part of a grove or are otherwise healthy and appropriately situated. The significance of these trees should not substitute for evaluating specific site conditions, approval criteria, or other code requirements that may affect priorities.

Scientific Name	Common Name	Priority Size (Diameter)
Abies grandis	Grand Fir	10 inches
Acer macrophyllum	Bigleaf Maple	18 inches
Alnus rubra	Red Alder	18 inches
Arbutus menziesii	Madrone	4 inches
Cornus nuttallii	Western Flowering Dogwood	6 inches
Crataegus douglasii	Douglas' Hawthorn	8 inches
Crataegus gaylussacia	Suksdorf's hawthorn	8 inches
Frangula purshiana	Cascara, chitum	6 inches
Fraxinus latifolia	Oregon Ash	10 inches
Pinus ponderosa var. *benthamiana*	Willamette Valley ponderosa pine	8 inches
Populus trichocarpa	Black Cottonwood	18 inches
Prunus emarginata	Bitter Cherry	10 inches
Pseudotsuga menziesii	Douglas Fir	18 inches
Quercus garryana	Oregon White Oak	4 inches
Salix scouleriana	Scouler Willow	6 inches
Taxus brevifolia	Pacific Yew	2 inches
Thuja plicata	Western Red Cedar	10 inches
Tsuga heterophylla	Western Hemlock	10 inches

3.6 ARBORESCENT SHRUBS

Vine Maple *Acer circinatum*

The form of the Vine Maple varies widely according to the amount of sunlight it receives. In the shady understory of conifers it takes on an open, loose shape as it spreads its branches like a 'vine' seeking sunlight. In the open, it is a small multi—stemmed tree. The leaves of the Vine Maple are one of the brights spots of fall color in the native landscape, ranging from yellow to brilliant red.

Mature height: 25 ft.	**Mature spread**: 20 ft.
10 yr. height: 15 ft.	**10 yr. spread:** 10 ft.
Growth rate: Medium	
Conditions: Full sun to full shade, moist to seasonally wet soil	
Relocate success: Medium	
Availability: High (seed, bare root, container)	
Habitat type(s): Forest, Forest slope	

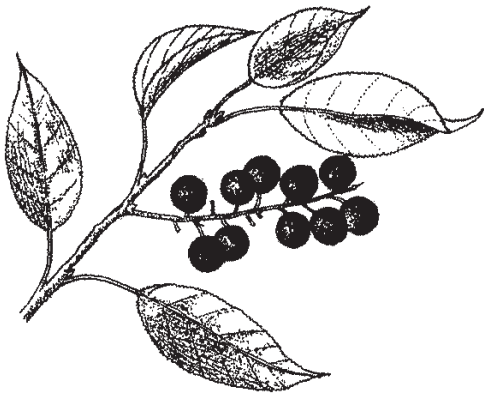
Western Crabapple *Malus fusca*

The Western Crabapple has interesting features from spring to fall. In the spring, small pinkish white fragrant blossoms hang in clusters. By mid—summer, 3/4" long crabapples appear. The fruits, which are quite sour but appealing to birds and animals, turn yellow in the fall. The leaves also provide fall color, with shades of orange and bright red.

Mature height: 30 ft.	**Mature spread**: 35 ft.
10 yr. height: 15 ft.	**10 yr. spread:** 15 ft.
Growth rate: Medium	
Conditions: Full to part sun, moist to seasonally wet soil	
Relocate success: Medium	
Availability: Medium (seed, container)	
Habitat type(s): Wetland, Riparian, Forest	

Common Chokecherry *Prunus virginiana*

The Common Chokecherry is found in many parts of North America in various forms. In the spring it produces 3–5" long clusters of showy white flowers. The edible fruits are dark purple or black, and are very sour. They may be used for jam or wine. Bear, birds and small animals also eat the fruits, and deer and elk graze on the young foliage.



Mature height: 20 ft.	**Mature spread**: 15 ft.
10 yr. height: 15 ft.	**10 yr. spread:** 12 ft.
Growth rate: Medium	
Conditions: Full to part sun, dry, moist to seasonally wet soil	
Relocate success: Medium	
Availability: High (seed, bare root, container)	
Habitat type(s): Riparian, Forest, Thicket	

Columbia River Willow *Salix exigua* var. *columbiana*

The Columbia River Willow is found only on the banks of the Columbia River and on lower reaches of the Willamette River. The young branches have many fine hairs which give them a silky appearance. The mature foliage is light green. The yellow female catkins which appear in early summer are 3–4" long.

Mature height: 20 ft.	**Mature spread**: 20 ft.
10 yr. height: 15 ft.	**10 yr. spread:** 15 ft.
Growth rate: Fast	
Conditions: Full to part sun, moist, seasonally wet to perennially wet soil	
Relocate success: High	
Availability: Low (bare root, container)	
Habitat type(s): Wetland, Riparian	

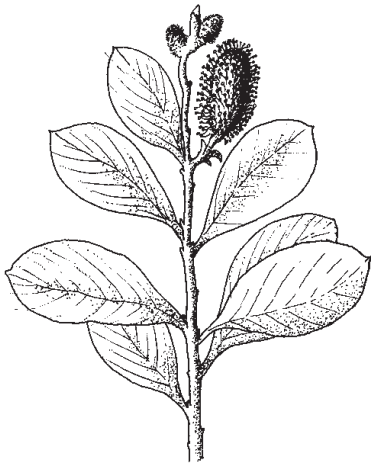
Soft—Leaved Willow *Salix exig*ua var. *sessilifolia*

The Soft—leaved Willow is found next to water, and spreads rapidly by putting up new shoots from its extensive root system. This suckering habit allows it to form thickets. Soft—leaved Willow has hairy twigs and leaves, and is found in some if the same areas as the Columbia River Willow. In fact, the two willows sometimes hybridize.

Mature height: 25 ft.	**Mature spread**: 25 ft.
10 yr. height: 25 ft.	**10 yr. spread:** 25 ft.
Growth rate: Fast	
Conditions: Full to part sun, moist, seasonally wet to perennially wet soil	
Relocate success: High	
Availability: Low (seed, bare root, container)	
Habitat type(s): Wetland, Riparian	

Hooker's willow *Salix hookeriana*

Hooker's willow is found both as a densely—branched shrub, and as a short—trunked tree with a few thick limbs from which arise many branches. The leaves are broad at the tip and narrow at the base, and are either silvery or glossy green above, with a silvery white underside. Hooker's willow commonly occurs in seaside conditions and is tolerant of wind and salt spray.



Mature height: 20 ft.	**Mature spread**: 20 ft.
10 yr. height: 15 ft.	**10 yr. spread:** 15 ft.
Growth rate: Fast	
Conditions: Full to part sun, moist, seasonally wet to perennially wet soil	
Relocate success: High	
Availability: Medium (bare root, container)	
Habitat type(s): Wetland, Riparian	

Sitka Willow *Salix sitchensis*

Sitka Willow is also called 'silky willow' because the undersides of its leaves are covered with long, whitish silk hairs. The tops of the leaves are bright green. Sitka Willow is one of the more common Northwest willows. It is considered to be a 'pioneer' species because it adapts readily to disturbed situations and can tolerate difficult conditions.

Mature height: 25 ft.	**Mature spread**: 25 ft.
10 yr. height: 25 ft.	**10 yr. spread:** 25 ft.
Growth rate: Fast	
Conditions: Full to part sun, moist to seasonally wet soil	
Relocate success: High	
Availability: Medium (bare root, container)	
Habitat type(s): Wetland, Riparian	

3.7 NATIVE ARBORESCENT SHRUB LIST

Scientific Name	Common Name	Fire	Indicator Status	Habitat Type						
						Forest	F. Slope		Grass	Rocky
Acer circinatum[a]	Vine Maple	N	FAC-			●	●		●	
Malus fusca[a]	Western Crabapple	N	FACW		●	●		●		
Prunus virginiana[a]	Common Chokecherry	N	FACU		●	●		●		
Salix. exigua var. columbiana[a]	Columbia River Willow	N	OBL	●	●					
Salix exigua var. sessilifolia[a]	Soft-leaved Willlow	N	FACW	●	●					
Salix hookeriana[a]	Hooker's willow	N	FACW	●	●					
Salix sitchensis[a]	Sitka Willow	N	FACW	●	●					

KEY

Plants with an [a] are arborescent (tree-like) shrubs. These shrubs may not be used to meet Title 33 or Title 11 standards, criteria, or conditions of approval which require trees.

**Fire Accelerant Y: plants with higher than average flammable combustion potential due to flammability chemicals present within the leaves, needles, and stems; Fire accelerant N (neutral): plants with average flammable combustion potential (There are no chemicals present within the stems, leaves, and needles that make it less flammable or more flammable than average).*

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Obligate Upland (UPL) *almost never, under natural conditions, occur in wetlands in the Northwest*
No indicator (NI) *no status*

● ***HABITAT TYPE***

WETLAND *all forms of wetlands*
RIPARIAN *stream and river shorelines and bottomlands*
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3.8 SHRUBS

Western Serviceberry *Amelanchier alnifolia*

The Western Serviceberry is covered with compact clusters of 1" white flowers from April to June. The flowers are soon replaced with 1/4" reddish fruits, that turn nearly black when they are ripe in August. The edible fruits are sweet and very appealing to many birds. The leaves of the Western Serviceberry (also called 'Saskatoon') turn yellow in the fall.

Mature height: 4–12 ft.

Growth rate: Medium

Conditions: Full sun to part sun, dry, moist to seasonally wet soil

Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Forest, Forest slope, Thicket

Hairy Manzanita *Arctostaphylos columbiana*

This evergreen shrub is not common in Portland. It usually has an erect form but may sometimes be found with a sprawling habit. The dark reddish bark on large, old branches becomes papery and flakes off, to reveal smooth, lighter colored bark underneath. The name manzanita means 'little apple' in Spanish, referring to the shape of the red or brown 1/4" fruits of this plant. The clusters of many tiny pink urn-shaped flowers appear from May to July,

Mature height: 6–8 ft.

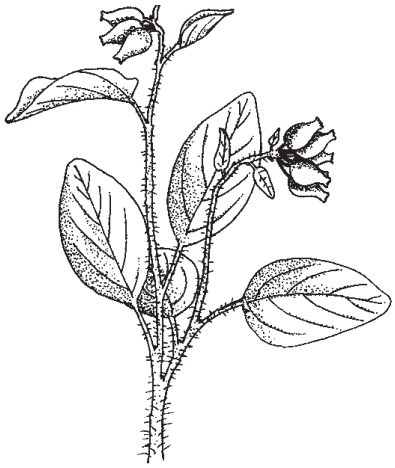
Growth rate: Slow

Conditions: Full sun, dry to moist soil

Relocate success: Medium

Availability: Medium (seed, container)

Habitat type(s): Grass, Rocky



Kinnikinnick *Arctostaphylos uva-ursi*

Kinnikinnick (also known as 'Common Bearberry'), is an evergeen trailing plant that forms a dense ground cover. It has the same type of urn-shaped flowers found on Hairy Manzanita and Pacific Madrone. On Kinnikinnick, the tiny flowers are white to pink, and appear from April to June. They mature in late fall into small red or orange berries that persist into winter.

Mature height: 5–8 inches

Growth rate: Fast

Conditions: Full sun, dry to moist soil

Relocate success: Medium

Availability: High (seed, container)

Habitat type(s): Grass, Rocky

Tall Oregon Grape *Berberis aquifolium*

The stiff, evergreen leaves of the Tall Oregon Grape look somewhat like holly leaves, with sharp prickly scalloped edges. The form of this plant can be either compact and dense in full sun, or more open in the shade. Bright, fragrant yellow clusters of small flowers appear from March to June. The edible, but tart, dusty blue berries hang look like clusters of miniature grapes.

Mature height: 5–6 ft.

Growth rate: Medium

Conditions: Full sun to part sun, dry to moist soil

Relocate success: Medium

Availability: High (seed, container)

Habitat type(s): Forest, Forest slope

Cascade Oregon Grape *Berberis nervosa*

The leaves of the Cascade Oregon Grape, while similar to those of Tall Oregon Grape, usually have 9–19 leaflets. The Tall Oregon Grape has only 5–9 leaflets. The upright clusters of fragrant yellow flowers appear from March to June, emerging from the center of the plant. The leaves are generally arranged in a circular fashion around a central stem, and may take on a reddish color in the winter.

Mature height: 2 ft.

Growth rate: Medium

Conditions: Full sun to part sun, dry to moist soil

Relocate success: Medium

Availability: High (seed, container)

Habitat type(s): Forest, Forest slope

Oregon Tea-tree *Ceanothus sanguineus*

The Oregon Tea-tree is not common in Portland. It is an upright shrub with reddish bark and reddish flower stems. These features account for the other common name of this plant 'Redstem Ceanothus'. A deciduous shrub, Oregon Tea-tree has fragrant clusters of many tiny white flowers that appear at the tips of its branches in June. This plant is well-adapted to disturbed conditions, and is able to improve soil by fixing nitrogen through its roots.

Mature height: 2–6 ft.

Growth rate: Medium

Conditions: Full sun to part sun, dry soil

Relocate success: Low

Availability: Medium (seed, container)

Habitat type(s): Forest, Forest slope, Thicket, Grass

Mountain Balm *Ceanothus velutinus* var. *laevigatus*

Mountain Balm is not common in Portland. It is an evergreen ceanothus, with green bark and a spreading form. Its leaves are very sticky and shiny on top, and soft underneath. The fragrant plumes of tiny white flowers appear from June to August, and are arranged along the sides of the branches. Mountain Balm is also called 'Snowbrush', and is able to colonize in burned areas because its seeds are fire-resistant and can remain dormant for many years.

Mature height: 2–6 ft.

Growth rate: Medium

Conditions: Full sun, dry to moist soil

Relocate success: Low

Availability: Low (seed)

Habitat type(s): Forest,Thicket, Grass

Redosier Dogwood *Cornus sericea*

An extensive system of spreading roots helps Redosier dogwood form large, dense thickets along moist stream banks. This deciduous shrub is easy to recognize in the winter by the bright red bark on its twigs. It has 1–3" flat, circular clusters of small white flowers from May to July. The inedible, bitter berries are appealing to birds, and range in color from dark blue to almost white with a bluish tint.

Mature height: 6–18 ft.

Growth rate: Very fast

Conditions: Full sun to part sun, moist, seasonally wet to perennially soil

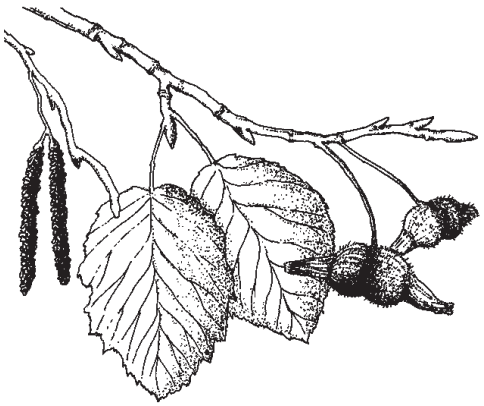
Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Wetland, Riparian,Thicket

California hazelnut *Corlyus cornuta* ssp. *californica*

The California hazelnut, or 'Beaked Hazelnut', as it is sometimes called, has an edible seed that is a favorite food of squirrels. The nuts are found in clusters of 2–3 at the tips of branches, and are enclosed in fuzzy, pointed beak-like husks. In the spring, before the leaves come out, the male flowers, called catkins, appear in 1–2" pale yellow chains. The leaves turn pale yellow in the fall.



Mature height: 3–12 ft.

Growth rate: Fast

Conditions: Full sun to full shade, moist soil

Relocate success: High

Availability: High (seed, container)

Habitat type(s): Forest, Forest slope,Thicket

Western Wahoo *Euonymus occidentalis*

Western Wahoo has large oblong leaves that occur in pairs, and have very fine serration along the edge. In May and June, small flowers appear in group of 3–4. The flowers are greenish, mottled with red or purple. Another common name for this plant is 'Burning Bush', referring to the red and yellow coloration of its foliage in the fall. (Note: 'Burning Bush' is also sometimes applied to Euonymus alatus, a non-native ornamental shrub.)

Mature height: 8–15 ft.

Growth rate: Medium

Conditions: Part sun to full shade, moist soil

Relocate success: Low

Availability: Low (container)

Habitat type(s): Riparian, Forest

Salal *Gaultheria shallon*

Salal is an evergreen shrub that may form dense patches in drier coniferous forests. The flowers are urn-shaped and range from white to pinkish. Salal blooms from May to July and the reddish flower stalks bend so that the loose 6-inch clusters of flowers are oriented in one direction. The leaves are egg-shaped and alternate, thick and leathery but shiny. The dark purple to black berries are edible but often bland. The berries attract birds.

Mature height: 1–5 ft.

Growth rate: Medium

Conditions: Part sun to full shade, dry to moist soil

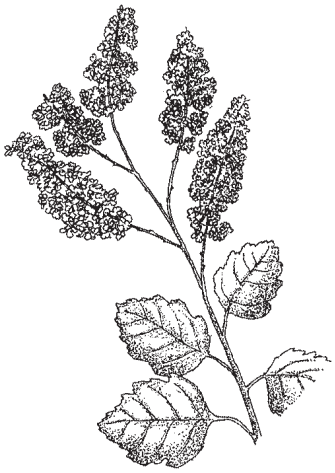
Relocate success: Medium

Availability: High (seed, container)

Habitat type(s): Forest, Forest slope

Oceanspray *Holodiscus discolor*

A large, vase-shaped shrub with arching branches, Oceanspary produces large foamy white clusters of tiny flowers from June to August. In the fall and winter, the long clusters can often be found still hanging down from the branches. The wood of Oceanspray is very hard, and becomes even harder when heated over a fire. It has been used for many purposes including fish hooks, nails and knitting needles.



Mature height: 8–12 ft.

Growth rate: Fast

Conditions: Full sun to full shade, dry, moist to seasonally wet soil

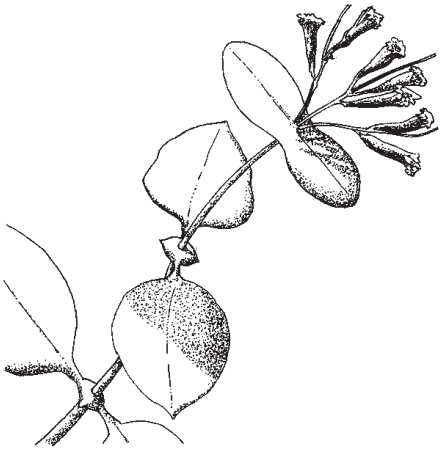
Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Forest, Forest slope, Thicket

Hairy Honeysuckle *Lonicera hispidula*

Hairy Honeysuckle is usually a trailing or sometimes climbing vine, that has a 1" long trumpet shaped flowers from June to August. The flowers range from pink to purple, and usually occur atop a pair of leaves that have fused to look almost like a single rounded leaf. The branches are covered with many fine hairs. While the orangish-red berries are eaten by birds, they are not edible for humans and may be somewhat poisonous.



Mature height: 12 ft.

Growth rate: Fast

Conditions: Full to part sun, dry soil

Relocate success: Medium

Availability: Medium (container)

Habitat type(s): Forest, Thicket

Black Twinberry *Lonicera involucrata*

The common name of the Black Twinberry refers to the pairs of shiny black berries that can be found hanging near the base of the leaves. The pairs of yellow, tubular flowers are about 3/4" long and appear from April to August. The bracts which surround the flowers and later the berries, are red to purple, and form a shape like a shallow cup.

Mature height: 8–12 ft.

Growth rate: Fast

Conditions: Full to part sun, moist to seasonally wet soil

Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Wetland, Riparian, Grass

Indian Plum *Oemlaria cerasiformis*

One of the first native shrubs to flower in the early spring, Indian Plum produces 2–3" hanging chains of delicate greenish white flowers. The flowers appear just as the bright green new leaves are appearing. The small oval fruit, a favorite with birds, is intially yellow-gold, and turns a dull bluish-black as it ripens in late summer. In the open, Indian Plum may form a large, dense shrub while in the shade it may be more open and sprawling.

Mature height: 8–15 ft.

Growth rate: Fast

Conditions: Full sun to full shade, dry to moist soil

Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Riparian, Forest, Forest slope, Thicket

Mockorange *Philadelphus lewisii*

The common name of the Mockorange refers to the beautiful white, sweetly fragrant blossoms which appear in abundance in late spring and early summer. The 1" flowers are in large clusters at the ends of the twigs, and are eventually replaced by clusters of 1/4" woody seed capsules. Mockorange is widely used as an ornamental garden shrub.

Mature height: 6–12 ft.

Growth rate: Fast

Conditions: Full sun to full shade, dry to moist soil

Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Forest, Forest slope, Thicket

Pacific Ninebark *Physocarpus capitatus*

Pacific Ninebark is easily recognized by its habit of shedding its reddish bark in peeling vertical strips on the older wood and twigs. The common name refers to a popular notion that there are nine layer of thin bark on the stems. Pacific ninebark has small white flowers in 2–3" rounded cluster from May to June. As the flowers mature, they form clusters of reddish seed capsules that dry out and turn brown by late summer.

Mature height: 6–12 ft.

Growth rate: Fast

Conditions: Part sun, moist to seasonally wet soil

Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Riparian, Forest, Thicket

Blue Currant *Ribes bracteosum*

The Blue Currant is not common in Portland. It produces long (7–12") upright clusters of white or greenish-white flowers in the spring. As these flowers develop into berries over the summer, the clusters bend down. The berries are bluish black and have a dusty white coating. Their flavor is variable, sometimes sweet and other times inedible. Yellow glands on the leaves and twigs of the Blue Currant produce a strong scent that is reflected in its other common name 'Stink Currant'.

Mature height: 8–10 ft.

Growth rate: Medium

Conditions: Part sun to full shade, moist to seasonally wet soil

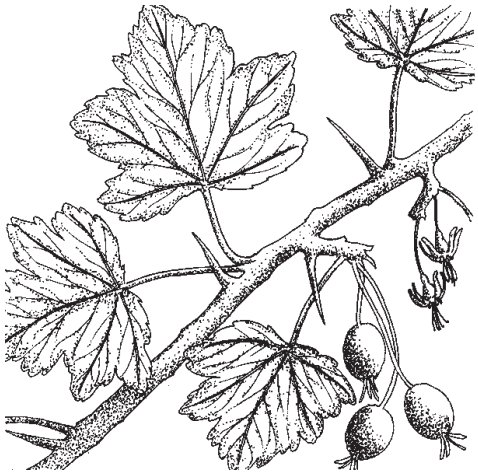
Relocate success: Medium

Availability: Low (container)

Habitat type(s): Riparian, Forest

Straggly Gooseberry *Ribes divaricatum*

The Straggly Goosberry is not common in Portland. It is also called Wild Gooseberry. It has smooth, 1/2" purple berries that are edible, and which usually occur in small cluster of 2 to 4. The flowers may be green or purple and are about 1/5" across. Straggly Gooseberry has no thorns except for a few at the point where the leaf attaches to the twig.



Mature height: 3–9 ft.

Growth rate: Medium

Conditions: Full to part sun, moist soil

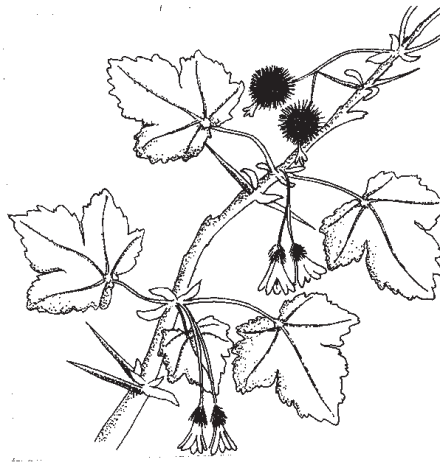
Relocate success: Medium

Availability: Low (seed, container)

Habitat type(s): Forest, Forest slope

Pioneer Gooseberry *Ribes lobbii*

Pioneer Gooseberry is not common in Portland. It is also known as 'Gummy Gooseberry' because it has hairy, sticky berries and sticky stems and leaves. There are usually 3 long spines at the point where the leaves attach to the stems, as well as spines along the stems. The large oval fruits, green in the early summer and maturing to a reddish brown, are ornamental but not edible by humans. From April to June, Pioneer Gooseberry has 1" red and white fischia-like flowers.



Mature height: 4 ft.

Growth rate: Medium

Conditions: Full to part sun, dry to moist soil

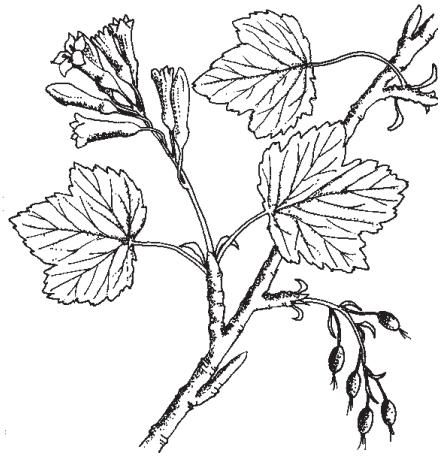
Relocate success: Medium

Availability: Low (container)

Habitat type(s): Forest, Thicket, Grass

Red Currant *Ribes sanguineum*

The flowers of the Red Currant may range in color from pale pink to deep red. They begin to appear in March and are a source of early food for hummingbirds. The individual flowers of Red Currant are small (1/3"), but they occur in many 2–4" clusters of 10–20 flowers, to produce a very beautiful display. The round blue-black berries are almost always completely eaten by birds before the end of summer.



Mature height: 3–9 ft.

Growth rate: Medium

Conditions: Full to part sun, dry to moist soil

Relocate success: Medium

Availability: High (seed, bare root, container)

Habitat type(s): Riparian, Forest, Forest slope, Thicket, Grass

Sticky Currant *Ribes viscosissimum*

Like the Pioneer Gooseberry, the Sticky Gooseberry has sticky stems, leaves and berries. The two plants can be told apart, however, by the lack of spines on the Sticky Gooseberry. The 3/4" flowers are greenish white or may have a pink tinge. The appear in June and July in rounded clusters of 6–12 flowers. The black berries are sparse and are not palatable to humans, but are probably appealing to birds.

Mature height: 8–10 ft.

Growth rate: Medium

Conditions: Full sun to full shade, dry to moist soil

Relocate success: Medium

Availability: Low (seed, container)

Habitat type(s): Riparian, Forest

Baldhip Rose *Rosa gymnocarpa*

The fragrant, pale pink or rose flowers of the Baldhip Rose are 1/2–3/4" across and appear in May and June. They are usually single, and occur at the tips of the branches. The fruit of the Baldhip Rose is a small, pear-shaped orange or scarlet 'hip' which has lost the leaf-like sepals that are normally found attached to mature rosehips. Baldhip Rose may have many soft spines or no spines, especially on new growth.

Mature height: 3–5 ft.

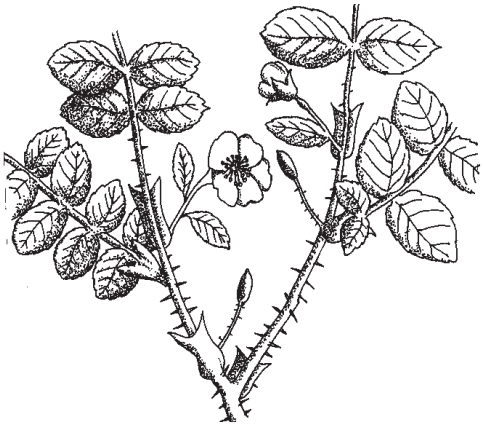
Growth rate: Medium

Conditions: Part sun to full shade, dry, moist to seasonally wet soil

Relocate success: Medium

Availability: High (seed, bare root, container)

Habitat type(s): Forest, Forest slope



Nootka Rose *Rosa nootkana* var. *nutkana*

The Nootka Rose has large (2") showy light pink to deep rose flowers that start to appear in May. They almost always occur singly on the tips of branches. The large curved thorns on the Nootka Rose often appear in pairs at the base of the leaves. By mid-summer, the fruits have matured, forming large scarlet or purplish hips that stay on the plants throughout winter providing food for animals.

Mature height: 4–10 ft.

Growth rate: Medium

Conditions: Full to part sun, dry, moist to seasonally wet soil

Relocate success: Medium

Availability: High (seed, bare root, container)

Habitat type(s): Forest slope

Swamp Rose *Rosa pisocarpa*

The Swamp Rose is also called the 'Clustered Rose' because its flowers usually occur in groups of 3–20. The pink flowers are about 1–1-1/2" across. Like the Nootka Rose, the Swamp Rose often has pairs of thorns where the leaves attach to the stems. Its fruits are clusters of small purplish pear-shaped hips.

Mature height: 4–10 ft.

Growth rate: Medium

Conditions: Full to part sun, moist to seasonally wet soil

Relocate success: Medium

Availability: High (bare root, container)

Habitat type(s): Riparian, Forest slope

Thimbleberry *Rubus parviflorus*

The leaves of the Thimbleberry are large (up to 5" across) and are covered with very fine hairs which make them feel velvety to the touch. There are no thorns. As the leaves emerge in the spring, Thimbleberry produces stems with multiple large (1–2") white flowers that have crinkly petals like tissue paper. The red berries look like raspberries, and their flavor is quite variable, from very sweet to bland, depending on the particular growing conditions.

Mature height: 3–6 ft.

Growth rate: Medium

Conditions: Full sun to full shade, dry, moist to seasonally wet soil

Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Riparian, Forest, Forest slope

Pacific Blackberry *Rubus ursinus*

The Pacific blackberry is a low growing, but widely spreading plant that can trail extensively. It has tough, curved spines and a three-part leaf. Pacific blackberry is the only native blackberry in the Portland area. The flowers are either male or female and occur on separate plants. Both are required to produce fruit. The shiny black fruit is about 1/2" long and ripens in August. It is delicious and a favorite of birds, bears and deer.

Mature height: 1–1-1/2 ft. and up to 18 ft. long

Growth rate: Fast

Conditions: Full sun to full shade, dry, moist to seasonally wet soil

Relocate success: High

Availability: Low (seed, container)

Habitat type(s): Riparian, Forest, Forest slope

Salmonberry *Rubus spectabilis*

Salmonberry produces a yellow or reddish fruit, that is very delicate and is easily crushed. Like its relative the Thimbleberry, the fruit of the Salmonberry can range from very tasty to poor, depending on the local conditions and the individual plant. Salmonberry flowers are 1–2" across and vary from pink to magenta. They appear singly or in small groups from March to April, either just before or along with the new leaves, and ripen into fruit by July.

Mature height: 4–10 ft.

Growth rate: Fast

Conditions: Part sun to full shade, moist soil

Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Riparian

Blue Elderberry *Sambucus nigra* ssp. *caerulea*

Blue Elderberry is an important source of food for a number of creatures. Deer eat the young shoots and leaves, and the fruits are consumed by squirrels, chipmunks and many species of birds. The large flattened clusters of small white flowers appears on the Blue Elderberry from May to July. They are soon replaced by clusters of blue berries with a whitish bloom that ripen in September.

Mature height: 10–20 ft.

Growth rate: Fast

Conditions: Full to part sun, dry, moist to seasonally wet soil

Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Riparian, Forest

Red Elderberry *Sambucus racemosa* var. *arborescens*

The Red Elderberry, like the Blue Elderberry, is important to many wildlife species. Its clusters of fragrant white flowers provide nectar for butterflies and bees, and the many small red berries are eaten by birds. The Red Elderberry can be distinguished from the Blue Elderberry by the color of its fruit, and by the more rounded clusters of flowers. Both have hollow stems and can grow to the size of a small tree,

Mature height: 10–20 ft.

Growth rate: Fast

Conditions: Full sun to full shade, moist to seasonally wet soil

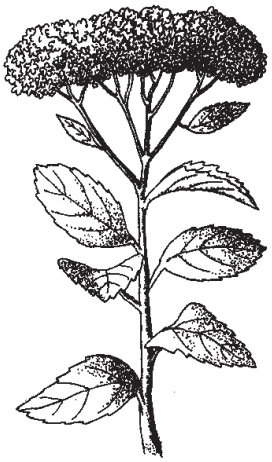
Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Riparian, Forest, Forest slope

Shiny-leaf Spiraea *Spiraea betulifolia* var. *lucida*

The tiny, white or pink flowers of Shiny-leaf Spiraea appear in July and August in flat clusters that form a dense crown on top of the plant. This plant has a considerable range of habitat, being found all the way from sea level to nearly 10,000 ft. elevation. It seems to be at home in the dry shade at the edge of conifer forests or in open, sunny wet places as well.



Mature height: 1–3 ft.

Growth rate: Medium

Conditions: Full to part sun, dry, moist to seasonally wet soil

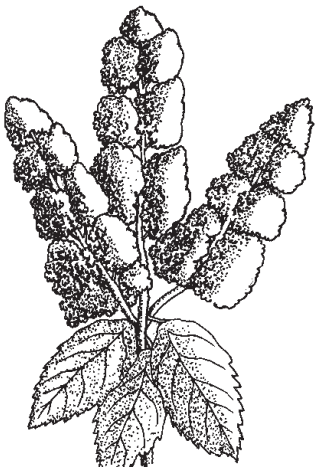
Relocate success: Medium

Availability: Medium (seed, container)

Habitat type(s): Riparian, Thicket, Rocky

Douglas' Spirea *Spiraea douglasii*

Douglas' spirea, or Hardhack, forms very dense stands in marshy areas or along stream banks throughout much of the Pacific Northwest. It flowers from July to August, with upright plumes of many tiny bright pink flowers. These plumes dry and often remain on the plants through the winter. The leaves can be quite variable in size, and often have a pale underside.



Mature height: 3–6 ft.

Growth rate: Fast

Conditions: Full to part sun, dry, moist to seasonally wet soil

Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Wetland, Riparian, Thicket

Common Snowberry *Symphoricarpos albus*

Common Snowberry can be found growing in a wide variety of conditions. It leaves have a bluish green color, but may look very different from plant to plant, depending on the local conditions. Often they are roughly oval, but in deep shade they may be irregular and lobed. The small white or pink bell-shaped flowers appear in April to June in small groups at the tips of the branches. The round white berries, which are poisonous to humans, are a source of winter food for birds.

Mature height: 1–3 ft.

Growth rate: Fast

Conditions: Full sun to full shade, dry, moist to seasonally wet soil

Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Forest, Forest slope, Thicket

Creeping Snowberry *Symphoricarpos mollis*

The Creeping Snowberry spreads by trailing across the ground and sending out new roots from along its stem. It has small pink or white flowers and round white berries that are very similar to the more upright shrub, Common Snowberry. The Creeping Snowberry has solid, hairy twigs while those of the Common Snowberry are smooth and hollow.

Mature height: 1–2 ft.

Growth rate: Fast

Conditions: Full sun to full shade, dry soil

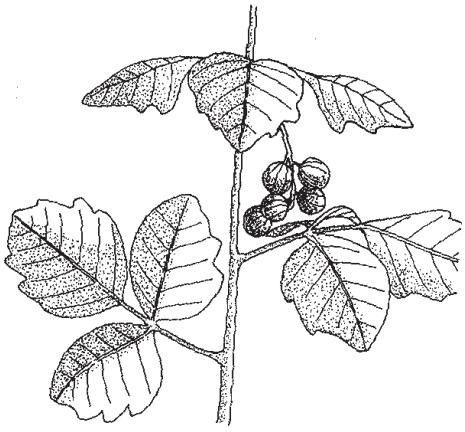
Relocate success: High

Availability: High (seed, container)

Habitat type(s): Forest, Thicket

Poison Oak *Toxicodendron diversiloba*

Because it can be so variable, Poison Oak is sometimes difficult to identify. It has a three-part leaf that is shiny with a reddish tint when it first emerges in early spring. It becomes completely green by early summer, when the clusters of attractive, tiny white flowers appear. Poison Oak is an aggressive plant, and can appear as a compact, dense shrub is open sunny locations, or as a climbing vine reaching up into the trees in a shady area.



Mature height: 1–6 ft.

Growth rate: Fast

Conditions: Full to part sun, dry to moist soil

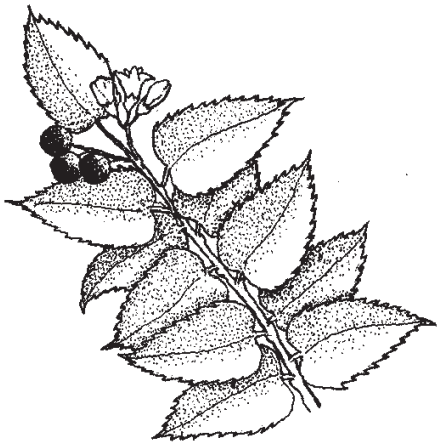
Relocate success: High

Availability: Low (container)

Habitat type(s): Forest, Forest slope, Grass

Evergreen Huckleberry *Vaccinium ovatum*

This evergreen shrub has shiny, leathery pointed leaves that are about 3/4" long and arranged quite closely in a rather horizontal manner along the twigs. The pink bell shaped flowers are small (1/4") and appear in clusters of 3–10 from April through July. The shiny, dark blue berries are very sweet, and are said to taste best after a frost. In the shade, Evergreen Huckleberry will tend to have a more open form than when grown in the open.



Mature height: 3–8 ft.

Growth rate: Medium

Conditions: Full sun to full shade, dry to moist soil

Relocate success: Low

Availability: High (seed, bare root, container)

Habitat type(s): Forest

Red Huckleberry *Vaccinium parvifolium*

The Red Huckleberry is a deciduous shrub with bright green leaves that is most commonly found in the Oregon Coast Ranges. It has 1/2" round berries that are bright reddish orange, and relatively tart when compared to the Evergreen Huckleberry. The berries, which look like salmon eggs, were once used as fishing bait. It has pale yellowish to pinkish bell shaped flowers that appear in April to June at the bases of the leaves.

Mature height: 3–8 ft.

Growth rate: Medium

Conditions: Part sun to full shade, dry to moist soil

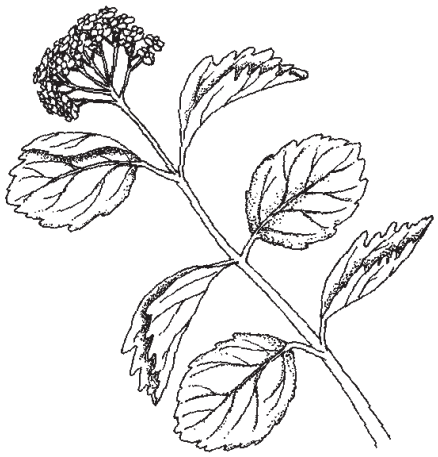
Relocate success: High

Availability: High (seed, bare root, container)

Habitat type(s): Forest, Forest slope

Oval-leaved Viburnum *Viburnum ellipticum*

The small white flowers of the Oval-leaved Viburnum appear in April and May, in 1–2" clusters. Its leaves are oval but have a toothed or serrate upper edge. The small rounded fruit is bright red or orange, and has a slightly tart, acidic flavor. They are quite attractive in the fall along with the bronzy coloration of the leaves.



Mature height: 3–8 ft.

Growth rate: Medium

Conditions: Part sun to full shade, dry to moist soil

Relocate success: Medium

Availability: Low (seed)

Habitat type(s): Forest, Thicket

Attachment 7

Projected Tree Cover of planted materials by Year 10

Nativity	Common Name	Scientific Name	Height at 10 years (ft)	Species cover @ 10 years (ft)-	radius	Individual Cover per sq ft	Speed	size source	Form	Size	Total by Species/Form	Cover total by species s.f.
native	Grand fir	Abies grand	20	15	7.5	176.7	medium	https://www	tree	bareroot	9	**12900**
native	Grand fir	Abies grand	30	20	10	314.2	medium	https://www	tree	B&B	67	**21049**
native	Bigleaf maple	Acer macrop	35	25	12.5	490.9	fast	https://www	tree	B&B	31	**8306**
native	Bigleaf maple	Acer macrop	25	15	7.5	176.7	fast	https://www	tree	bareroot	14	**2474**
native	White alder	Alnus rhom	35	20	10	314.2	very fast	https://nww	tree	B&B	9	**2827**
native	White alder	Alnus rhom	35	20	10	314.2	very fast	https://nww	tree	bareroot	255	**80111**
native	Incense cedar	Calocedrus	35	7	3.5	38.5	medium	https://www	tree	B&B	53	**2886**
native	Incense cedar	Calocedrus	20	7	3.5	38.5	medium	https://www	tree	bareroot	9	**346**
native	Flowering dogwood	cornus nutt	20	10	5	78.5	medium	https://www	tree	B&B	104	**5967**
native	Flowering dogwood	cornus nutt	20	10	5	78.5	medium	https://www	tree	bareroot	105	**4081**
native	Western larch	Larix occide	35	7	3.5	38.5	fast	https://www	tree	B&B	6	**231**
native	Western larch	Larix occide	30	7	3.5	38.5	fast	https://www	tree	bareroot	5	**308**
native	Western crabapple	Malus fusca	15	15	7.5	176.7	medium	https://www	tree	bareroot	51	**9012**
native	Black tupelo	Nyssa sylvat	18	10	5	78.5	medium	https://pnw	tree	B&B	6	**471**
native	Lodgepole pine	Pinus conc	20	15	7.5	176.7	medium	https://www	tree	B&B	186	**32869**
native	Lodgepole pine	Pinus conc	15	12	6	113.1	medium	https://www	tree	bareroot	333	**37661**
native	Ponderosa pine	Pinus pond	32	15	7.5	176.7	fast	https://www	tree	bareroot	34	**12900**
native	Ponderosa pine	Pinus pond	40	20	10	314.2	fast	https://www	tree	B&B	154	**48381**
native	Black Cottonwood	Populus tric	50	20	10	314.2	medium	https://www	tree			**26154**
native	Douglas-fir	Pseudotsug	30	20	10	314.2	very fast	https://www	tree	bareroot	7	**21991**
native	Douglas-fir	Pseudotsug	40	20	10	314.2	very fast	https://www	tree	B&B	50	**13195**
native	Oregon white oak	Quercus gar	15	8	4	50.3	very slow	https://www	tree	B&B	16	**804**
native	Cascara	Rhamnus p	18	10	5	78.5	slow	https://www	tree	B&B	483	**3691**
native	Cascara	Rhamnus p	15	8	4	50.3	slow	https://www	tree	bareroot	706	**37699**
native	Scouler's willow	Salix scoule	20	20	10	314.2	fast	https://www	tree	bareroot	183	**67230**
native	Scouler's willow	Salix scoule	30	30	15	706.9	fast	https://www	tree	B&B		**9896**
native	Western red cedar	Thuja plicat	20	10	5	78.5	medium	https://www	tree	bareroot	48	**3770**
native	Oregon white oak	Quercus gar	10	8	4	50.3	very slow	https://www	trees	1/2" bareroot		**40162**
native	Oregon white oak	Quercus gar	10	8	4	50.3	very slow	https://www	trees	bareroot	775	**38956**

TOTAL PROJECTED AREA OF TREE COVER AT YEAR 10 is 533,248 or 12.2 ACRES

Tree and Shrub totals derived from counts in the following drawings: S. 32 PWB Response to Upland Habitat Comments- Carpenter Lane 00-LU-412, Dodge Park Roadside Clusters 00-LU-413, Proposed Restoration of Johnson Creek, Stormwater Planting- Land Use Plans 00-LU-404, Wetland Enhancement 36910 Lusted Road, Plant Schedules including B&B Updates 00-LU-409 revised, Upland Forest, Riparian and Hedgerow Planting Schedules 00-LU-411

Projected Shrub Cover of planted materials by Year 10

Nativity	Common Name	Scientific Name	Height at 10 years (ft)	Species cover @ 10 years (ft)-diameter	radius	Individual Cover per sq ft	Speed	Form	Size	Total by Species/Form	Cover total by species s.f.
native	Serviceberry	Amelanchie	8	3	1.5	7.1	medium	shrub	bareroot	254	**1795**
native	Snowbrush ceanoth	Ceanothus	4	4	2	12.6	medium	shrub	bareroot	2548	**32019**
native	Red-twig dogwood	Cornus seri	12	6	3	28.3	very fast	shrub	bareroot	1844	**71251**
native	California hazelnut	Corylus cor	8	4	2	12.6	fast	shrub	bareroot	49	**616**
native	California hazelnut	Corylus cor	8	4	2	12.6	fast	shrub	large contai	0	**1307**
native	Silk tassel	Garrya ellipt	12	6	3	28.3	medium	shrub	bareroot	162	**9811**
native	Silk tassel	Garrya ellipt	12	6	3	28.3	medium	shrub	large contai	29	**5400**
native	Oceanspray	Holodiscus	8	3	1.5	7.1	medium	shrub	bareroot	87	**1265**
native	Oceanspray	Holodiscus	8	3	1.5	7.1	medium	shrub	large contai	0	**573**
native	Twinberry	Lonicera inv	8	4	2	12.6	fast	shrub	bareroot	676	**13836**
native	Tall Oregon grape	Mahonia aq	4	2	1	3.1	medium	shrub	bareroot	1983	**6230**
native	Pacific wax myrtle	Myrica calif	20	12	6	113.1	fast	shrub	large contai	530	**59942**
native	Osoberry	Oemleria ce	7	3	1.5	7.1	fast	shrub	bareroot	895	**6326**
native	Mock orange	Philaelphus	9	4	2	12.6	fast	shrub	bareroot	210	**2639**
native	Pacific ninebark	Physocarpu	9	6	3	28.3	fast	shrub	bareroot	2183	**80836**
native	Sword fern	Polystichun	3	3	1.5	7.1	medium	shrub	bareroot	889	**6284**
ornamental	Chaparral currant	Ribes malva	3	3	1.5	7.1	medium	shrub	bareroot	303	**2142**
native	Red-flowering curran	Ribes sangu	6	2	1	3.1	medium	shrub	bareroot	791	**2485**
native	Wood rose	Rosa gymno	3	3	1.5	7.1	medium	shrub	bareroot	303	**2142**
native	Nootka rose	Rosa nutka	7	4	2	12.6	medium	shrub	bareroot	2488	**51946**
native	Swamp rose	Rosa pisoca	7	4	2	12.6	medium	shrub	bareroot	7115	**90713**
native	Thimbleberry	Rubus parvi	4	4	2	12.6	medium	shrub	bareroot	3852	**48406**
native	Sitka willow	Salix sitche	25	25	12.5	490.9	fast	shrub	bareroot	117	**114864**
native	Blue elderberry	Sambucus c	12	10	5	78.5	fast	shrub	bareroot	2548	**200119**
native	Red elderberry	Sambucus r	12	10	5	78.5	fast	shrub	bareroot	685	**53800**
native	Birchleaf spiraea	Spiraea bet	2	1	0.5	0.8	medium	shrub			**1721**
native	Douglas spiraea	Spiraea dou	4	3	1.5	7.1	fast	shrub	bareroot	7577	**54294**
native	Snowberry	Symphorica	3	3	1.5	7.1	fast	shrub	bareroot	2302	**16272**
native	Evergreen huckleberr	Vaccinium c	5	2	1	3.1	medium	shrub		0	**437**
native	Evergreen huckleberr	Vaccinium c	5	2	1	3.1	medium	shrub	5 gal	233	**732**

TOTAL PROJECTED AREA OF SHRUB COVER AT YEAR 10=941,203 s.f. or 21.5 ACRES

Attachment 8

List of plants installed

Count	Nativity	Common Name	Scientific Name	Form
1	native	Grand fir	*Abies grandis*	tree
2	native	Bigleaf maple	*Acer macrophyllum*	tree
3	native	white alder	*Alnus rhombifolia*	tree
4	native	Incense cedar	*Calocedrus decurrens*	tree
5	native	pacific dogwood	*Cornus nuttallii*	tree
6	native	Western larch	*Larix occidentalis*	tree
7	native	Western crabapple	*Malus fusca*	tree
8	native	Black tupelo	*Nyssa sylvatica*	tree
9	native	Shore pine	*Pinus concorta var. contorta*	tree
10	native	Ponderosa pine	*Pinus ponderosa*	tree
11	native	Black Cottonwood	*Populus trichocarpa*	tree
12	native	Douglas-fir	*Pseudotsuga menziesii*	tree
13	native	Oregon white oak	*Quercus garryana*	tree
14	native	Cascara	*Rhamnus purshiana*	tree
15	native	Scouler's willow	*Salix scouleriana*	tree
16	native	Western red cedar	*Thuja plicata*	tree
17	native	Serviceberry	*Amelanchier alnifolia*	shrub
18	native	Snowbrush	*Ceanothus velutinus*	shrub
19	native	Red osier dogwood	*Cornus sericea*	shrub
20	native	Western hazelnut	*Corylus cornuta var. californica*	shrub
21	native	Silk tassel	*Garrya elliptica*	shrub
22	native	Oceanspray	*Holodiscus discolor*	shrub
23	native	Twinberry	*Lonicera involucrata*	shrub
24	native	Tall Oregon grape	*Mahonia aquifolium*	shrub
25	native	Low Oregon grape	*Mahonia nervosa*	shrub
26	ornamental	Pacific wax myrtle	*Myrica californica*	shrub
27	native	Osoberry	*Oemleria cerasiformis*	shrub
28	native	Mock orange	*Philadelphus lewisii*	shrub
29	native	Ninebark	*Physocarpus capitatus*	shrub
30	native	Pacific ninebark	*Physocarpus capitatus*	shrub
31	native	Sword fern	*Polystichum munitum*	shrub
32	ornamental	Chaparral currant	*Ribes malvaceum*	shrub
33	native	Red flowering currant	*Ribes sanguineum*	shrub
34	native	Baldhip rose	*Rosa gymnocarpa*	shrub
35	native	Nootka rose	*Rosa nutkana*	shrub
36	native	Swamp rose	*Rosa pisocarpa*	shrub
37	native	Thimbleberry	*Rubus parviflorus*	shrub
38	native	Hooker's willow	*Salix hookeriana*	shrub
39	native	Sitka willow	*Salix sitchensis*	shrub
40	native	Sitka willow	*Salix sitchensis*	shrub
41	native	Blue elderberry	*Sambucus cerulea*	shrub
42	native	Red elderberry	*Sambucus racemosa*	shrub
43	native	Birchleaf spiraea	*Spiraea betufolia*	shrub
44	native	Douglas spiraea	*Spiraea douglasii*	shrub
45	native	Snowberry	*Symphoricarpos albus*	shrub
46	native	Evergreen huckleberry	*Vaccinium ovatum*	shrub

List of plants installed (continued)

Count	Nativity	Common Name	Scientific Name	Form
47	native	White yarrow	*Achillea millefolium*	herbaceous
48	native	Spike bentgrass	*Agrostis exarata*	herbaceous
49	native	Pearly everlasting	*Anaphalis margaritacea*	herbaceous
50	non-native	Lawn daisy	*Bellis perennis*	herbaceous
51	native	Brodiaea	*Brodaea coronaria*	herbaceous
52	native	Dense sedge	*Carex densa*	herbaceous
53	native	Slough sedge	*Carex obnupta*	herbaceous
54	native	Thick-headed sedge	*Carex pachystachya*	herbaceous
55	native	Broom sedge	*Carex scoparia*	herbaceous
56	native	One-sided sedge	*Carex unilateralis*	herbaceous
57	native	California oatgrass	*Danthonia californica*	herbaceous
58	native	Tufted hairgrass	*Deschampsia cespitosa*	herbaceous
59	native	Slender hairgrass	*Deschampsia elongata*	herbaceous
60	native	Fireweed	*Epilobium angustifolium*	herbaceous
61	native	Oregon sunshine	*Eriophyllum lanatum*	herbaceous
62	native	Western fescue	*Festuca occidentalis*	herbaceous
63	non-native	Quatro tetraploid sh	*Festuca 'Quatro'*	herbaceous
64	native	Roemer's fescue	*Festuca roemeri*	herbaceous
65	non-native	Hard fescue	*Festuca trachyphylla*	herbaceous
66	native	blanketflower	*Gaillardia aristata*	herbaceous
67	native	Western geranium	*Geranium oreganum*	herbaceous
68	native	Willamette gumwee	*Grindelia integrifolia*	herbaceous
69	native	Meadow barley	*Hordeum brachyantherum*	herbaceous
70	native	Slender rush	*Juncus tenuis*	herbaceous
71	native	Prairie junegrass	*Koeleria macrantha*	herbaceous
72	non-native	Sweet alyssum	*Lobularia maritima*	herbaceous
73	non-native	Perennial ryegrass	*Lolium perenne*	herbaceous
74	native	Bigseed biscuitroot	*Lomatium macrocarpum*	herbaceous
75	native	Common biscuitroo	*Lomatium utriculatum*	herbaceous
76	native	Slender madia	*Madia elegans*	herbaceous
77	native	Yellow monkeyflowe	*Mimulus guttatus*	herbaceous
78	native	Cardwell's penstem	*Penstemon cardwellii*	herbaceous
79	native	Fragrant popcorn flo	*Plagiobothrys figuratus*	herbaceous
80	native	Pine bluegrass	*Poa scabrella*	herbaceous
81	native	Self-heal	*Prunella vulgaris ssp. Lanceolata*	herbaceous
82	native	Meadow checkerma	*Sidalcea campestris*	herbaceous
83	native	California goldenro	*Solidago candadensis*	herbaceous
84	non-native	White clover	*Trolium repens*	herbaceous

Attachment 9

Tree Removal During Construction

Count	Nativity	Common Name	Scientific Name	Form
1	native	Bigleaf maple	*Acer macrophyllum*	tree
2	native	Bitter cherry	*Prunus emarginata*	tree
3	native	Black cottonwood	*Populus trichocarpa*	tree
4	native	Cascara	*Rhamnus purshiana*	tree
5	native	Douglas-fir	*Pseudotsuga menziesii*	tree
6	native	Incense cedar	Calocedrus decurrens	tree
7	native	Oregon ash	*Fraxinus latifolia*	tree
8	native	Western red cedar	*Thuja plicata*	tree
9	ornamental	Blue spruce	Picea pungens	tree
10	ornamental	Deodor cedar	*Cedrus deodara*	tree
11	ornamental	Eastern red cedar	*Juniperus virginiana*	tree
12	ornamental	English hawthorn	*Crataegus monogyna*	tree
13	ornamental	Fruit trees	Prunus species	tree
14	ornamental	Giant sequoia	*Sequoiadendron giganteum*	tree
15	ornamental	Hinoki cypress	Chamaecyparis obtusa	tree
16	ornamental	Ornamental maples	*Acer spp.*	tree
17	ornamental	Ornamental pines	*Pinus spp.*	tree
18	ornamental	Port Orford cedar	Chamaecyparis lawsoniana	tree
19	ornamental	Red maple	*Acer rubrum*	tree
20	ornamental	Walnut	*Juglans nigra*	tree
21	native	California hazelnut	*Corylus cornuta var. californica*	shrub
22	native	Elderberry species	*Sambucus spp.*	shrub
23	native	Mock orange	*Philadelphus lewisii*	shrub
24	native	Ocean spray	*Holodiscus discolor*	shrub
25	native	Snowberry	*Symphoricarpos albus*	shrub
26	ornamental	English holly	*Ilex aquifolium*	invasive shrub
27	ornamental	Himalayan blackberry	*Rubus armeniacus*	invasive shrub
28	ornamental	English laurel	*Prunus laurocerasis*	shrub

Attachment 10

Attachment 10

Proposed Habitat Monitoring Conditions of Approval

Final Planting Plan Monitoring Condition for Filtration Facility Site (00-LU-306), Carpenter Lane Properties (00-LU-412), Raw Water Pipeline (LU-200)

A landscape or habitat restoration professional shall monitor the plantings for ten years after to ensure survival and replacement as described below. The landowner is responsible for ongoing survival of required plantings beyond the designated ten-year monitoring period. The landscape professional shall:

- Provide a minimum of 10 letters (to serve as monitoring and maintenance reports) to the Multnomah County Planning Director containing the monitoring information described below. Submit the first letter within 12 months following completion of plantings identified on the Final Planting Plan for the subject property. Submit subsequent letters every 12 months following the date of the previous monitoring letter. All letters shall contain the following information:
  - A count of the number of planted trees and shrubs that have died. If fewer than 80% of the planted trees in the mitigation areas are surviving at the time of monitoring, one replacement tree must be planted for each dead tree (replacement must occur within one planting season).
  - For areas with native seed mixes: the percent coverage of native ground covers within the 8-acre invasive species removal area and all temporary disturbance areas. If less than 80 percent of these areas is covered with native groundcovers at the time of the annual count, additional groundcovers shall be planted to reach 80 percent cover (replacement must occur within one planting season).
  - A list of replacement plants that were installed.
  - Photographs of the mitigation area and a site plan, in conformance with the Final Planting Plan, showing the location and direction of photos.
  - A description of the method used and the frequency for watering trees, and groundcovers for the first two summers after planting.
  - An estimate of percent cover of non-native invasive species within each mitigation area and the invasive species removal area (invasive hawthorn, Himalayan blackberry, Scotch broom, teasel, English ivy, reed canarygrass, clematis, etc.) within 10 feet of all plantings. Invasive species must not exceed 20 percent cover during the monitoring period.
  - Assessment of habitat features- includes annual visit to large wood installations, bird boxes, bat boxes, rock piles annually to assess function and use. Replace features that are no longer providing the intended function. (applicable to 00-LU-306)

Final Planting Plan Monitoring Condition for Dodge Park Boulevard ROW (00-LU-413)

A landscape or habitat restoration professional shall monitor the required right-of-way plantings for two years to ensure survival and replacement as described below. The landscape professional shall:

- Provide a minimum of two letters (to serve as monitoring and maintenance reports) to the Multnomah County Planning Director containing the monitoring information described below. Submit the first letter within 12 months following completion of the right-of-way planting. Submit subsequent letters every 12 months following the date of the previous monitoring letter. All letters shall contain the following information:
  - A count of the number of planted shrubs that have died. If fewer than 80% of the planted shrubs in the mitigation areas are surviving at the time of monitoring, one replacement shrub must be planted for each dead shrub (replacement must occur within one planting season).
  - A list of replacement plants that were installed.
  - Photographs of the mitigation area and a site plan, in conformance with the Final Planting Plan, showing the location and direction of photos.
  - A description of the method used and the frequency for watering mitigation shrubs, and groundcovers for the first two summers after planting.
  - An estimate of percent cover of invasive species within each mitigation area and the invasive species removal area (invasive hawthorn, Himalayan blackberry, Scots broom, teasel, English ivy, reed canarygrass, clematis, etc.) within 10 feet of all plantings. Invasive species must not exceed 20 percent cover during the monitoring period.