LACAMAS NORTH SHORE TRAIL PROJECT
City Project: P1005

Application for Shoreline Variance

Submitted By:
City of Camas
Parks and Recreation Department
616 NE 4th Avenue
Camas, Washington 98607

February 23, 2018

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APPLICANT:

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City of Camas

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PROPERTY OWNER:

City of Camas

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APPLICANT'S CONSULTANT:

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LOCATION OF PROJECT:

Parcel Serial Number: 178099-000, 124244-000 and 177896-000

Comprehensive Plan Designation: Parks/Open Space (P/OS) and Open Space/Green Space (OS/GS)

Zoning: Open Space (OS) and Parks/Open Space (P/OS)

Overlay Zone(s): Urban Holding / Gateway Corridor

Sec: 02 Township: 1N Range: 3E

Sec: 35 Township: 2N Range: 3E

Sec: 34 Township: 2N Range: 3E

Parcel Size: 178099-000 - 45 acres; 124244-000 - 3.2 acres; 177896-000 - 12 acres; total: 60.2 acres

TYPE OF REVIEW

( ) Substantial Development Permit

( ) Conditional Use Permit

(X) Variance

SUBMITTAL REQUIREMENTS

1. *Name of water area and/or wetlands within which development is proposed:*

Work would occur within the shoreline and 100-year floodplain of Lacamas Lake.

No work below the OHWM of any waterbody. A boardwalk would be located over the East wetland, identified by HHPR.

2. *Current use of the property with existing improvements:*

The three parcels are open space, all owned by the City of Camas. The parcels are forested, or, in one section, grassy lawn extending from abutting private properties.

3. *Proposed use of property:*

The City of Camas proposes to extend the existing trail system at the south end of Lacamas Lake onto the three parcels.

4. *Nature of the existing shoreline. (Describe type of shoreline, such as marine, stream, lake, lagoon, marsh, bog, swamp, flood plain, floodway, delta; type of beach, such as accretion, erosion, high bank, low bank, or dike; material, such as sand, gravel, mud, clay, rock riprap; and extent and type of bulkheading, if any):*

Lacamas Lake, adjacent to the project area, is regulated as a water of the state, a shoreline of the state, and a priority habitat for resident fish.

The majority of the jurisdictional shoreline is within the 100-year floodplain of Lacamas Lake. The shoreline is mostly mixed-evergreen deciduous forest, dominated by Douglas fir, with mowed lawns extending onto public property from abutting private residences in a few locations.

Two wetlands are present in the project area: the East wetland, a large forested wetland located to the east of the proposed trail and intersecting it at one location (boardwalk); and the Lake wetland, a scrub-shrub/aquatic bed wetland along the fringe of Lacamas Lake.

5. *In the event that any of the proposed buildings or structures will exceed a height of 35 feet above the existing grade level, indicate the approximate location of and number of residential units, existing and potential, that will have an obstructed view.*

No buildings or structures exceeding a height of 35 feet are proposed.

6. *Project Diagrams:*

Engineering Drawings (Appendix F).

7. *State Environmental Policy Act (SEPA) checklist.*

Prepared by HHPR and submitted as a separate, concurrent document.

8. *Additional material or comments (included on other sheets if necessary).*

Project Narrative (See below). Figures (Appendix A). Photographs (Appendix B). Tree Survey (Appendix C). Other Technical Reports (Appendix D). Mailing List—Properties within 300 feet (Appendix E). Engineering Drawings (Appendix F). Mitigation Plans (Appendix G).

AUTHORIZATION:

The undersigned hereby certifies that all information submitted with this application is complete and correct to the best of my knowledge and belief. I understand that any errors and/or omissions may lengthen the time to process the request.

_____ _____

Authorized Signature Date

(letter of authorization required if other than property owner)

SUBMIT THIS APPLICATION TO THE PLANNING DEPARTMENT AT CITY HALL, 616 NE 4TH AVENUE, CAMAS, WASHINGTON (360) 834-3451.

for office use only do not write below this line

Application No.: _____ Filing Date:

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1. PROJECT DESCRIPTION

1.1 Project Description

The City of Camas (City) proposes to extend the existing trail system at the south end of Lacamas Lake (Figures 1 and 2, Appendix A). The new trails would be located within City property on the northeast side of Lacamas Lake, from the Round Lake Loop Trail east of NE Everett Street (State Route 500) to a natural area on the lakeshore.

The main trail, approximately 3,300 feet in length, would traverse northwest from NE Everett Street, following the alignment of an abandoned access road (Photographs 1 and 2, Appendix B). The main trail would include a 75-foot-long boardwalk, 25 feet of which would lie above a wetland. The boardwalk would be supported on pin piers, resulting in only 6 cubic feet of fill in the wetland.

A shorter loop trail, approximately 1,120-feet long, would connect to the main trail to create a loop in the natural area. A spur trail, approximately 180-feet long, would follow the path of an existing informal packed dirt trail (Photograph 3) from the loop trail to a viewpoint of Lacamas Lake. The main trail would be 8-feet wide and constructed of impervious material (geotextile and a gravel cover); the loop and spur trails would be 4-feet wide with a pervious surface (wood chips).

Per the City's (2014) *Park, Recreation and Open Space Comprehensive Plan Update*, the main trail is considered a Regional Multi-use Trail and the loop and spur trails as Semi-Primitive Trails. The trails would pass through multiple environmentally sensitive (critical) areas and have been designed and located to minimize impacts, including deviation from specific trail standards. The Plan Update anticipated authorizing exceptions in such cases. The adjustments for the main trail would: 1) use lower impact construction methods by installing a gravel surface rather than a paved or concrete surface, and 2) avoid and minimize vegetation clearing in wetland and stream buffers by limiting width to that of the existing abandoned access road. Side clearance for the main trail, the spur trail, and a short segment of the loop trail would be 1 foot; there would be no formal side clearance along the section of the loop trail where vegetation would be cut to establish the trail surface.

Construction of the trails (including boardwalk) is scheduled for summer or fall 2018.

1.2 Shoreline Jurisdiction

Lacamas Lake, adjacent to the proposed trails, is a dam-controlled lake designated as a shoreline of the state by the City's (2015) *Shoreline Master Program* (SMP). Associated wetlands and wetland buffers are present along the fringe of Lacamas Lake, extending inland in some locations.

The OHWM of Lacamas Lake, in the vicinity of the proposed trails, was evaluated during field visits on October 26 and 30, and December 14, 2017. The boundary character varies depending on the precise location, but typically integrates three or more of the following (HHPR 2018a):

- A vegetation change from lacustrine or wetland to upland community;
- An abrupt topographic break;
- A sediment change from gravel beach to soils with a developed soil profile;
- Watermarks on boulders and dock structures along the bank;
- Wrack accumulation; and

- Full summer pool elevation of Lacamas Lake (181 feet).

Jurisdictional shorelands include lands within 200 feet of the ordinary high water mark (OHWM) of designated shorelines and extend to encompass associated wetlands, critical areas and their buffers, where present. As a result, the proposed trails would be within jurisdictional shorelands for their entire length, with the boundary of the shoreline located either: 1) 200 feet from the OHWM of Lacamas Lake, or 2) At the outer boundary of associated wetland buffers, where they extend landward more the 200 feet (Figure 3).

The shoreline designation for the parcel is Urban Conservancy. Table 6-1 of the SMP indicates that recreational trails within Urban Conservancy shorelines are a Permitted Use. The boardwalk, which would be oriented parallel to the shoreline in order to cross a wetland, is considered part of the main trail.

Recreational trails in Urban Conservancy shorelines require a 100 foot setback from the OHWM, according to Table 6-1. However, trails setback less than 150 feet from the OHWM must comply with additional criteria regarding stream buffer width reduction contained in SMP 16.61.040.D.2. As a result of site constraints, the proposed trails would be within 150 feet of the OHWM of Lacamas Lake along the entire length, and within 100 feet at several locations. Thus, a shoreline variance would be required.

The applicant requests approval of a Shoreline Variance and critical areas permit for the proposed trail project.

1.3 Consistency with Shoreline Goals (SMP 3.1 and 3.7)

The proposed project will be consistent with the General Shoreline Goals contained in SMP 3.1 and the Public Access and Recreation goal and policies contained in SMP 3.7 because it will expand the publically owned recreation trail network and provide improved public access to this relatively unused portion of the Lacamas Lake shoreline. The site is a publically owned natural area and the proposed trails will allow the public to enjoy the shoreline character while protecting ecological function.

The proposed trails will utilize public lands to expand the trail system that provides public access to the shorelines around Lacamas and Round Lakes. The two types of trail—one regional trail and two shorter semi-primitive trails—are consistent with policy 3.7.2.1.

The proposed trails support policy 3.7.2.2 by developing a trail system along a stretch of shoreline where none currently exists.

The proposed trails will provide access in a manner that will preserve the natural characteristics of the shoreline, as described in section 5 of this report, consistent with policy 3.7.2.3.

In accordance with policy 3.7.2.4, the proposed trails are consistent with the adopted city trail system, identified in the City's (2014) *Park, Recreation and Open Space Comprehensive Plan Update*, and are designed according to the Design & Development Guidelines contained in Appendix B of that document (see section 6.3 of this narrative for details).

The proposed trails will encourage, and not curtail, public access to the Lacamas Lake shoreline, consistent with policy 3.7.2.5-6.

2. CAMAS ZONING CODE (TITLE 18)

2.1 Permitted Uses (Chapter 18.07 – Use Authorization)

The property is zoned Parks/Open Space (P/OS). Pedestrian and multi-use trails are a permitted use per Section 18.07.050 Park and Open Space Land Uses. Therefore the proposed trail project is a land use that is permitted outright in the P/OS zone.

2.2 Sensitive Areas and Open Space (Chapter 18.31)

2.2.1 Sensitive Area – Scope (Section 18.31.020)

Chapter 18.31 is applicable because the project requires Shoreline Variance (18.31.020.C).

2.2.2 Sensitive Area – Administration (Section 18.31.030)

The applicant has addressed critical areas in section 5 of this narrative and supporting documentation.

2.2.3 Sensitive Areas—Tree Retention (Section 18.31.080)

A tree survey was conducted by HHPR natural resource scientists and is provided in Appendix C. Significant trees are defined by the Camas Municipal Code (CMC) 18.03, Definitions, as "evergreen trees eight inches dbh [diameter 4.5 feet above the ground surface], and deciduous trees, other than red alder [*Alnus rubra*] or cottonwood [*Populus* spp.], twelve inches dbh".

The route of the trail project has been aligned to avoid removing significant trees. The majority of the trail project (the main trail) occurs within a forest, where grading is expected to be minimal and would be limited to the bounds of the existing abandoned access road. Thus, such grading is expected to avoid damage to significant trees because they are typically greater than 5 feet beyond the edge of the access road.

2.2.4 Sensitive Areas – Vegetation Removal (Section 18.31.090)

This section is superseded by greater vegetation protections provided by SMP requirements (see section 6.2.8 of this report).

2.2.5 Sensitive Areas – Mandatory Preservation (Section 18.31.110)

The land is zoned Parks/Open Space (P/OS) and no additional protective mechanisms are proposed.

2.3 Park and Open Space (Chapter 18.32)

2.3.1 Park and Open Space – Applicability (Section 18.32.010)

Chapter 18.32 is applicable because the project is proposed on land held in the public trust.

2.3.2 Park and Open Space – Permitted Uses (Section 18.32.020)

The property is zoned Parks/Open Space (P/OS). Pedestrian and multi-use trails are permitted uses per Section 18.07.050 Park and Open Space Land Uses. Therefore, the proposed project is a land use that is permitted outright in the P/OS zone.

2.3.3 Park and Open Space – Development Standards (Section 18.32.030)

Lot area, building lot coverage, landscaping, and parking are not relevant to this trail project.

Setbacks will be a minimum of 20 feet.

Signage will follow the provisions of Chapter 18.15 and be consistent with other trail and boundary signage in the City park system.

2.3.4 Park and Open Space – Site Plan Review & Design Review (Section 18.32.040)

The project will undergo Site Plan Review and Design review as applicable.

2.4 Administrative Procedures (Chapter 18.55)

2.4.1 Shoreline Master Program Permits (SMP) (Section 18.55.330)

The applicant requests a Shoreline Variance permit. Variance criteria are addressed in section 6.1 of this report.

2.4.2 Expiration of Shoreline Master Program Permits.

The applicant intends to commence construction within the timelines stated in this section.

3. STATE ENVIRONMENTAL POLICY ACT (SEPA) COMPLIANCE (Title 16.01)

The applicant has completed a SEPA Environmental Checklist, submitted as a concurrent, separate document.

4. ARCHAEOLOGICAL COMPLIANCE (Title 16.31)

Archaeological surveys were conducted for the proposed project by Archaeological Investigations Northwest, Inc. (AINW) in 2016, and for a different project in 2010. Another survey on one parcel was done by Archaeological Services of Clark County in 2004. AINW reviewed records held by the Washington Department of Archaeology and Historic Preservation (DAHP), AINW's library, and the Clark County GIS. Recently, AINW archaeologists conducted pedestrian surveys and shovel testing within the project area. Four archaeological resources were identified within the project area including two pre-contact lithic scatters, one historic-period refuse scatter, and one historic-period isolated glass fragment (Dubois, et al., 2018). The final report will be placed on file with DAHP.

Archaeological permits will be needed from DAHP prior to construction within the two pre-contact lithic scatter sites. AINW recommends that no additional archaeological excavation is needed for either site, as long as trail construction methods involve minimal ground disturbance (for example, gravel on top of permeable ground protection such as filter fabric). Archaeological monitoring may be needed for ground disturbing activities within the two pre-contact archaeological sites, depending on the nature and extent of the final project design. An Inadvertent Discovery Plan will outline procedures to be followed if archaeological resources are encountered during construction. DAHP permits will not be needed for the historic-period refuse scatter and the isolated historic-period glass fragment, because they are not recommended to be eligible for the National Register of Historic Places (NRHP).

5. CRITICAL AREAS COMPLIANCE (SMP Appendix C, 16.51)

The Growth Management Act (RCW 36.70A) and the City Critical Area Regulations (Camas SMP, Appendix C, 16.51) protect wetlands, critical aquifer recharge areas, frequently flooded areas,

geologically hazardous areas, and fish and wildlife habitat conservation areas.

Pedestrian evaluations (November 10 and December 1, 2016; October 26 and 30, and December 14, 2017; and January 14, 2018) assessed site conditions, delineated wetlands and OHWM, conducted non-protocol plant surveys, conducted habitat assessments, and evaluated impacts of proposed project actions.

The project is partially or wholly within a Frequently Flooded Area, a Critical Aquifer Recharge Area (the countywide Troutdale Sole Source Aquifer), Fish and Wildlife Habitat Conservation Areas, and wetland buffers (Figures 4 through 6).

5.1 Wetlands (SMP 16.53)

5.1.1 Wetland Delineation, Rating, and Buffers (SMP 16.53.030.A-D)

One depressional, forested wetland (East wetland) and one lake fringe, scrub-shrub wetland/aquatic bed (Lake wetland) were identified and delineated in the study area (HHPR 2018a) (Figure 4), in accordance with SMP 16.53.020.A and 16.53.030.D.

The East wetland (Photograph 4) is a forested wetland along the east and south sides of the upland ridge on which the proposed trail would be located. This wetland intersects the proposed trail in a broad swale at the south end of the ridge, where a 12-inch (diameter) steel culvert lies beneath the abandoned access road (Photograph 5).

The Lake wetland (Photograph 6), is a scrub-shrub fringe along Lacamas Lake at the northwest and north side of the ridge, extending into a wide aquatic bed in the lake (Photograph 7). The proposed trail would not intersect this wetland.

The East and Lake wetlands were rated following Hruby (2014). Overall, these wetlands have a score of 19 (East wetland) and 21 points (Lake wetland), Category III and II, respectively (Table 1). The wetlands score moderate to high water quality function (scores of 7 and 8), with moderate hydrologic function (scores of 6), and moderate to high habitat function (scores of 6 and 7).

Vegetation in the core of the East wetland is dominated by a dense canopy of Oregon ash (*Fraxinus latifolia,* FACW), with occasional red alder, and an understory of slough sedge (*Carex obnupta*, OBL). At the northwest and southeast ends, the tree canopy thins and a shrub understory is present, composed of salmonberry (*Rubus spectabilis*, FAC), twinberry (*Lonicera involucrata*, FAC), redosier dogwood (*Cornus alba*, FACW), Douglas spirea (*Spiraea douglasii*, FACW), Pacific ninebark (*Physocarpus capitatus*, FACW), and occasional Himalayan blackberry (*Rubus armeniacus*, FAC). In these areas, Western lady fern (*Athyrium cyclosorum*, FAC), piggyback plant (*Tolmiea menziesii*, FAC), tall mannagrass (*Glyceria elata*, FACW), skunk cabbage (*Lysichiton americanus*, OBL), and reed canarygrass (*Phalaris arundinacea*, FACW) join slough sedge in herbaceous openings and understory.

Where the abandoned access road passes through the East wetland, vegetation is sparse and dominated by non-native species, primarily creeping buttercup (*Ranunculus repens*, FAC) and non-native grasses (e.g. annual blue grass [*Poa annua*, FAC]), with occasional intrusions by Himalayan blackberry.

The Lake wetland contains a scrub-shrub area along the upland boundary, above the OHWM. Here, vegetation is composed of a variety of shrub species, including salmonberry, redosier dogwood, Pacific ninebark, and Himalayan blackberry, sometimes heavily shaded by trees in adjacent uplands. The wetland often includes a strip of reed canarygrass along the OHWM. Below the OHWM, aquatic bed vegetation, dominated by yellow pond lily (*Nuphar polysepala*, OBL), extends into the lake.

Backwater areas, where water is shallow and vegetation is shaded by Douglas fir trees (*Pseudotsuga menziesii)* and protected from the fetch of the lake, are dominated by emergent species, including skunk cabbage, Western lady fern, reed canarygrass, slough sedge, and water parsley (*Oenanthe sarmentosa*, OBL) (Photograph 8).

Tree canopy in the upland forest on the ridge between the two wetlands is dominated by Douglas fir and bigleaf maple (*Acer macrophyllum*, FACU), with occasional western hemlock (*Tsuga heterophylla*) (Photograph 9). There is a diverse shrub layer—including vine maple (*Acer circinatum*), beaked hazelnut (*Corylus cornuta*), Pacific ninebark, salmonberry, common snowberry (*Symphoricarpos albus*), salal (*Gaultheria shallon*), dull Oregon grape (*Mahonia nervosa*), and mock orange (*Philadelphus lewisii*)—with sword fern (*Polystichum munitum*), fringe cup (*Tellima grandiflora*), threeleaf foamflower (*Tiarella trifoliata*), and other herbs in the understory. Invasive upland species, including English holly (*Ilex aquifolium*), ivy (*Hedera spp.*), periwinkle (*Vinca sp.*), and shiny geranium (*Geranium lucidum*), are well established in some locations, but generally not dominant.

The wetland buffers for the two wetlands (Table 1) occupy much of this upland ridge. The abandoned access road, which the proposed main trail would follow, is partially within the wetland buffers. Otherwise, they are undeveloped.

Table 1. Summary of the Wetland Ratings and Buffer Widths.

Wetland	Wetland Category	Habitat Score	Maximum Wetland Buffer Width (ft)§
East	III	6	65 for pervious trail (low intensity use) 100 for impervious trail (moderate intensity use)
Lake	II	7	110 for pervious trail (low intensity use) 165 for impervious trail (moderate intensity use)

§ SMP Tables 16.53.040-2 and -3 applying uses per SMP Table 16.53.040-4

5.1.2 Wetland Analysis (SMP 16.53.030.E)

All trails would be outside of wetland, except where the main trail would cross the East wetland via a boardwalk. The main trail would follow the route of the abandoned access road along the narrow ridge of upland, between the East wetland and Lacamas Lake/Lake wetland. This ridge is typically between 150 and 450 feet wide. The shorter loop trail would be located in the wider upland area.

Buffers from the East wetland are 65 feet for a pervious trail (low-intensity land use) and 100 feet for an impervious trail (moderate-intensity land use). Buffers from the Lake wetland are 110 feet for a pervious trail and 165 feet for an impervious trail. Wetland buffers overlap the stream buffer (150 feet from the OHWM of Lacamas Lake, discussed in section 5.5.6 of this report) so that any trail alignment in the upland would be located within one or more critical area buffers.

Given these constraints, the trails were realigned and redesigned multiple times (based on field reviews) to avoid and minimize impacts to wetlands and other resources. Avoidance and minimization measures included:

- Utilizing the existing abandoned access road for the main trail to the extent possible;
- Reducing the width of the main trail from 12 feet (the preferred width for regional trails [Camas 2014]) to 8 feet to remain inside the footprint of the abandoned access road;
- Crossing the East wetland on the existing fill of the abandoned access road;
- Utilizing a low-impact boardwalk design: 6 cubic feet of excavation vs. 60 cubic feet of excavation and concrete for cylindrical footings, and eliminating presence of green concrete in wetland;
- Designing the trails for construction with low-impact manual methods to the extent practical (e.g. using a geotextile and gravel surface in place of a paved surface);
- Avoiding removal of mature trees from wetlands or buffers (Photographs 3 and 9);
- The stormwater design for the main trail is full dispersion within 20 feet of the edge of the trail, which avoids stormwater impacts to wetlands and Lacamas Lake;
- Utilizing the existing dirt path for the loop and spur trails to the maximum extent possible;
- Utilizing level areas for the loop and spur trails to the extent possible to minimize the need for filling or grading;
- Changing the loop and spur trail design from a 12-foot wide impervious surface to a 4-foot wide pervious surface;
- Re-routing the loop trail around wetlands and backwaters (Photographs 8 and 10);
- Eliminating a viewpoint along the loop trail that would have encroached into the Lake wetland;
- Shortening the loop trail and realigning it uphill, away from the Lake wetland; and
- Eliminating a segment of the loop trail that would have encroached closer toward the East wetland.

In the proposed design, the main trail would be within wetland buffers for impervious trails for approximately 1,610 feet (Figure 4).

The main trail would be 8-feet wide, constructed of geotextiles and gravel, and confined to the existing footprint of the abandoned access road, which is compacted and bare of native vegetation for much of its route. No trees or shrubs lie within the abandoned access road. As a result, only minimal clearing would be required in the few locations where vegetation has grown into the abandoned access road.

The main trail would not result in any impacts to wetland buffer functions and values.

The loop trail would be a new trail, 4-feet wide, with a pervious surface. Approximately 550 feet of the loop trail, at the north end, would be within the Lake wetland buffer for pervious trails.

In addition to design considerations, proposed measures to avoid and minimize impacts during construction would be identified in a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP would include Best Management Practices (BMPs) that would be employed throughout the project to minimize impacts. The SWPPP would also include practices for the prevention of spills.

Proposed measures to reduce or control erosion, or other temporary impacts, will be outlined in the completed SWPPP. Specific BMPs related to erosion would include:

- High visibility plastic or metal fence near residences and commercial parcels and NE Everett Street;
- Preserving natural vegetation;
- Temporary and permanent seeding;
- Mulching, nets, and blankets;
- Silt fence;
- Material stockpiling/staging; and
- Dust control.

Impacts from hazardous materials in the project corridor will be addressed through standard minimization measures and BMPs such as:

- All equipment to be used for construction activities will be cleaned and inspected prior to arriving at the project site, to ensure no potentially hazardous materials are exposed, no leaks are present, and the equipment is functioning properly;
- Construction equipment will be inspected daily to ensure there are no leaks of hydraulic fluids, fuel, lubricants, or other petroleum products; and
- Should a leak be detected on equipment used for the project, the equipment will be immediately removed from the area and not used again until adequately repaired.

5.1.3 Wetland Permits (SMP 16.53.050)

SMP 16.53.050.A.1 states that a wetland permit is required for any non-exempt development activity within wetland or wetland buffers. Per SMP 16.53.010.C.1.l, clearing within a wetland buffer, as minimally necessary, to create a 4-foot wide path with a natural, pervious surface is exempt from permit requirements. Thus, the loop and spur trails are exempt from wetland permits. The main trail, where located within wetland and wetland buffers, is subject to a wetland permit.

The main trail will comply with SMP 16.53.050.B, Standards—General. In accordance with SMP 16.53.050.B.1, the proposed trails will not cause significant degradation of wetland functions. The main trail would be confined to the footprint of the existing abandoned access road, which is a compacted, gravel crossing, mostly bare of perennial vegetation as it passes through the wetland. Clearing would be limited to those areas where vegetation has encroached into the abandoned access road.

In accordance with SMP 16.53.050.B.2, the proposed trails will comply with all state and federal laws and acquire all required permits.

No buffer reduction is being requested (SMP 16.53.050.C).

The following are the major measures taken to avoid, minimize, and compensate for (SMP 16.53.050.D) wetland impacts, primarily at the East wetland:

- Install a boardwalk to avoid construction of a larger earthen fill (either by removing/replacing or raising/widening the existing road crossing) for an at-grade trail;
- Use pin piers to avoid potential impacts from pouring concrete footings for the boardwalk;
- Utilize the existing abandoned access road crossing as the boardwalk crossing location to minimize impacts from the boardwalk;
- A boardwalk design that minimizes the number of pin piers required (six) in the wetland;

- Use low-impact pin piers to minimize the amount of excavation, 1/10 that required for an equivalent concrete footing (6 cubic feet for six pre-cast concrete pier heads vs. 60 cubic feet for cylindrical footings poured in place);

A wetland mitigation plan (included in Appendix G) has been prepared to compensate for the 6 square feet of total impact from the concrete pier heads that would be located within the boundary of the East wetland (SMP 16.53.050.E).

A pre-application meeting was held on April 6, 2017 with City planning, engineering, and parks staff (SMP 16.53.050.F).

This is a Parks and Recreation Department project, which provides the financial assurance for the wetland activities associated with this project (SMP 16.53.050.J).

No programmatic permit is being requested (SMP 16.53.050.K).

No emergency wetland permit is being requested (SMP 16.53.050.L).

5.2 Critical Aquifer Recharge Areas (SMP 16.55)

The project site does not lie within a wellhead protection zone. (Clark County GIS 2017/2018).

The Troutdale Aquifer, designated by the US Environmental Protection Agency (EPA) as a sole source aquifer, underlies the project. Per SMP 16.55.040, the proposed project is an allowed activity in the CARA and does not require submission of a CARA critical area report because it meets the following criteria:

- The proposed trails are a recreational development within an open space that results in less than 5 percent total site impervious surface area (approximately 1% or 0.62 acres of new impervious surface) does not increase the use of any hazardous substance, consistent with SMP 16.55.040.B; and
- The proposed trails do not result in loss of more than 40 percent of the total pervious surface of the site, consistent with SMP 16.55.040.C.

5.3 Frequently Flooded Areas (SMP 16.57)

5.3.1. Applicability/Uses and Activities Prohibited (SMP 16.57.010-020)

From NE Everett Street to the forest, the 100 year floodplain of Lacamas Lake (as mapped on the FIRM for Clark County [FEMA 2012]) extends inland from the OHWM for 30 to 80 feet, depending on the location. The proposed trail would generally be located outside of the 100 year floodplain in this segment. At the north end of the site, the 100 year floodplain extends across the entire upland ridge from the edge of the forested area to the northwest terminus of the main trail (Figure 5).

The 100 year floodplain, identified as an area of special flood hazard on the FIRM, is designated as a Frequently Flooded Area by SMP 16.57.010.A.

None of the prohibited uses and activities identified in SMP 16.57.020 are proposed as part of this project.

5.3.2. Additional Report Requirements (SMP 16.57.030)

The project site and special flood hazard areas and other flood areas within 300 feet are shown in Figure 5 (SMP 16.57.030.B.1-3).

Proposed development, floodplain (no floodway mapped at site), other critical areas, and shoreline areas are shown in Figures 1 through 6. No management zones or buildings are proposed (SMP 16.57.030.C.1.).

The proposed project does not include buildings, so a floodproofing certificate is not required per SMP 16.57.030.C.2.

No watercourse alteration is proposed as part of this project (SMP 16.57.030.C.3).

Potential impacts to wetlands, fish and wildlife habitat, and other critical areas are addressed throughout section 5 of this report, in accordance with SMP 16.57.030.D.

5.3.3. Performance Standards (SMP 16.57.050-080)

The project will obtain all necessary permits (SMP 16.57.050.A.).

Regarding SMP 16.57.050.B, the base flood elevation at the project site is 191 feet (FEMA 2012), but a regulatory floodway is not designated at the project site. Because the project would be constructed at-grade, or possibly only inches above in some locations along the main trail, it has been determined that the cumulative effect of the project will not increase the water surface elevation of the base flood more than 1 inch at any point within the City limits (Robert VanderZanden, P.E., HHPR, pers. comm., February 9, 2018).

SMP 16.57.050.C is not applicable because base flood elevation data is available. The base flood elevation at the project site is 191 feet (FEMA 2012).

In compliance with SMP 16.57.050.D.1, the project will be constructed using materials and methods that are flood resistant and/or minimize flood damage.

SMP 16.57.050.D.2 through F are not applicable because no buildings or utilities are proposed.

The engineering design (Appendix F) firmly anchors the boardwalk against flotation, collapse, or lateral movement and would be installed to minimize flood damage (e.g., without hand rails and having low profile) (SMP 16.57.050.G).

In accordance with SMP 16.57.050.H, grading proposed as part of this project will not block side channels, inhibit channel migration, increase flood hazards to others, or be placed in the channel migration zone (Robert VanderZanden, P.E., HHPR, pers. comm., February 9, 2018). There are no side channels present on or adjacent to the project site. The proposed trails are at ground level and would not inhibit channel migration. The proposed trails would not interfere with the movement of floodwaters. The project would not be located in slopes or banks that could be susceptible to erosion during a flood.

SMP 16.57.060 and .070 are not applicable because no residential units, non-residential construction, utilities, subdivision/land division, watercourse alteration, or recreational vehicles are proposed as part of the project.

No variance request is being made regarding these standards (SMP 16.57.080).

5.4 Geological Hazard Areas (SMP 16.59)

5.4.1 Erosion Hazards

No erosion hazards exist in the vicinity of the proposed project. SMP 16.59.020.A defines erosion hazard areas as those not mapped as landslide hazard areas, but having a slope equal to or greater than 40 percent. Steep slopes with a vertical height less than 10 feet and not part of a larger slope system are excluded. Topography within the project area is generally flat to gently sloping. Steep, nearly vertical slopes exist in some locations along the banks of Lacamas Lake, but these are less than 10 feet high and

are therefore not designated as erosion hazards.

5.4.2 Landslide Hazard Areas

No landslide hazards as defined in the SMP 16.59.020.B exist on-site or within 300 feet of the project (Clark County GIS 2017/2018). There is no evidence of unstable or recent landslides, and no areas meeting the definition in SMP 16.59.020.B.2-7.

5.4.3 Seismic Hazard Areas

The project does not lie within a Seismic Hazard Area. Per SMP 16.59.020.C, Seismic Hazard Area is defined as an area subject to severe risk of damage as a result of earthquake-induced soil liquefaction, ground shaking amplification, slope failure, settlement, or surface faulting. The project site is mapped as Site Class C on the National Earthquake Hazard Reduction Program (NEHRP) site class map of Clark County (Clark County GIS 2017/2018). The project area is mapped as Low to Moderate for risk of liquefaction (Clark County GIS 2017/2018).

5.4.4 Other Hazard Areas

No other hazards as defined in the SMP 16.59.020.D exist on-site.

5.5 Fish and Wildlife Habitat Conservation Areas (SMP 16.61)

The southeastern segment of the proposed alignment (approximately 1,200 feet) is located on a strip of City property between Lacamas Lake and private homes (Photograph 1). This area is dominated by open grass (a mix of non-native pasture and lawn species) with scattered trees, primarily Douglas fir, bigleaf maple, and Oregon white oak (*Quercus garryana*). Just before the culvert crossing (Figure 2), the alignment enters the forested natural area (Photograph 2). Here, the proposed alignment is located on a narrow peninsula of upland between the lake, to the west, and a large wetland, to the east.

Tree canopy in the upland (riparian) forest is dominated by Douglas fir and bigleaf maple, with occasional Western hemlock. There is a diverse shrub layer—including vine maple, beaked hazelnut, Pacific ninebark, salmonberry, common snowberry, salal, dull Oregon grape, and mock orange—with sword fern, fringe cup, threeleaf foamflower, and other herbs in the understory. Invasive upland species, including English holly, ivy, periwinkle, and shiny geranium, are well established in some locations, but generally not dominant.

Red alder and Oregon ash occur in moist areas along the edge of the lake, backwaters, and in wetlands, with an understory of redosier dogwood, salmonberry, elderberry (*Sambucus* sp.), slough sedge, skunk cabbage, and Western lady fern. Invasive plant species in these areas include Himalayan blackberry, reed canarygrass, and creeping buttercup (*Ranunculus repens*).

The majority of the overstory trees are approximately 12 to 24 inches diameter breast height (dbh), although some Douglas fir are much larger (one measured greater than 50 inches dbh).

A large, forested wetland (the East wetland, described in section 5.1 of this report) is located to the northeast of the proposed alignment and Lacamas Lake, a 300-acre dam-controlled lake with a wetland fringe (the Lake wetland, described in section 5.1) is located to the north and west.

The proposed trails are above the OHWM of Lacamas Lake, but partially within the 100-year floodplain.

5.5.1 Threatened, Endangered, or Sensitive (TES) Plants

An Endangered Species Act (ESA) list of species potentially in the project vicinity, obtained from the USFWS IPaC service (2018), included one federally-listed plant species: golden paintbrush (*Castilleja levisecta*, federally-listed Threatened, state-listed Endangered).

Washington Natural Heritage Program (WNHP) rare plant spatial data (Washington Department of

Natural Resources [WDNR] 2017) indicates the presence of three additional state-listed species in the project vicinity: Oregon yampah (*Perideridia oregano,* state-listed Sensitive), tall bugbane (*Cimicifuga elata*, state-listed Sensitive), and small-flowered trillium (*Trillium parviflorum*, state-listed Sensitive).

Of these four plant species, only tall bugbane (associated with margins and openings in mature coniferous and mixed evergreen-deciduous stands) and, possibly, small-flowered trillium (associated with moist, shady, hardwood forests) have the potential to occur along the trail alignment. Habitat for Oregon yampah (associated with prairies, meadows, and oak woodlands) or golden paintbrush (associated with open grasslands dominated by native grasses) does not occur along the alignment (HHPR 2018b). In addition, WNHP data indicate that although the site is part of the historic range of golden paintbrush (last known observation 1889), there are no current populations mapped in the area.

5.5.2 Threatened, Endangered, or Sensitive (TES) Fish

There are no TES fish species, or associated Critical Habitat in Lacamas Lake, Round Lake, or their tributaries. Lacamas Lake Dam is a total passage barrier (WDFW 2018, NOAA 2016, USFWS 2018). The nearest location of a listed fish species (including bull trout [*Salvelinus confluentus*]) is approximately 1 mile below Lacamas Lake Dam in Lacamas Creek.

Lacamas Lake is within the Lower Columbia/Sandy basin (USGS HUC 170800010606) and thus, based on historical presence (pre-Lacamas Dam), is considered Essential Fish Habitat (EFH) for Chinook (*Oncorhynchus tshawytscha*) and coho (*O. kisutch*) salmon (NOAA 2014). The project would have no impacts on waters or substrate of Lacamas Lake for spawning, breeding, feeding, or maturation of Chinook or coho salmon.

5.5.3 Threatened, Endangered, or Sensitive (TES) Wildlife

An ESA list of wildlife species potentially in the project vicinity, obtained from the USFWS IPaC service (2018), identifies three wildlife species: Oregon spotted frog (*Rana pretiosa*, federally-listed Threatened, state-listed Endangered), streaked horned lark (*Eremophila alpestris strigata*, federally-listed Threatened, state-listed Endangered), and yellow-billed cuckoo (*Coccyzus americanus*, federally-listed Threatened, state-listed Species of Concern). There is no designated Critical Habitat in the project vicinity for these species.

Habitat with the necessary characteristics to support habitat for Oregon spotted frogs (“an expansive meadow/wetland with a continuum of vegetation densities along edges and in pools and an absence of introduced predators” [USFWS 2016]), streaked horned lark (flat, open areas with sparse low-stature vegetation and substantial areas of bare ground) or yellow-billed cuckoo (large patches—typically >50 acres—of riparian habitat [for nesting] dominated by cottonwood and willow [Wiles and Kalasz 2017]) do not occur in the project vicinity.

5.5.4 State Priority Habitats and Species

Lacamas Lake and associated floodplain is mapped as a Riparian Habitat Conservation Area. Five additional priority habitat and species areas (WDFW 2018) are mapped in and abutting the project site: resident cutthroat trout (*O. clarki*) in Lacamas Lake, a Cave-rich Area (the 6-mile by 8.5-mile rectangle mapped across southeastern Clark County), the Camas Biodiversity Area (mapped in natural areas around Round Lake and west across Lacamas Lake from the project area), herbaceous balds (southeast of the project area next to Round Lake), and white oak woodlands (also at Round Lake).

Pedestrian reviews determined that no caves or herbaceous balds are present in the project area.

WDFW PHS data (WDFW 2018) also indicates the presence of a Bald Eagle breeding area approximately 4,000 feet from the beginning of the trail at NE Everett Street. The largest buffer recommended under the National Bald Eagle Management Guidelines (USFWS 2007) is 660 feet for all activities, except blasting (which is 0.5 miles).

5.5.5 Habitats of Local Importance

The entire project area is listed by the City's (2014) *Park, Recreation and Open Space Comprehensive Plan Update* as natural open space and is therefore designated as a Habitat of Local Importance per SMP 16.61.010.A.3.

The tree survey identified five Oregon white oaks greater than or equal to 20 inches dbh (Appendix C) within 10 feet of the proposed alignment; all are in a strip of land between the residential homes and the lake. White oaks of this size qualify as Habitats of Local Importance per SMP 16.61.010.A.3.a.i. Additional white oaks that could fall in this size class were observed along the edge of Lacamas Lake west of the loop and main trails at north end of the project. No stands of white oak greater than one acre (SMP 16.61.010.A.3.ii) or oak snags (SMP 16.61.010.A.3.iii) were identified adjacent to the proposed project.

During the design phase, trail alignments were adjusted to avoid impacting Oregon white oaks.

5.5.6 Analysis of Performance Standards

The proposed project complies with SMP 16.61.030.A.1.a by: avoiding impacts to the fish habitat in Lacamas Lake by routing proposed trails around backwater areas; avoiding impacts to Oregon white oak (habitats of local importance) by routing the trail to avoid removal and work under tree canopies; limiting impacts to the wetland by utilizing a boardwalk crossing; and substantially maintaining the level of habitat functions and values in the designated natural open space/Riparian Habitat Conservation Area.

The proposed trails minimize habitat disruption and alteration, consistent with SMP 16.61.030.A.1.b, by utilizing the route of an existing abandoned access road for the main trail, utilizing a low-impact boardwalk at the wetland crossing, using a narrow width and pervious surface for the proposed loop and spur trails, and selecting a routes that avoid removal of significant trees.

The loss in functions and values would be limited to loss of vegetation as a result of trail clearing. This vegetation provides cover and food resources for wildlife, as well soil stability. These functions will be replaced within areas of the project site where they are currently lacking, in accordance with SMP 16.61.030.A.2. See section 6.2.8 and the Vegetation Mitigation Plan (Appendix G) for further details.

No alternative mitigation (SMP 16.61.030.A.3) is proposed.

Proposed mitigation measures address project impacts in accordance with the following measures enumerated in SMP 16.61.030.A.4:

- Avoiding impacts that would have occurred under preliminary trail designs, such as additional wetland and lake impacts (SMP 16.61.030.A.4.c);
- Selecting a revised trail alignment and design that would have resulted in fewer impacts (SMP 16.61.030.A.4.d);
- Replacing non-native grasses and ivy with native shrubs and herbs in on-site mitigation areas (SMP 16.61.030.A.4.h);
- Using appropriate native plantings in mitigation areas (SMP 16.61.030.A.4.i);
- Using the existing abandoned access road crossing of the wetland as the location for the boardwalk crossing (SMP 16.61.030.A.4.k); and
- Restricting construction activities to the dry season (SMP 16.61.030.A.4.m).

No non-indigenous species will be introduced via mitigation (SMP 16.61.030.B). Mitigation will be achieved via planting of native species.

The mitigation (Appendix G) would be located on-site and contiguous with wildlife habitat corridors (SMP 16.61.030.C).

A vegetation mitigation plan meeting the requirements of SMP 16.61.030.F is in Appendix G.

Performance standards for TES species (SMP 16.61.040.A) are not applicable because no habitat conservation areas or buffers with a documented presence of TES species occur in or adjacent to the project area.

Performance standards for anadromous fish (SMP 16.61.040.B) are not applicable because no anadromous fish occur upstream of the Lacamas Lake dam.

Compliance with wetland development standards contained in SMP 16.53 is addressed in section 5.1 of this report.

In accordance with SMP 16.61.040.D, shorelines of the state have a stream buffer of 150 feet from the OHWM (Figure 6). As a result of site constraints (the presence of wetlands and private property along one side of a relatively narrow strip of publicly owned upland), all but 600 feet of the trails would be within the stream buffer, typically setback between 50 and 100 feet from the OHWM, but sometimes coming closer. The trail would be approximately 20 feet from the OHWM at the nearest point, where it is routed around the end of backwater 1. The proposed project has minimized and avoided impacts to the extent practical during the design development, and mitigated for unavoidable impacts (Appendix G). The project is requesting a variance to allow trail construction within the 150 foot setback.

6. CITY OF CAMAS SHORELINE MASTER PROGRAM

6.1 Shoreline Variance

Table 6-1 of the SMP identifies recreational trails within Urban Conservancy shorelines as a Permitted Use with a 100 foot setback from the OHWM. However, trails setback less than 150 feet from the OHWM must comply with additional criteria regarding stream buffer width reduction contained in SMP 16.61.040.D.2.

As a result of site constraints, the proposed trails would not comply with the following specific criteria:

- Portions of the trail project would be setback from the OHWM less than the 100 feet required for trails in Urban Conservancy shorelines (SMP Table 6-1);
- Portions of the trail project within wetland buffers would be wider than 4 feet and constructed of impervious material; and
- Portions of the trail project would be located within Lacamas Lake's 150-foot stream buffer.

The project must demonstrate consistency with both the City variance criteria, contained in the SMP, and the State of Washington variance criteria, contained in WAC 173-27-170.

6.1.1 Camas Shoreline Variance Criteria (SMP Appendix B section IX)

Variance approval is contingent on the applicant demonstrating consistency with seven criteria (SMP Appendix B, IX.A.1-7).

The proposed project is consistent with IX.A.1 because compliance with the setbacks and performance standards associated with the shoreline designation and critical area buffers would eliminate all upland area where a trail could reasonably be constructed. Strict application of the 100-150 foot setbacks from the OHWM would: push the trail out of existing disturbed area (e.g., abandoned access road) and into undisturbed wetland buffer; require a longer wetland crossing in a more pristine portion of the wetland, and necessitate the removal of numerous mature trees. Strict compliance with the SMP standards would also require large portions of the loop trail to be relocated from relatively flat, open ground to heavily forested side slopes, resulting in greater impact to wetland and stream buffers.

Consistent with IX.A.2, the constraints on the site are the result of unique conditions of the property. The southeastern segment of the trail project is located on a relatively narrow strip of publicly owned property between the lake and private residents. This parcel varies in width from approximately 110 to 140 feet. Thus, the trail in this area must be located within the 150-foot stream buffer. In addition, in order to utilize the route with the least impact on resources (i.e. trees and native vegetation) and in an attempt to give adequate space to the residential properties bordering this parcel, the trail comes within 100 feet of the OHWM in some locations.

The northwestern segment of the trail project is located on a narrow ridge of upland between a large wetland (the East wetland) and Lacamas Lake, with its fringe of wetland. This ridge is typically between 150 and 450 feet wide. A small loop trail, one of the design goals of the project, would be located in the wider area. Buffers from the East wetland are 65 feet for a pervious trail and 100 feet for an impervious trail. Buffers from the Lake wetland are 110 feet for a pervious trail and 165 feet for an impervious trail. Wetland buffers overlap the stream buffer so that any given trail alignment would be located within one or more critical area buffers.

The trails were realigned and redesigned multiple times (based on field reviews) to avoid and minimize impacts to wetlands, wetland buffers, and associated wildlife. Specific measures included:

- Utilizing the existing abandoned access road for the main trail to the maximum extent possible;
- Reducing the width of the main trail from 12 feet (the preferred width for regional trails [Camas 2014]) to 8 feet to remain inside the footprint of the abandoned access road;
- Crossing the East wetland on the existing fill for the abandoned access road and utilizing a low-impact boardwalk design: 6 cubic feet of excavation vs. 60 cubic feet of excavation and concrete for cylindrical footings, and eliminating presence of green concrete in wetland;
- Designing the trails for construction with low-impact manual methods to the extent practical (e.g. using a geotextile and gravel surface in place of a paved surface);
- Avoiding removal of mature trees;
- The stormwater design for the main trail is full dispersion within 20 feet of the edge of the trail, which avoids stormwater impacts to wetlands and Lacamas Lake;
- Utilizing the existing dirt path for the loop and spur trails to the maximum extent possible;
- Utilizing level areas wherever possible for the loop and spur trails to minimize the need for filling or grading;
- Changing the loop and spur trail design from a 12-foot wide impervious surface to 4-foot wide, pervious surface;
- Rerouting the loop trail around wetlands and backwaters;
- Eliminating a viewpoint along the loop trail that would have encroached into the Lake wetland;
- Shortening the loop trail and realigning it uphill, away from the Lake wetland; and
- Eliminating a segment of the loop trail that would have encroached closer toward the East wetland.

As a result, the variance requested is the minimum necessary to allow construction of the trail, in accordance with IX.A.3.

The variance would not constitute the grant of a special privilege (IX.A.4).

The proposed trail would be in harmony with other authorized shoreline uses in the area, consistent with IX.A.5. There are multiple public recreational facilities on the shores of Lacamas and Round Lakes. The

trail would be an extension of the trail around Round Lake and is identified in the City's (2014) *Parks, Recreation and Open Space Comprehensive Plan Update*. Existing regional trails and recreational facilities are also located on the opposite shore of Lacamas Lake, including the Lacamas Heritage Trail.

The proposed trail would be in harmony with the intent of the SMP because it is designed to provide public access to the shoreline while protecting the natural character of the shoreline.

In accordance with IX.A.6, granting this variance would preserve the public welfare by allowing improved public access to the shoreline while minimizing impacts to critical areas on the site. Strict application of the SMP criteria would result in much greater impacts to critical areas on the site and would make the trail impractical to permit and construct.

Consistent with IX.A.7, no development is proposed waterward of the OHWM of Lacamas Lake.

There are additional requests for like actions in the vicinity of the proposed project (IX.B).

6.1.2 State Variance Criteria (WAC 173-27-170)

Variance approval may be granted in circumstances where denial would result in thwarting the policies of RCW 90.58.020 (WAC 173-27-170 (1)), or, for uses landward of the OHWM, when the applicant demonstrates consistency with six criteria (WAC 173-27-170 (2) (a-f)).

WAC 173-27-170 (1) is applicable to this variance request because the proposed regional trail would provide improved regional, public access and recreational opportunity in a publicly owned shoreline, consistent with the preferences enumerated in RCW 90.58.020. In addition, the proposed alignment has been optimized during the design process to protect the resources and ecology of the shoreline, also consistent with RCW 90.58.020, including:

- Rerouting around backwaters and wetlands;
- Utilizing a boardwalk at an existing disturbed area to cross the wetland;
- Utilizing the existing abandoned access road to the extent possible;
- Utilizing level areas wherever possible to minimize fill and grading;
- Avoiding removal of mature trees;
- Reducing the length of the loop trail;
- Changing the loop and spur trails from a wide impervious-surfaced trail to a narrow, pervious-surfaced trail; and
- Revegetating unused portions of the existing access road and sparsely vegetated shoreline.

Strict application of the 100 -150 foot setback from the OHWM would push the trail off the existing disturbed area (abandoned access road) into undisturbed wetland buffer, require a longer wetland crossing in a more pristine portion of the wetland, and necessitate the removal of numerous mature trees. Strict compliance with the SMP standards would also require large portions of the loop trail be relocated from relatively flat, open ground to heavily forested side slopes, resulting in greater impact to wetland and stream buffers. Thus, denial of the permit would make it impractical or impossible to provide regional public access to the shoreline in this location while protecting the ecology of the shoreline.

For the same reasons, the six criteria enumerated in WAC 173-27-170 (2) (a-f) are also applicable to this variance request.

As described, denial of the permit would make it impractical or impossible to provide regional public access to the shoreline in this location while protecting the ecology of the shoreline, consistent with criteria (a).

Consistent with criteria (b), this is specifically related to unique conditions of the property. The southeastern segment of the trail is located on a relatively narrow strip of publicly owned property between the lake and private residents. This parcel varies in width from approximately 110 to 140 feet. Thus, the trail in this area must be located within the 150-foot stream buffer. In addition, in order to utilize the route with the least impact on resources and in an attempt to give adequate space to the residential properties bordering this parcel, the trail comes within 100 feet of the OHWM in some locations.

The northwestern segment of the trail is located on a narrow ridge of upland between a large wetland (the East wetland) and Lacamas Lake with its fringe of wetland (the Lake wetland). This ridge is typically between 150 and 450 feet wide. A loop trail, one of the design goals of the trail project, would be located in the wider area. Buffers from the east wetland are 65 feet for a pervious trail and 100 feet for an impervious trail. Buffers from the lake fringe wetland are 110 feet for a pervious trail and 165 feet for an impervious trail. Wetland buffers overlap the stream buffer so that any given trail alignment would be located within one or more critical area buffers.

The proposed trails are compatible with other authorized uses within the area and with uses planned for the area, consistent with criteria (c). There are multiple public recreational facilities on the shores of Lacamas and Round Lakes. The trails would be an extension of the trail around Round Lake and is identified in the City's (2014) *Parks, Recreation and Open Space Comprehensive Plan Update*. Existing regional trails and recreational facilities are also located on the opposite shore of Lacamas Lake, including the Lacamas Heritage Trail. In addition, as a result of the design features described above, the trail would not cause adverse impacts to the shoreline environment.

Consistent with criteria (d), the variance would not constitute a grant of special privilege.

As a result of a design process that minimized impacts on critical areas and shoreline vegetation, the request is the minimum necessary, consistent with criteria (e).

Finally, consistent with criteria (f), the public interest would suffer no substantial detrimental effect from approval of the variance. On the contrary, denial of the variance would harm the public interest by limiting public access to this publicly owned shoreline and/or resulting in a trail alignment with a greater impact on critical areas.

6.2 General Shoreline Use and Development Regulations (SMP 5)

SMP Chapter 5, *General Shoreline Use and Development Regulations*, provides general regulations to which all use and development activities are subject. These apply to the proposed project as follows:

6.2.1 General Shoreline Use and Development Regulations (SMP 5.1)

Though not a water dependent use, the proposed project is consistent with SMP 5.1.1 because it does not interfere with or preclude any water dependent uses.

In accordance with SMP 5.1.2, the proposed project would not cause impacts that require remedial action or loss of shoreline function on other properties.

In accordance with SMP 5.1.3, no shoreline stabilization would be necessary as a result of the project, at the time of development or in the future. The trails would be setback sufficiently from the banks of Lacamas Lake to avoid the need for shoreline stabilization.

In accordance with SMP 5.1.4, no land would be cleared, graded, filled, excavated, or otherwise altered prior to issuance of necessary permits and approvals.

No single family residential development is proposed as part of the project (SMP 5.1.5).

In accordance with SMP 5.1.6, the project would fully comply with CMC titles 17 and 18.

The project is not located on navigable waters or their beds (SMP 5.1.7).

In accordance with SMP 5.1.8, hazardous materials, although not anticipated as part of this trail project, would be disposed of and other steps taken to protect the ecological integrity of the shoreline area in accordance with applicable policies and regulations.

No in-water work is proposed as part of this project (SMP 5.1.9).

In accordance with SMP 5.1.10, all reasonable efforts have been taken in project design, and would be made during construction, to avoid, minimize, and mitigate impacts to critical area and shoreline functions; no net loss of function would result from the project. See sections 5.and 6.2.8 for a full discussion.

No in-stream structures are proposed (SMP 5.1.11).

The project is not requesting relief from use and development regulations under RCW 90.58.580 (SMP 5.1.12).

6.2.2 Archaeological, Cultural and Historic Resources (SMP 5.2)

Archaeological surveys were conducted for the proposed project by Archaeological Investigations Northwest, Inc. (AINW) in 2016, and for a different project in 2010. Another survey on one parcel was done by Archaeological Services of Clark County in 2004. AINW reviewed records held by the Washington Department of Archaeology and Historic Preservation (DAHP), AINW's library, and the Clark County GIS. Recently, AINW archaeologists conducted a pedestrian survey and shovel testing within the project area. Four archaeological resources were identified within the project area including two pre-contact lithic scatters, one historic-period refuse scatter, and one historic-period isolated glass fragment (Dubois, et al., 2018). The final report will be placed on file with DAHP.

Archaeological permits would be needed from DAHP prior to construction within the two pre-contact lithic scatter sites. AINW recommends that no additional archaeological excavation is needed for either site, as long as trail construction methods involve minimal ground disturbance (for example, gravel on top of permeable ground protection such as filter fabric). Archaeological monitoring may be needed for ground disturbing activities within the two pre-contact archaeological sites, depending on the nature and extent of the final project design. An Inadvertent Discovery Plan will outline procedures to be followed if archaeological resources are encountered during construction. DAHP permits would not be needed for the historic-period refuse scatter and the isolated historic-period glass fragment, because they are not recommended to be eligible for the NRHP.

6.2.3 Critical Areas Protection (SMP 5.3)

Compliance with Critical Areas Regulations is discussed in section 5.

The project does not include any non-conforming uses, or stream buffers along the Columbia River or Washougal Rivers. NE Leadbetter Road does not intersect the Lacamas Lake buffer in this location.

6.2.4 Flood Prevention and Flood Damage Minimization (SMP 5.4)

In accordance with SMP 5.4.1, the proposed development would not significantly or cumulatively increase flood hazard and is consistent with an adopted comprehensive flood hazard management plan.

In accordance with SMP 5.4.2, no structural flood hazard reduction measures within the floodway or channel migration zone are reasonably foreseeable to become necessary as a result of this project. The trails would be set back from the banks of Lacamas Lake sufficiently to avoid such a necessity.

No new structural flood hazard reduction measures are proposed (SMP 5.4.3).

The sources identified in SMP 5.4.4 are used in this application to identify areas of special flood hazard.

No in-stream structures are proposed (SMP 5.4.5).

In accordance with SMP 5.4.6, the trail would not be placed on an earthen fill to cross the East wetland. Rather, a pier and boardwalk system is proposed (Appendix F). This pier and boardwalk system would be installed utilizing an existing abandoned access road. The project is consistent with specifics contained in SMP 5.7.2.

No dikes or levees are proposed (SMP 5.4.7).

No removal of gravel for flood management purposes is proposed (SMP 5.4.8).

No removal of beaver dams is proposed (SMP 5.4.9).

6.2.5 Public Access (SMP 5.5)

Consistent with SMP 5.5.1-2, the proposed project would provide public access to the shoreline by extending a regional recreational trail network around Lacamas and Round Lakes.

The proposed trails are not designed as ADA trails (SMP 5.5.3).

Many of the privately owned parcels that border the southeastern portion of the main trail have existing fences erected by the property owners (SMP 5.5.4).

A sign indicating the public's right of access would be installed and maintained at the end of the main trail at NE Everett Street (SMP 5.5.5).

Public access would be provided upon opening of the trail project (SMP 5.5.6).

6.2.6 Restoration (SMP 5.6)

Although impacts to shoreline functions have been minimized, remaining impacts to shoreline functions will be fully mitigated by restoration efforts (SMP 5.6.1 and 2). Such efforts include: planting native grasses in any areas temporarily disturbed by construction; planting native herbs and shrubs to restore the decommissioned sections of the existing loop trail; and planting shrubs beneath the Douglas fir forest canopy near NE Everett Street to restore long-term structural diversity. Restoration efforts (SMP 5.6.3 and 4) have been developed by qualified HHPR natural resource professionals. The restoration efforts have primarily considered wetland buffer/aquatic soil conditions, and healthy aquatic and terrestrial food webs, with less emphasis on fish habitats because of the lack of such impacts.

6.2.7 Site Planning and Development (SMP 5.7)

In accordance with SMP 5.7.1.1, land disturbing activities such as grading and cut/fill would be conducted in such a way as to minimize impacts to soils and native vegetation. Clearing of vegetation would be kept to the minimum necessary to develop the proposed project and all areas of temporary disturbance would be revegetated. Construction would occur during the dry seasons and BMPs would be implemented in order to control erosion and runoff during construction (see section 5.1.2).

In accordance with SMP 5.7.1.2, impervious surface would be minimized to the extent feasible by using a pervious surface for the loop and spur trails.

Consistent with SMP 5.7.1.3, the main trail would follow the route of an abandoned access road.

In accordance with SMP 5.7.1.4, pedestrian circulation (the trail alignments) is designed to minimize clearing, grading, alteration of topography and natural features, and accommodate wildlife movement. See sections 5.1.2 and 5.1.3 of this report for a full discussion.

In accordance with SMP 5.7.1.5, the proposed project does not include any parking, storage, or other non-water dependent accessory structures.

Many of the privately owned parcels that border the southeastern portion of the main trail have existing

fences erected by the property owners (SMP 5.7.1.6).

Consistent with SMP 5.7.1.7, an elevated walkway (boardwalk) will be utilized at the wetland crossing.

No fences, walls, hedges, or similar features are proposed as part of this project. The project will not create new barriers to wildlife movement (SMP 5.7.1.8).

No exterior lighting is proposed as part of this project (SMP 5.7.1.9).

No utilities are proposed as part of this project (SMP 5.7.1.10).

The project is not located near a legally established aquaculture enterprise, as described in SMP 5.7.1.11.

In accordance with SMP 5.7.2.1, clearing and grading will be scheduled to minimize adverse impacts, including, but not limited to, damage to water quality and aquatic life. Construction activities would take place during summer or early fall in order to avoid the rainy season. No in-water work for trail construction is proposed.

In accordance with SMP 5.7.2.2, clearing and grading for the proposed project would not result in substantial changes to surface water drainage patterns off the project site and onto adjacent properties. Grading would be minimal and limited to that needed to clear vegetation and make a smooth relatively trail surface. No grading would occur in drainages or alter slope directions.

In accordance with SMP 5.7.2.3, the project would control erosion during construction by following City standards. Prior to construction, the work limits in the vicinity of the wetland crossing (boardwalk) would be demarcated with orange construction fence, or similar, and areas of sensitive native vegetation. Areas of temporary disturbance would be revegetated with native grasses.

In accordance with SMP 5.7.2.4, any grading and grubbing areas that would remain exposed for an extended time will be planted with a cover crop until construction activities are complete.

In accordance with SMP 5.7.2.5, no clearing, filling, or excavation is proposed in locations where shoreline stabilization will be necessary.

Consistent with SMP 5.7.2.6, no speculative fill is proposed and the project has been designed so the fill required is of the minimum size necessary for the proposed trail system:

- Rather than constructing a new earthen fill, a boardwalk would be installed on piers driven into an existing road prism that crosses the East wetland.
- A gravel trail surface flush with the existing grade (thus not raising the ground elevation) would be employed throughout most of the main trail. A trail section rising no more than 6 inches above existing grade (Appendix F) would be used for the first 250 feet of the main trail west of NE Everett Street.

In accordance with SMP 5.7.2.7, any substrate transported to the site for fill will be screened and documented as uncontaminated.

Consistent with SMP 5.7.2.8, the fill associated any trail sections above existing grade will allow surface water penetration to the groundwater supply where it existed prior to filling. The trail section is designed with a pervious geotextile below the gravel.

Consistent with SMP 5.7.2.9, the proposed project protects shoreline ecological functions, including channel migration, by:

- Reducing the main trail width from 12 feet to 8 feet in width;
- Using a gravel trail surface rather than a concrete or asphalt surface for the main trail;
- Employing a gravel trail flush with the existing grade (thus not raising the ground elevation)

throughout most of the main trail. Only the first 250 feet of the main trail west of NE Everett Street would be above ground, and then no more than 6 inches above existing grade.

No fill is proposed waterward of the OHWM (SMP 5.7.2.10).

No fills for beach nourishment or enhancement, or fills along the Columbian River are proposed (SMP 5.7.2.11).

No excavation below the OHWM is proposed (SMP 5.7.2.12).

In accordance with SMP 5.7.2.13, upon completion of construction, any remaining cleared areas will be replanted with native species (grass mix) approved by the City and fully re-established within 3 years.

No conversion of land, as described in SMP 5.7.2.14, will occur at the project site.

No structures are proposed as part of this project (SMP 5.7.3.1-4).

6.2.8 Vegetation Conservation (SMP 5.8)

In accordance with SMP 5.8.1, removal of native vegetation will be avoided to the extent possible in order to protect ecological functions. This is accomplished by utilizing an existing abandoned access road and limiting the trail to the width of that road. For new trails, alignments were selected, and would be further refined during construction, that avoid removal of mature trees and limit removal of other vegetation. For the proposed loop trail, a route was selected that utilizes relatively level ground with open forest rather than a side slope in denser forest where vegetation impacts would be greater. The loop trail has been located, and will be further refined during construction, in order to avoid the removal of mature trees.

In accordance with SMP 5.8.2, unavoidable vegetation removal will be mitigated so that no net loss of overall function occurs. Installation of the loop trail would impact approximately 2,500 square feet of native, herbaceous and shrub upland vegetation (clearing 4,160 square feet of forest understory that has 60% plant cover). Vegetation that would be removed is approximately 1/3 shrubs and 2/3 sword ferns. Some additional herbaceous species and tree saplings also occur at very low densities. This vegetation provides cover and food resources for wildlife, as well soil stability. These functions will be replaced within areas of the project site where they are currently lacking (Appendix G). This will be accomplished via dense plantings of native shrubs and herbs in two locations:

1) At a decommissioned portion of the existing dirt trail (backwater 1).
2) In the Douglas fir stand at the southeast end of the main trail, adjacent to NE Everett Road, where the understory is dominated by non-native grasses and the invasive species ivy and scotch broom (*Cytisus scoparius*) are present.

Control of invasive or non-native vegetation is not proposed beyond clearing required for trail construction and mitigation plantings (SMP 5.8.3).

In accordance with SMP 5.8.4, any areas of temporary disturbance to non-native vegetation will be revegetated with native vegetation.

Pruning of trees would be avoided to the extent possible. If pruning is necessary to avoid removal of a tree (e.g. to provide the required clearance along the trails), pruning will be conducted in compliance with the National Arborist Association pruning standards and the criteria in SMP 5.8.5. No more than 20 percent of the limbs of any single tree will be removed and no more than 20 percent of the canopy in a stand of trees will be removed in a given five year period without a shoreline permit.

In accordance with SMP 5.8.6, no trees will be topped as part of this project.

No hazardous trees, or portions of trees are identified for evaluation at this time. If such trees are identified, removal will be limited to the hazardous portion, per SMP 5.8.7.

Natural features, including snags, stumps, logs, or uprooted trees will be left undisturbed except for those

directly in the path of the loop trail or that could threaten safety of trail users (SMP 5.8.8). Any such disturbance will be minimized and logs will be left on-site to the extent practical.

No natural in-stream features will be disturbed (SMP 5.8.9).

No aquatic weed control is proposed (SMP 5.8.10).

6.2.9 Visual Access (SMP 5.9)

The proposed project would not alter visual access to the shoreline from shoreline street-ends or public utility right-of-ways. The trails will be essentially at-grade. No buildings are proposed and no structures (including the boardwalk) over 3 feet in height are proposed.

6.2.10 Water Quality and Quantity (SMP 5.10)

In accordance with SMP 5.10.1, the proposed trail project will protect the quality and quantity of surface and groundwater adjacent to the site through the application and maintenance of appropriate BMPs to control erosion, sedimentation and spills (see section 5.1.2). In addition, the main trail would follow an established corridor (abandoned access road), has been reduced in size to minimize site disturbance, and would use a boardwalk to pass over East wetland.

In accordance with SMP 5.10.2, all development will comply with the applicable requirements of CMC Chapter 14.02 Stormwater Control.

In accordance with SMP 5.10.3, BMPs for erosion and sediment control will be implemented in compliance with CMC 14.06. See section 5.1.2 for a discussion of proposed measures to control erosion and sediment during construction.

In accordance with SMP 5.10.4, no harmful materials, including but not limited to oil, chemicals, tires, or hazardous materials, will be allowed to enter any body of water or wetland.

In accordance with SMP 5.10.5, no use of herbicides, fungicides, fertilizers, or pesticides is proposed, except as necessary for mitigation purposes. The shoreline designation in the vicinity of the project is not Aquatic (SMP 5.10.6). The shoreline is designated Urban Conservancy.

No substance not composed entirely of surface and stormwater will be conveyed to water resources (SMP 5.10.7).

No new septic systems are proposed (SMP 5.10.8).

6.3 Specific Shoreline Use Regulations (SMP 6)

The specific use regulations contained in SMP 6.3.11, Recreational Development, apply to the project as follows:

6.3.1 Recreational Development (SMP 6.3.11)

The proposed trail project will be water-oriented, because the location and design is intended to facilitate public aesthetic enjoyment of Lacamas Lake, in accordance with SMP 6.3.11.1. Furthermore, the proposed trail project will not preclude other water-dependent uses.

In accordance with SMP 6.3.11.2, the trail project has been designed, and will be constructed, in substantial compliance with the design and development guidelines of the City's (2014) *Park, Recreation and Open Space Comprehensive Plan Update*. The trails would pass through multiple environmentally sensitive (critical) areas and have been designed and located to minimize impacts, including deviation from specific trail standards. The Plan Update anticipated authorizing exceptions in such cases. The main trail has been reduced from a standard 12-foot-wide concrete or asphalt path to an 8-foot-wide gravel path; and side clearance has been reduced from 2 feet on each side to 1 foot on each side, and to 0 for

the loop trail. A pier and boardwalk system would be used to cross the East wetland, consistent with Plan Update guidelines for constructing trails in sensitive areas.

Consistent with SMP 6.3.11.3, the proposed trail project will provide visual access to Lacamas Lake at multiple locations including almost continuously from NE Everett Street to the proposed boardwalk, at the terminus of the spur trail, and variously through the trees along the trails (Photograph 12).

No parking areas are proposed as part of this project (SMP 6.3.11.4).

The proposed project will not be within a mapped floodway (SMP 6.3.11.5).

No parks or trailheads are proposed as part of this project (SMP 6.3.11.6).

In accordance with SMP 6.3.11.7, the project proposes to densely plant with native shrubs and herbs the area between the main trail and the private residences, where this can be done without jeopardizing other sensitive resources.

Consistent with SMP 6.3.11.8, the proposed project will not require the use of fertilizers or pesticides.

The proposed project does not include golf courses or the related structures addressed in SMP 6.3.11.9-11.

7. REFERENCES

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Appendix A: Figures

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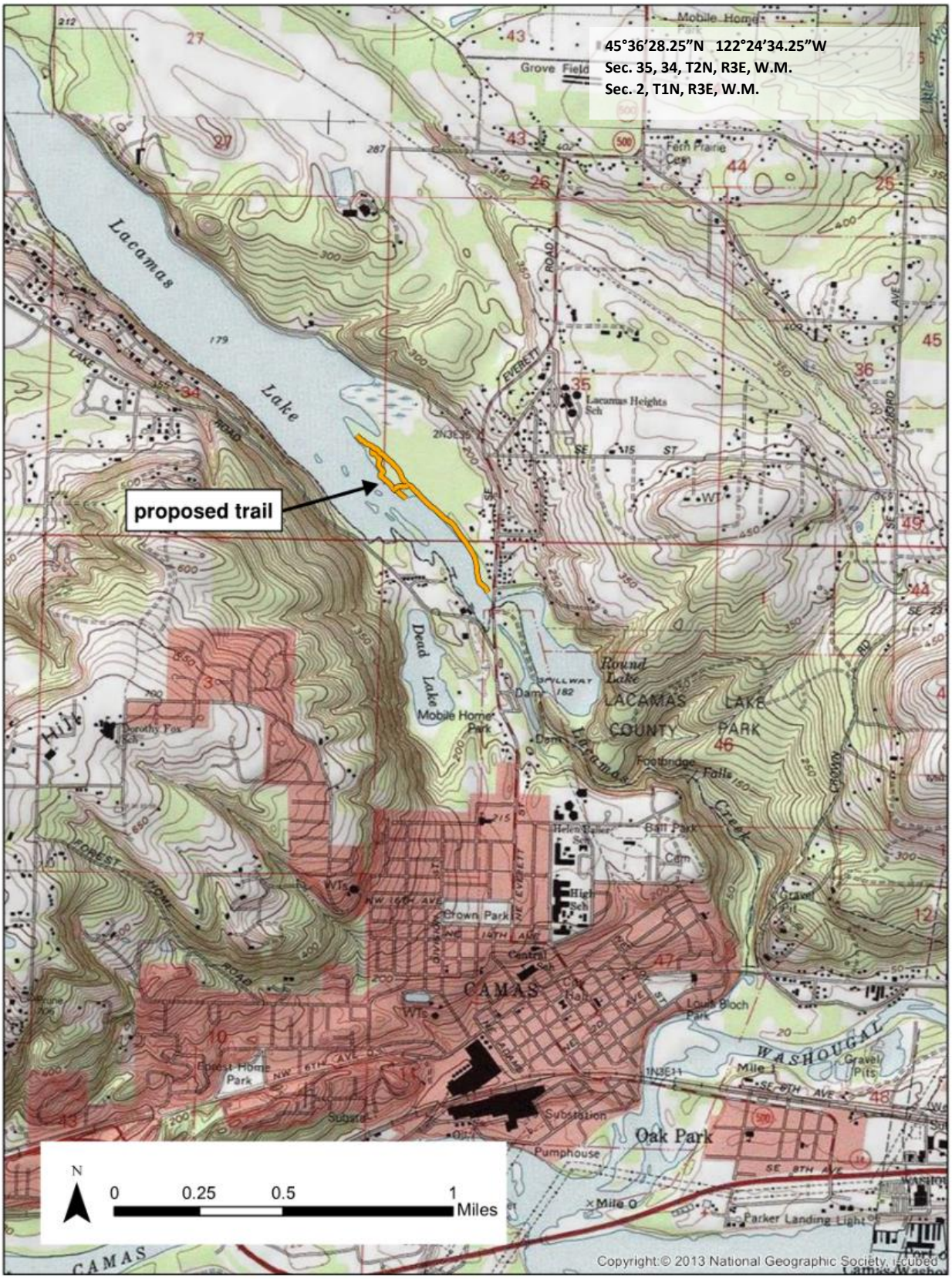

Figure 1: Project Vicinity

Lacamas North Shore Trail
Camas, Washington

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LANDSCAPE ARCHITECTS ◆ SURVEYORS

Figure 2: Proposed Trail

Lacamas North Shore Trail
Camas, Washington

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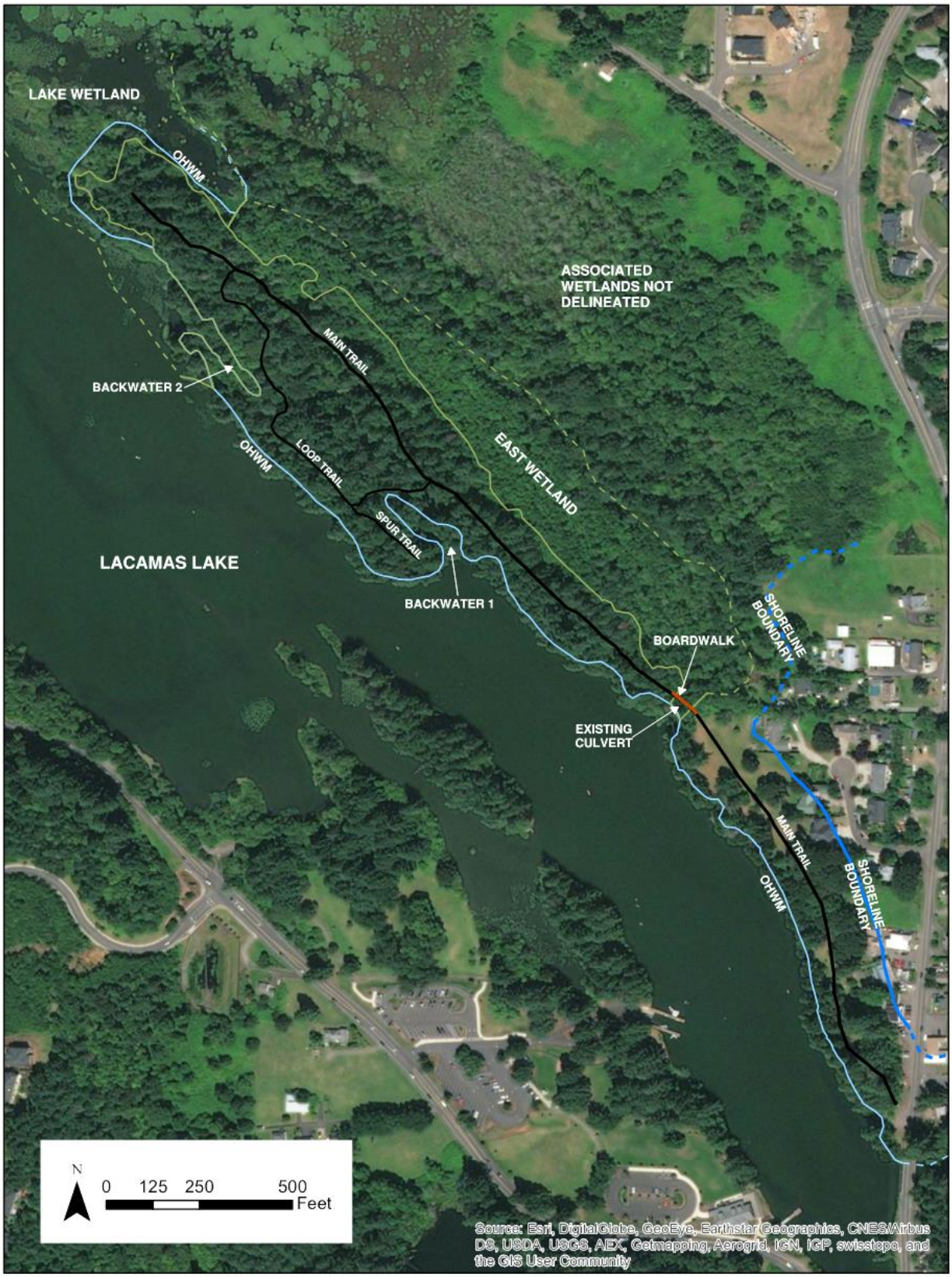

Figure 3: Shoreline Boundary

Lacamas North Shore Trail
Camas, Washington

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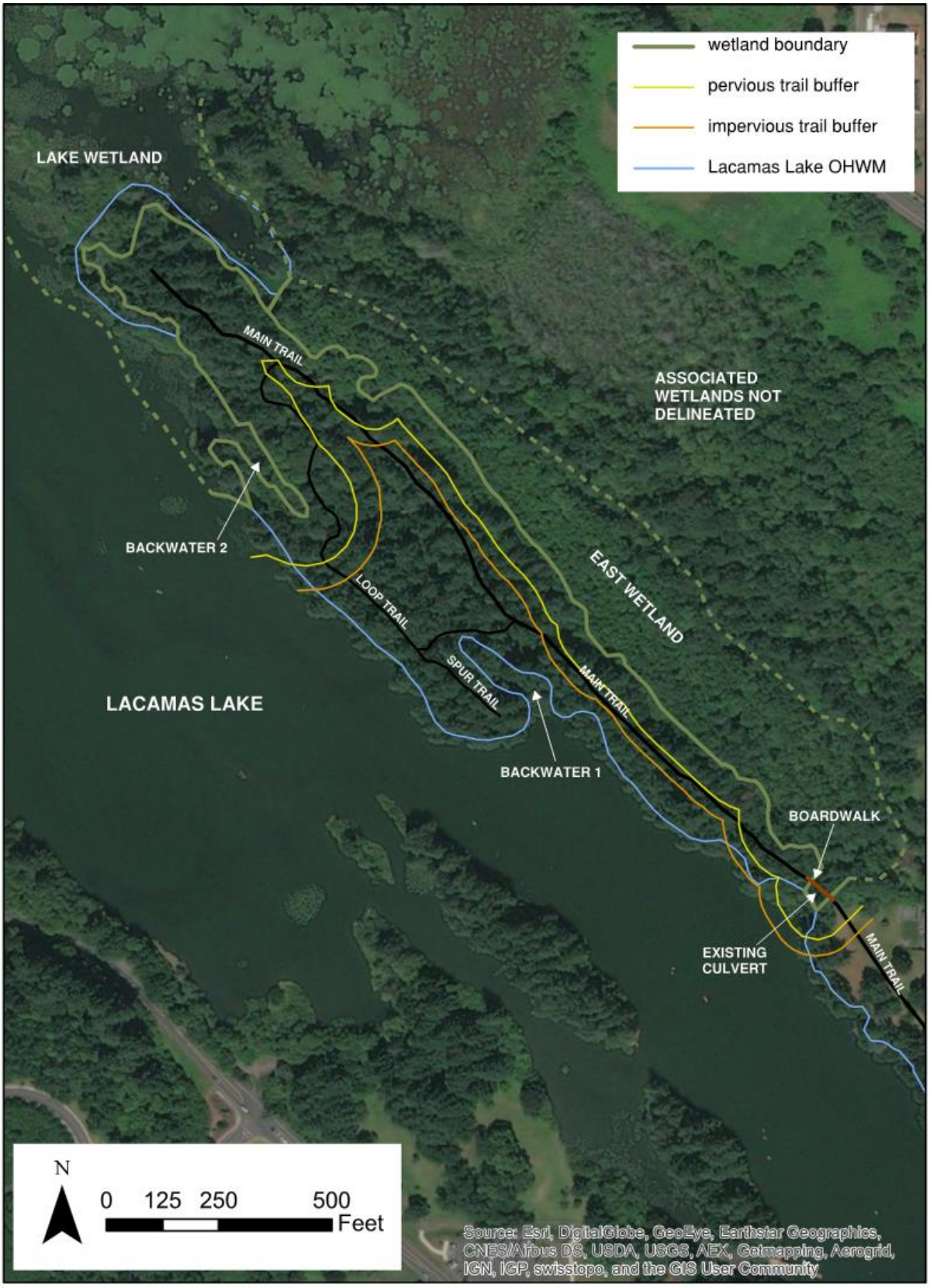

Figure 4: Wetlands and Wetland Buffers

Lacamas North Shore Trail
Camas, Washington

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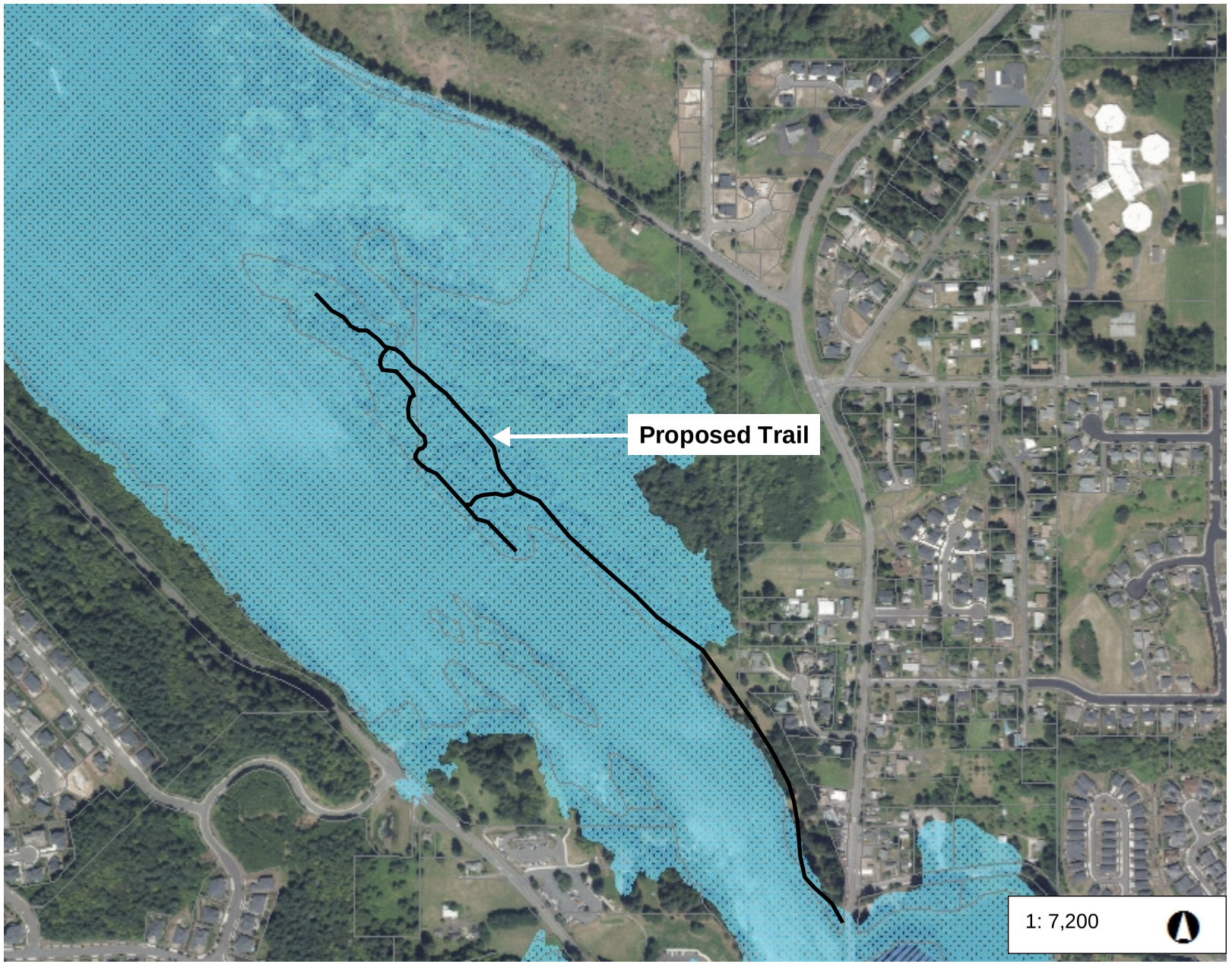
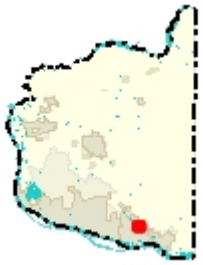
Figure 5: Frequently Flooded Area.





Legend

- Taxlots

Flood Zone Designation

- Floodway
- Floodway Fringe
- 500 Year Flood Area
- Area Not Studied

Notes:

1,200.0 0 600.00 1,200.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - http://gis.clark.wa.gov

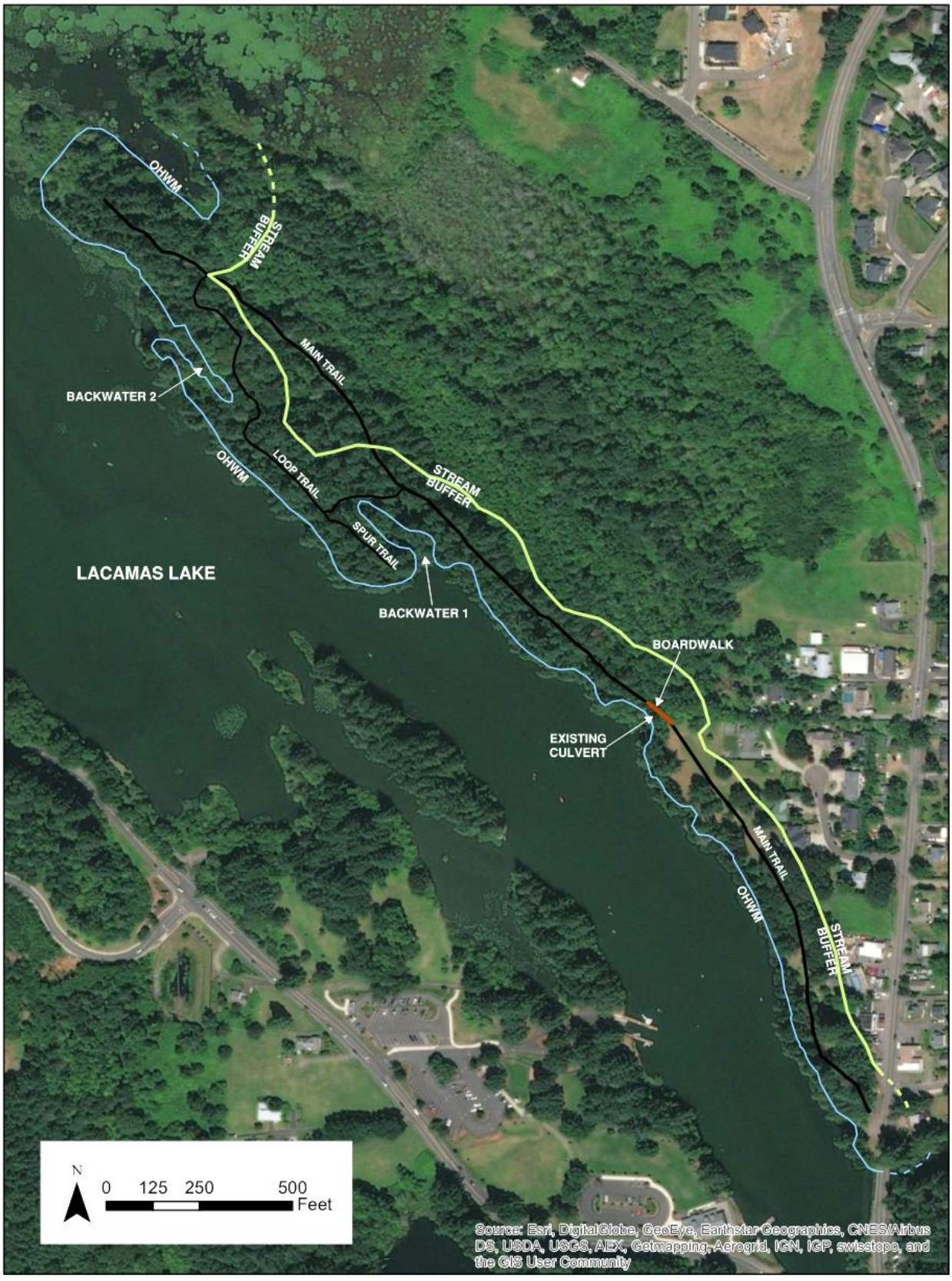


Figure 6: Lacamas Lake Stream 150-foot Buffer

Lacamas North Shore Trail
Camas, Washington

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Appendix B: Photographs

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Photograph 1: View looking south, where the main trail would follow the route of an abandoned access road on City property between private residences (left) and Lacamas Lake (right). Photograph taken January 14, 2018.

Photograph 2: View looking north, where the main trail would follow an abandoned access road through a forested natural area. Photograph taken January 14, 2018.

Photograph 3: View looking northwest, where the spur trail would follow an existing trail to a viewpoint of Lacamas Lake. Photograph taken December 1, 2016.

Photograph 4: View looking southeast, showing typical forest in the core of the East wetland, east of the proposed trail. Photograph taken December 1, 2016.

Photograph 5: View looking south, where the abandoned access road crosses the East wetland. A boardwalk would be constructed for this crossing. Photograph taken December 1, 2016.

Photograph 6: View looking southwest, towards Lacamas Lake, showing typical shrub-shrub fringe in Lake wetland, shaded by trees in adjacent upland. Photograph taken October 30, 2017.

Photograph 7: View looking northwest, showing exposed aquatic bed plants in the Lake wetland when Lacamas Lake is drawn down. Photograph taken October 30, 2017.

Photograph 8: View looking southeast, showing typical bare ground in backwater 1 (right) and sword ferns in upland (left). The preliminary trail alignment would have crossed the end of this backwater. Photograph taken October 26, 2017.

Photograph 9: View looking northwest. Showing typical upland forest in the natural area. Photograph taken December 1, 2016.

Photograph 10: View northeast, showing backwater 2 where the preliminary trail alignment would have crossed. Photograph taken December 1, 2016.

Photograph 11: View looking west, showing mature trees in the Lake wetland buffer. The final alignment was selected to avoid removal of such trees. Photograph taken December 1, 2016.

Photograph 12: View looking northwest from the vicinity of the proposed trail, showing view of Lacamas Lake. Photograph taken January 14, 2018.

Appendix C: Tree Survey

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Table C-1. Tree Survey of Main Trail (Forest)

Species and diameter of trees and stems >4 inches DBH (2-inch classes) along trail alignment.

DBH (in)	Douglas Fir	Big Leaf Maple	Red Alder	White Oak	Cherry spp	Misc.
4	7	3	5	1	2	2[a], 1[b], 1[e]
6	1	11	5		4	1[c]
8	1	7	2		3	
10	2	4	3			2[a]
12	3	2	2			
14	5	1				
16	1	2				
18	3	3				
20	3		1			
22	5					1[d]
24	11					
26	7					
28	12					
30	7					
32	9					
34	7					
36	1					
38	1					
40	4					
42	1					
44	1					

[a] Cascara, [b] English Holly, [c] Beaked Hazelnut, [d] Western Hemlock, [e] Unknown genus or species

Table C-2. Tree Survey of Main Trail (Forest to Everett)

Species and diameter of trees and stems >4 inches DBH (2-inch classes) along trail alignment.

DBH (in)	Douglas Fir	Big Leaf Maple	Red Alder	White Oak	Cherry spp	Misc.
4		3				
6		7				
8		2		1		
10		1				
12		1				
14		1		1		
16		1				
18	2	1				
20	1			1		
22	1			2		
24	2					
26	1					
28	1					
30	2					
32						
34				1		
36	2					
38						
40	1					
42						
44+						

Table C-3. Tree Survey of Spur Trail

Species and diameter of trees and stems >4 inches DBH (2-inch classes) along trail alignment.

DBH (in)	Douglas Fir	Big Leaf Maple	Red Alder	White Oak	Cherry spp	Misc.
4						
6						
8						
10						
12	5					
14	1					
16	1					
18	1					
20	3					
22						
24	1					
26	2					
28	1					
30	1					
32	1					
34						
36						
38						
40						
42						
44+						

Table C-4. Tree Survey of Loop Trail

Species and diameter of trees and stems >4 inches DBH (2-inch classes) along trail alignment.

DBH (in)	Douglas Fir	Big Leaf Maple	Red Alder	White Oak	Cherry spp	Misc.
4	1	1				1[c]
6	2	4	1	1		
8	4	5	1		1	
10	1	2				
12	1	5	2			
14	1	2			1	
16		4				
18	1	1			1	
20						
22						
24	2					
26	3					
28	2					
30	2					
32	1					
34	2					
36						
38						
44	2					
46	1					
54	2					

[a] Cascara, [b] English Holly, [c] Beaked Hazelnut, [d] Western Hemlock, [e] Unknown species or genus

Appendix D: Other Technical Reports

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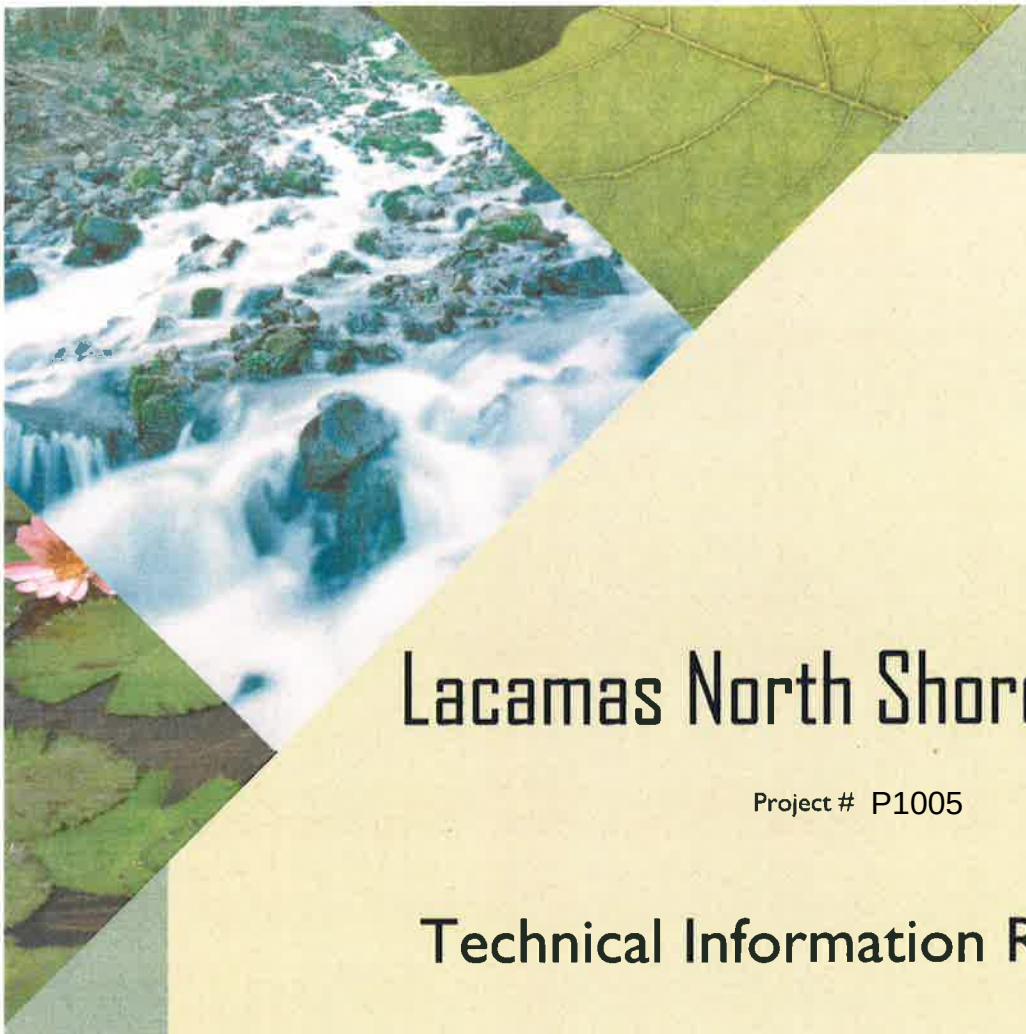

Harper
Houf Peterson
Righellis Inc.

Lacamas North Shore Trail

Project # P1005

Technical Information Report

February 13, 2018

Prepared For:

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    c. Wetland and Buffers Map
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2. Technical Supporting Documents
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    b. BMP T5.12
    c. WWHM Print Screens
3. Project Plan Set

REFERENCES

1. Camas Stormwater Design Standards Manual
2. Department of Ecology Stormwater Management Manual for Western Washington.

SECTION A – PROJECT OVERVIEW

1. Site Location: The City of Camas proposes to extend the existing trail system at the south end of Lacamas Lake. The new trails would be located within City property on the northeast side of Lacamas Lake, from the Round Lake Loop Trail east of NE Everett Street (State Route 500) to a natural area on the lakeshore.

2. Site Topography / Critical Areas: The existing area slopes gently southwest, typically within the shoreline of Lacamas Lake, but above the OHWM. The main trail would include a 75-foot-long boardwalk, 25 feet of which would lie above a wetland. The boardwalk would be supported on 16 pin piers (8 pairs). Six pin piers would be placed in the abandoned access road where it crosses a wetland. There is a small wetland impact where the pin piers will be installed to support the boardwalk. A wetland mitigation plan and shoreline application have been prepared for this project.

3. Existing Storm System: The existing area is typically undeveloped and the stormwater currently flows overland towards Lacamas Lake or wetlands to the east.

4. Site Parameters: The site slopes and the project desire to match existing flow patterns as much as possible have led the project to propose low impact development measures of sheet flow dispersion BMP T5.12.

5. Adjacent Parcels: Lacamas Lake borders the trail on the west side with typical forested uplands or wetlands on the east side. For the beginning portion of the trail, single family homes border the east side.

6. Affected Areas: The runoff from the 8' crushed surfacing trail should not adversely affect any adjacent areas. The site runoff from the post-developed condition will mimic the runoff from the pre-developed condition.

7. Proposed Site Construction: The City of Camas proposes to extend the existing trail system at the south end of Lacamas Lake. The new trails would be located within City property on the northeast side of Lacamas Lake, from the Round Lake Loop Trail east of NE Everett Street (State Route 500) to a natural area on the lakeshore. The main trail, approximately 3,300 feet in length, would traverse northwest from NE Everett Street, following the alignment of an abandoned access road. The main trail would include a 75-foot-long boardwalk, 25 feet of which would lie above a wetland. The boardwalk would be supported on 16 pin piers (8 pairs). Six pin piers would be placed in the abandoned access road where it crosses a wetland.

   A shorter loop trail, approximately 1,120-feet long, would connect to the main trail to create a loop in the natural area. A spur trail, approximately 180-feet long, would follow the path of an existing informal packed dirt trail from the south end of the loop trail to a viewpoint of Lacamas Lake. The latter two trails would have a pervious surface. The main trail would be 8-feet wide and constructed of impervious material (geotextile and a gravel cover); the loop and spur trails would be 4-feet wide and pervious.

SECTION B – MINIMUM REQUIREMENTS

The existing areas for this project consist of all pervious surfaces. Approximately 0.75 acres of land disturbing activities will be involved with this trail project. A summary of the project's surface impacts to the site is provided in the table below.

TABLE B-1. PROJECT IMPACT AREA VALUES

Existing Impervious	New Impervious (Main Trail)	Replaced Impervious	Native /Existing Vegetation or Converted to Lawn or Landscaping (loop and spur trails)	Native Vegetation Converted to Pasture	Total Land-Disturbing Activity
(ACRES)	(ACRES)	(ACRES)	(ACRES)	(ACRES)	(ACRES)
0	0.61	0	0.10	0.00	0.75

Since the project results in at least 5,000 square feet of new or replaced hard surface area, all Minimum Requirements apply to the new and replaced impervious surfaces (See Flow Chart in Appendix 2).

There is one Threshold Discharge Area.

A summary of how the project meets each of the minimum requirements is described below. See additional sections of this report for more detailed information.

MR#1 – Preparation of Stormwater Site Plans
See the project drawings for stormwater information (included in Appendix 3).

MR#2 - Construction Stormwater Pollution Prevention Plans
The contractor is responsible for conforming to the City of Camas Municipal Code Title 14. The 12 elements of the Construction Stormwater Pollution Prevention Plan (SWPPP) must be considered and will be prepared for this project prior to construction.

MR#3 – Source Control of Pollution
The project consists of a non-pollution generating walking trails and therefore the development does not include any pollutant generating sources as listed in the Stormwater Manual.

MR#4 – Preservation of Natural Drainage Systems and Outfalls
All existing natural drainage systems and outfalls will be maintained with this project.

MR#5 – On-site Stormwater Management
The project will utilize dispersion BMP's to meet the LID Performance Standard. BMP T5.12 Sheet flow dispersion will be utilized for all trail areas. All disturbed soils will be amended with BMP T5.13 Post-Construction Soil Quality and Depth.

MR#6 – Runoff Treatment
All hard surface will be non-pollution generating, therefore the MR#6 Runoff Treatment threshold is not

met and is not required.

MR#7 – Flow Control
Because the project is adding 26,400 sf of impervious surface, this minimum requirement must be met. See the WWHM printouts in Appendix 2 that shows the project "passes".

MR#8 – Wetlands Protection
There will be a small impact to the wetland with the project. The main trail will include a 75-foot-long boardwalk, 25 feet of which would lie above a wetland. The boardwalk would be supported on 16 pin piers (8 pairs). Six pin piers would be placed in the abandoned access road where it crosses a wetland. The wetland will be impacted (6 sf) where the pin piers will be installed. A wetland mitigation report has been prepared for the project.

MR#9 – Operation and Maintenance
The project will be publically maintained by the City of Camas.

SECTION C – SOILS EVALUATION

1. According to the NRCS Soils Survey, the project site consists mostly of Washougal Gravelly Loam (WgB). The soils are typically well drained. The LID treatment for the project consists of BMP T5.12 Sheet Flow Dispersion. The existing soils will be adequate for the BMP.

2. No geotechnical study was performed with this project, so the depth to the water table is unknown. However, Lacamas Lake is adjacent to the project and the OHWM was determined and shown on the Shoreline Boundary Map within the map section (Appendix 1). Because the stormwater BMP is Sheet Flow Dispersion which is all on the surface, the water table has little impact on the effectiveness of the BMP.

3. Maintaining the existing stormwater flows, low impact development and the ability to integrate into the existing surroundings were the main parameters utilized in the storm design.

4. The infiltration of the site soils was determined through the Soil Survey of Clark County. Slight infiltration was utilized within the dispersion areas.

SECTION D – SOURCE CONTROL

1. The primary use of the project is for walking and biking trails. No development activities listed in Section 2.2 of the Stormwater Manual are proposed for this site. Temporary Best Management Practices (BMP's) in accordance with City of Camas Standard Details will be implemented during construction to control stormwater pollution. After the project is completed, long-term stormwater pollution control measures include sheet flow dispersion.

SECTION E – ONSITE STORMWATER MANAGEMENT

1. BMP T5.12 Sheet Flow Dispersion will be utilized adjacent to the trail for the entire length of the project.

2. The information used to complete the analysis included the characteristics of the existing site, the existing soil parameters and the adjacent area deemed suitable for sheet flow dispersion.

3. The criteria for Sheet Flow Dispersion includes:
    a. avoid concentrated flows
    b. no downstream flooding or erosion

    Because the project consists of a new non-pollution generating trail that is long, but not wide, the sheet flow dispersion works well within the natural area.

4. The project will utilize BMP T5.12 Sheet Flow Dispersion for stormwater management.

5. The project will utilize the LID measure of sheet flow dispersion.

6. The assumptions used to complete the analysis are:

    a. The trail and adjacent area will be well-maintained throughout the life of the project.
    b. WWHM calculations mimic actual rainfall data on the site.

7. The project is good candidate for the chosen BMP. The construction will disturb very little area outside of the trails. The slopes are fairly consistent throughout the project and all drain at a gentle slope away from the trails. Because the project consists of a nature trail, the adjacent areas will be kept in natural vegetation and are unlikely to be developed in the near future.

8. Refer to the project plan set, Appendix 3, for trail sections, including crushed rock type, geotextile requirement and type of wood chip surfacing.

SECTION F – RUNOFF TREATMENT ANALYSIS AND DESIGN

There will not be any pollution-generating surfaces constructed with the project, therefore MR #6 Runoff Treatment is not required.

SECTION G – FLOW CONTROL ANALYSIS AND DESIGN

Flow control is required for TDA's with greater than 10,000 square feet of new impervious surface. Therefore, flow control is required for the project.

1. Washougal gravelly loam (WgB) is a somewhat excessively drained soil that is generally moderately permeable. To model BMP T5.12, sheet flow dispersion in WWHM for flow control, the dispersion area was modeled as an extremely shallow pond (0.10' high) with limited infiltration (0.1 iph). While the runoff will disperse over fifty feet prior to Lacamas Lake, twenty feet of dispersion was utilized in design. According to the NRCS Soil Survey, the permeability of WgB is in the range of 0.63 – 2.0 iph for the top 22 inches of soil. A conservative 0.1 iph was utilized in design.

2. A geotechnical report was not provided for the project. The NRCS Soil Survey of Clark County was referenced for the site soils.

3. BMP T5.12 Sheet Flow Dispersion will be utilized for all of the hard surfaces and converted pervious surfaces within the project.

4. The site is not known to be a historical prairie, therefore a forested condition is utilized for the pre-developed surfaces in the WWHM calculations.

5. Refer to Appendix 2 for the WWHM printouts.

6. The method of flow control for the project is sheet flow dispersion. The continuous flow model Western Washington Hydrology Model (WWHM) was utilized in design. Refer to Appendix 2.

7. See Appendix 1, Maps for all exhibit.

SECTION H – WETLANDS PROTECTION

There will be a small impact to the wetland with the project. The main trail will include a 75-foot-long boardwalk, 25 feet of which would lie above a wetland. The boardwalk would be supported on 16 pin piers (8 pairs). Six pin piers would be placed in the abandoned access road where it crosses a wetland. The wetland will be impacted (6 sf) where the pin piers will be installed. A wetland mitigation report has been prepared for the project.

APPENDIX 1 –Maps

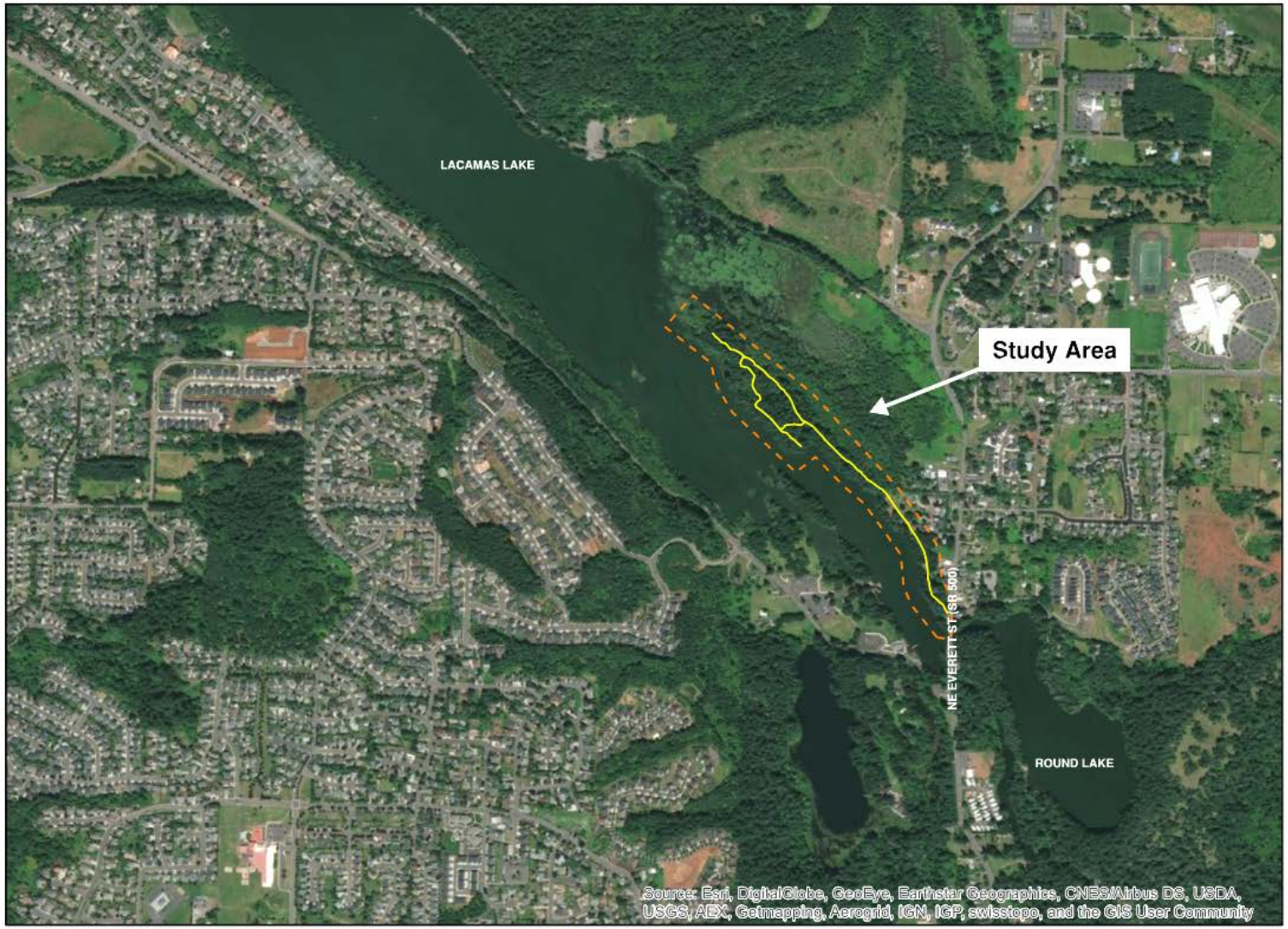


Figure 1: Vicinity Map

Lacamas North Shore Trail
Camas, Washington

Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

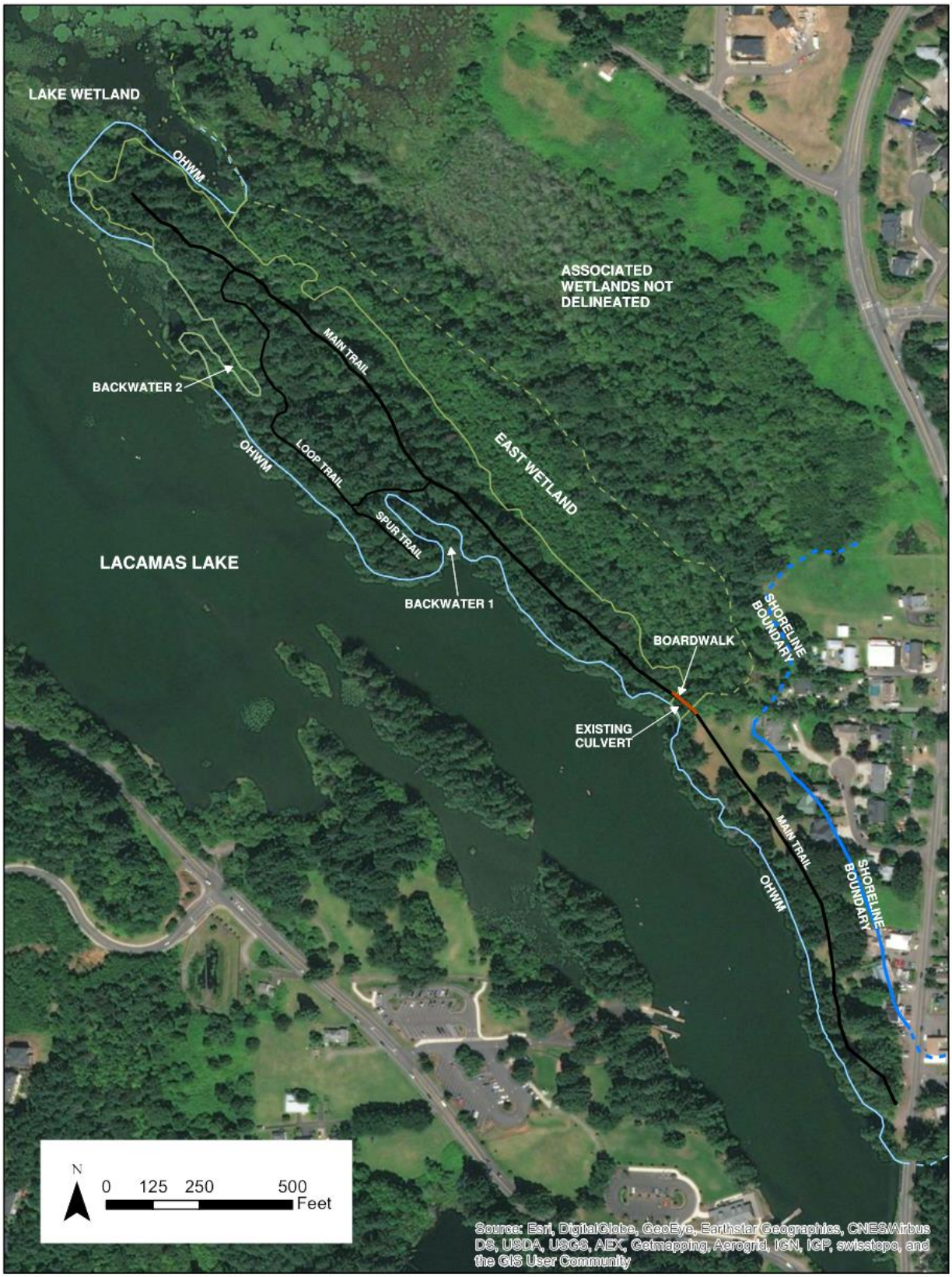


Figure 2: Shoreline Boundary

Lacamas North Shore Trail
Camas, Washington

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

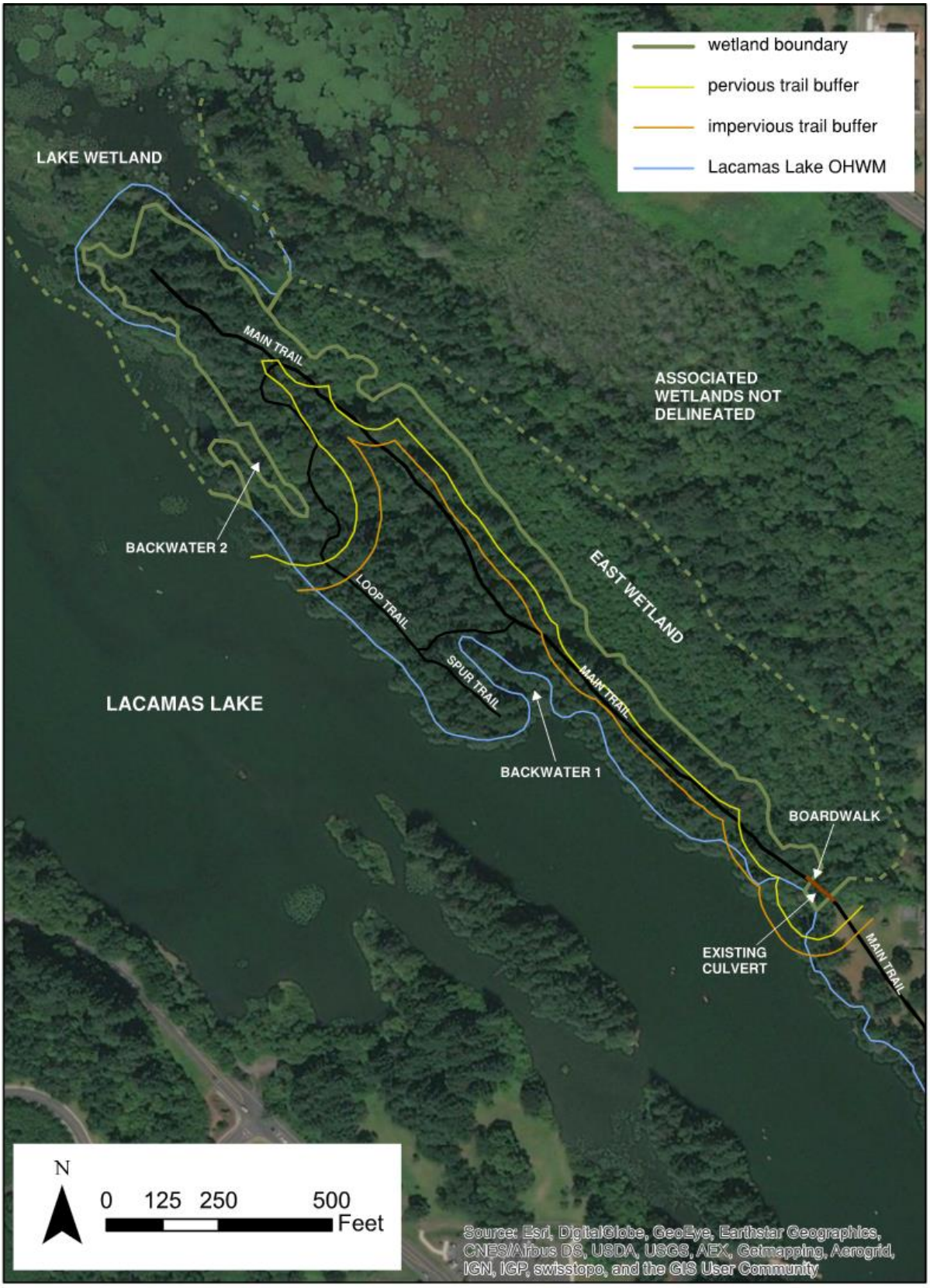
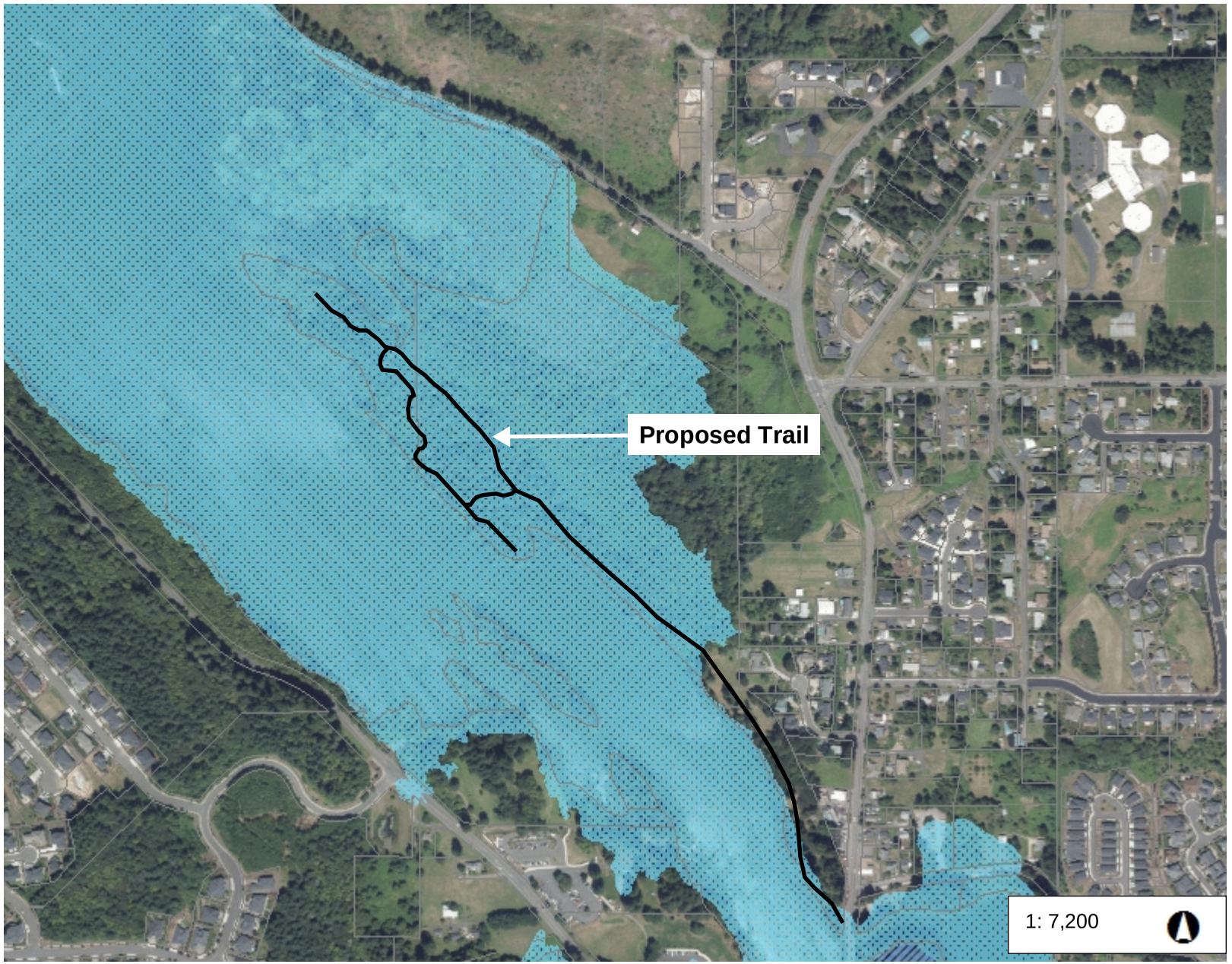


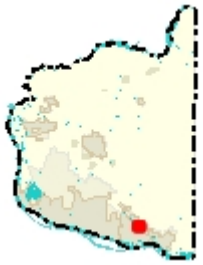
Figure 3: Wetlands and Wetland Buffers

Lacamas North Shore Trail
Camas, Washington

Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

Figure 4: Frequently Flooded Area.





Legend

- Taxlots

Flood Zone Designation

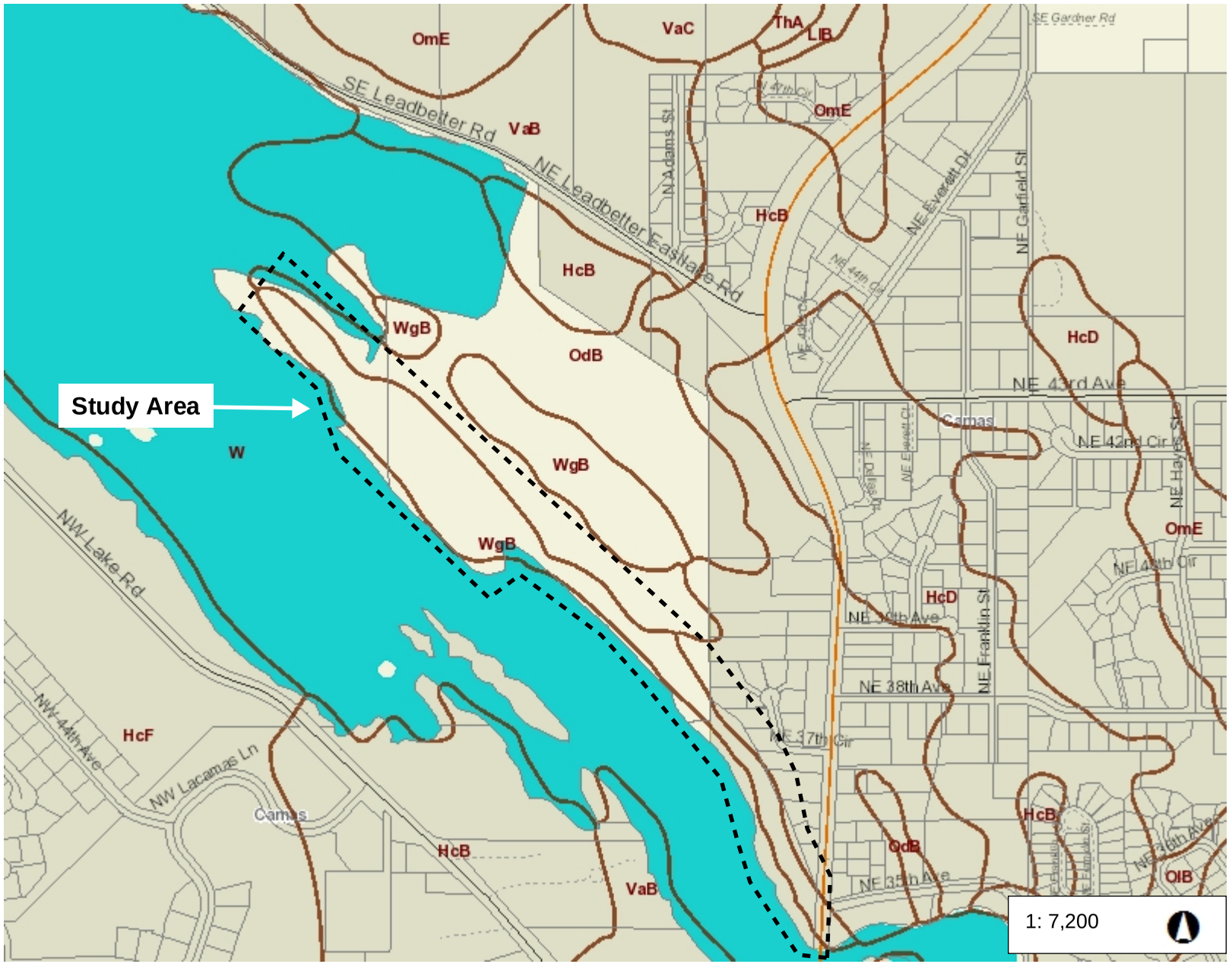
- Floodway
- Floodway Fringe
- 500 Year Flood Area
- Area Not Studied

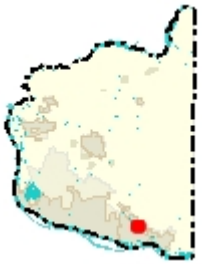
Notes:

1,200.0 0 600.00 1,200.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - http://gis.clark.wa.gov

Figure 5: Soil Map Units within the Study Area





Legend

- Taxlots
- Soil Map Units

Soil Map Units in Study Area

WgB - Washougal Gravelly Loam, 0 to 8 percent slopes, well drained.

OdB - Odne silt loam, 0 to 5 percent slopes, poorly drained.

HcB - Hesson Clay Loam, 0 to 8 percent slopes, well drained.

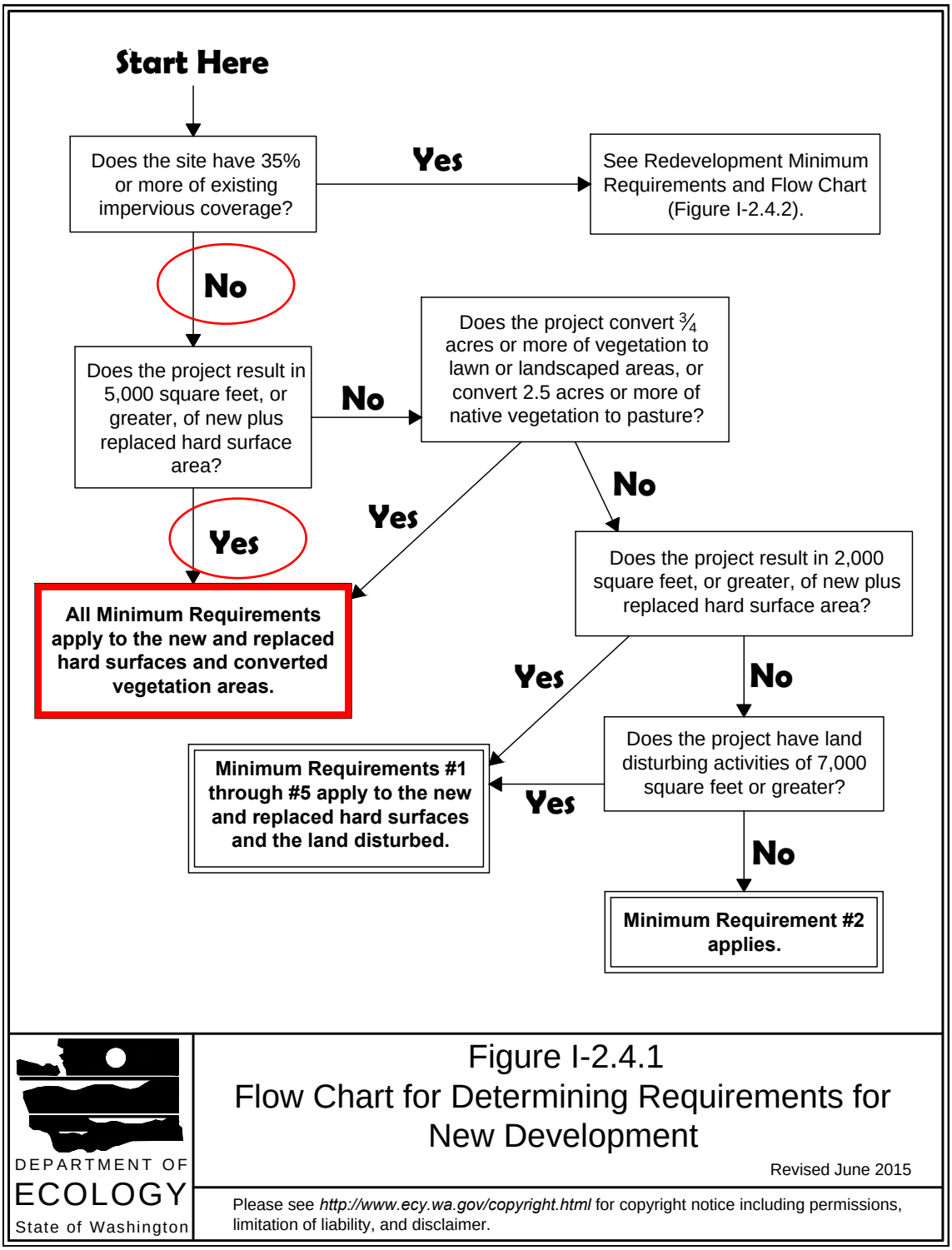
Notes:

1,200.0 0 600.00 1,200.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - http://gis.clark.wa.gov

APPENDIX 2 –Technical Supporting Documents

Figure I-2.4.1 Flow Chart for Determining Requirements for New Development



BMP T5.12: Sheet Flow Dispersion

Purpose and Definition

Sheet flow dispersion is the simplest method of runoff control. This BMP can be used for any impervious or pervious surface that is graded to avoid concentrating flows). Because flows are already dispersed as they leave the surface, they need only traverse a narrow band of adjacent vegetation for effective attenuation and treatment.

Applications and Limitations

Use this BMP for flat or moderately sloping (< 15% slope) surfaces such as driveways, sports courts, patios, roofs without gutters, lawns, pastures; or any situation where concentration of flows can be avoided.

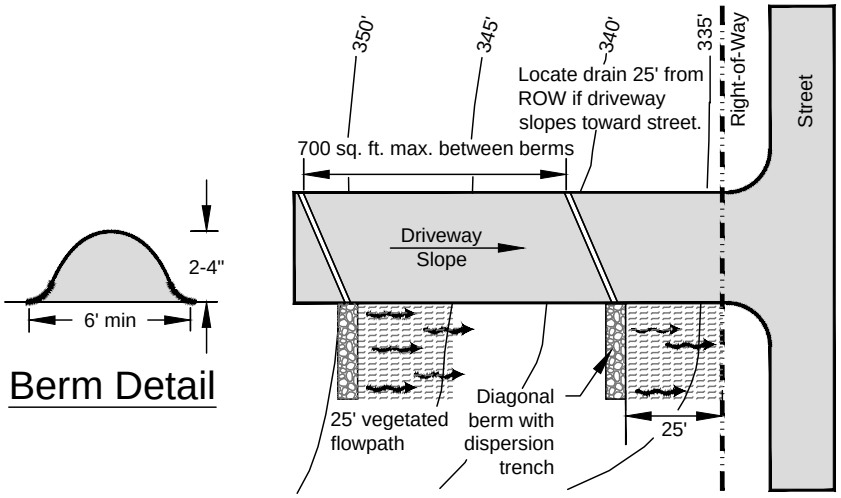
Design Guidelines

- See Figure V-5.3.2 Sheet Flow Dispersion for Driveways (p.910) for details for driveways.
- Provide a 2-foot-wide transition zone to discourage channeling between the edge of the impervious surface (or building eaves) and the downslope vegetation. This transition zone may consist of an extension of subgrade material (crushed rock), modular pavement, drain rock, or other material acceptable to the Local Plan Approval Authority.
- Provide a 10-foot-wide vegetated buffer for up to 20 feet of width of paved or impervious surface. Provide an additional 10 feet of vegetated buffer width for each additional 20 feet of impervious surface width or fraction thereof. (For example, if a driveway is 30 feet wide and 60 feet long provide a 20-foot wide by 60-foot long vegetated buffer, with a 2-foot by 60-foot transition zone.)
- No erosion or flooding of downstream properties may result.
- Runoff discharge toward landslide hazard areas must be evaluated by a geotechnical engineer or a qualified geologist. Do not allow sheet flow on or above slopes greater than 20%, or above erosion hazard areas, without evaluation by a geotechnical engineer or qualified geologist and approval by the Local Plan Approval Authority.
- For sites with septic systems, the discharge area must be ten feet downgradient of the drainfield primary and reserve areas (WAC 246-272A-0210). A Local Plan Approval Authority may waive this requirement if site topography clearly prohibits flows from intersecting the drainfield.

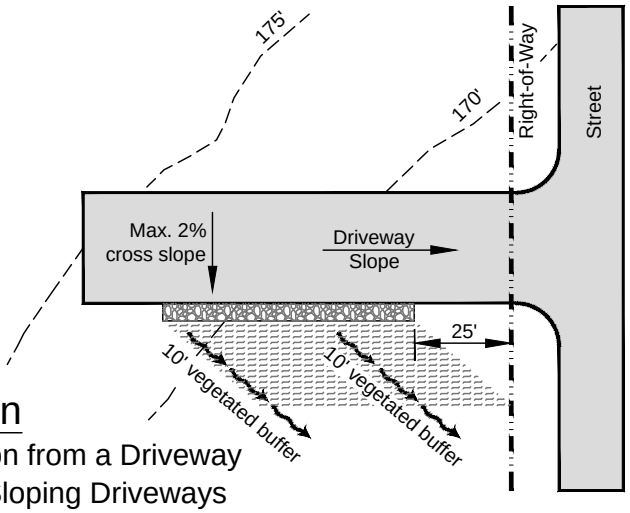
Runoff Modeling

Where BMP T5.12: Sheet Flow Dispersion is used to disperse runoff into an undisturbed native landscape area or an area that meets BMP T5.13: Post-Construction Soil Quality and Depth (p.911), and the vegetated flow path is 50 feet or more, the impervious area may be modeled as landscaped area. Where the vegetated flowpath is 25 to 50 feet, use of a dispersion trench (see BMP T5.10B: Downspout Dispersion Systems (p.905)) allows modeling the impervious area as 50% impervious/50% landscape. This is done in the WWHM3 on the Mitigation Scenario screen by entering the dispersed impervious area into one of the entry options for dispersal of impervious area runoff. For procedures in WWHM 2012, see Appendix III-C: Washington State Department of Ecology Low Impact Development Flow Modeling Guidance (p.587).

Figure V-5.3.2 Sheet Flow Dispersion for Driveways



Driveway Dispersion Trench
Driveway Slope Varies and Slopes Toward Street



Sheet Flow Dispersion from a Driveway
Flat to Moderately Sloping Driveways

NOT TO SCALE

DEPARTMENT OF ECOLOGY
State of Washington

Figure V-5.3.2
Sheet Flow Dispersion for Driveways

Revised January 2016

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	CAM-11A WWHM
Site Name:	
Site Address:	
City:	
Report Date:	2/13/2018
Gage:	Lacamas
Data Start:	1948/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	1.300
Version Date:	2017/04/14
Version:	4.2.13

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data
Predeveloped Land Use

Pre path area

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Forest, Flat	0.75
Pervious Total	0.75

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.75

Element Flows To:

Surface	Interflow	Groundwater

Pre dispersion area

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Forest, Flat	2.11
Pervious Total	2.11

Impervious Land Use	acre
Impervious Total	0
Basin Total	2.11

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Main Trail

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
SIDEWALKS FLAT	0.6
Impervious Total	0.6
Basin Total	0.6

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Basin 2

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Lawn, Flat	0.12
Pervious Total	0.12

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.12

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 2	Trapezoidal Pond 2	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	3300.00 ft.	
Bottom Width:	20.00 ft.	
Depth:	1.1 ft.	
Volume at riser head:	0.1667 acre-feet.	
Infiltration On		
Infiltration rate:	0.1	
Infiltration safety factor:	1	
Total Volume Infiltrated (ac-ft.):		118.681
Total Volume Through Riser (ac-ft.):		0
Total Volume Through Facility (ac-ft.):		118.681
Percent Infiltrated:		100
Total Precip Applied to Facility:		0
Total Evap From Facility:		0
Side slope 1:	0 To 1	
Side slope 2:	0 To 1	
Side slope 3:	0 To 1	
Side slope 4:	0 To 1	
Discharge Structure		
Riser Height:	0.1 ft.	
Riser Diameter:	39600 in.	
Element Flows To:		
Outlet 1	Outlet 2	

Pond Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	1.515	0.000	0.000	0.000
0.0122	1.515	0.018	0.000	0.152
0.0244	1.515	0.037	0.000	0.152
0.0367	1.515	0.055	0.000	0.152
0.0489	1.515	0.074	0.000	0.152
0.0611	1.515	0.092	0.000	0.152
0.0733	1.515	0.111	0.000	0.152
0.0856	1.515	0.129	0.000	0.152
0.0978	1.515	0.148	0.000	0.152
0.1100	1.515	0.166	35.05	0.152
0.1222	1.515	0.185	116.1	0.152
0.1344	1.515	0.203	224.0	0.152
0.1467	1.515	0.222	353.3	0.152
0.1589	1.515	0.240	500.9	0.152
0.1711	1.515	0.259	664.7	0.152
0.1833	1.515	0.277	843.2	0.152
0.1956	1.515	0.296	1035.	0.152
0.2078	1.515	0.314	1240.	0.152
0.2200	1.515	0.333	1457.	0.152
0.2322	1.515	0.351	1685.	0.152
0.2444	1.515	0.370	1924.	0.152
0.2567	1.515	0.388	2173.	0.152
0.2689	1.515	0.407	2432.	0.152
0.2811	1.515	0.425	2701.	0.152
0.2933	1.515	0.444	2979.	0.152
0.3056	1.515	0.463	3266.	0.152
0.3178	1.515	0.481	3562.	0.152

0.3300	1.515	0.500	3866.	0.152
0.3422	1.515	0.518	4178.	0.152
0.3544	1.515	0.537	4498.	0.152
0.3667	1.515	0.555	4826.	0.152
0.3789	1.515	0.574	5162.	0.152
0.3911	1.515	0.592	5505.	0.152
0.4033	1.515	0.611	5855.	0.152
0.4156	1.515	0.629	6213.	0.152
0.4278	1.515	0.648	6577.	0.152
0.4400	1.515	0.666	6949.	0.152
0.4522	1.515	0.685	7327.	0.152
0.4644	1.515	0.703	7711.	0.152
0.4767	1.515	0.722	8103.	0.152
0.4889	1.515	0.740	8500.	0.152
0.5011	1.515	0.759	8904.	0.152
0.5133	1.515	0.777	9314.	0.152
0.5256	1.515	0.796	9730.	0.152
0.5378	1.515	0.814	10153	0.152
0.5500	1.515	0.833	10581	0.152
0.5622	1.515	0.851	11015	0.152
0.5744	1.515	0.870	11455	0.152
0.5867	1.515	0.888	11900	0.152
0.5989	1.515	0.907	12351	0.152
0.6111	1.515	0.925	12808	0.152
0.6233	1.515	0.944	13270	0.152
0.6356	1.515	0.963	13737	0.152
0.6478	1.515	0.981	14210	0.152
0.6600	1.515	1.000	14689	0.152
0.6722	1.515	1.018	15172	0.152
0.6844	1.515	1.037	15661	0.152
0.6967	1.515	1.055	16155	0.152
0.7089	1.515	1.074	16654	0.152
0.7211	1.515	1.092	17158	0.152
0.7333	1.515	1.111	17667	0.152
0.7456	1.515	1.129	18180	0.152
0.7578	1.515	1.148	18699	0.152
0.7700	1.515	1.166	19223	0.152
0.7822	1.515	1.185	19751	0.152
0.7944	1.515	1.203	20284	0.152
0.8067	1.515	1.222	20822	0.152
0.8189	1.515	1.240	21365	0.152
0.8311	1.515	1.259	21912	0.152
0.8433	1.515	1.277	22464	0.152
0.8556	1.515	1.296	23020	0.152
0.8678	1.515	1.314	23581	0.152
0.8800	1.515	1.333	24146	0.152
0.8922	1.515	1.351	24716	0.152
0.9044	1.515	1.370	25290	0.152
0.9167	1.515	1.388	25869	0.152
0.9289	1.515	1.407	26451	0.152
0.9411	1.515	1.425	27039	0.152
0.9533	1.515	1.444	27630	0.152
0.9656	1.515	1.463	28226	0.152
0.9778	1.515	1.481	28826	0.152
0.9900	1.515	1.500	29430	0.152
1.0022	1.515	1.518	30038	0.152
1.0144	1.515	1.537	30651	0.152
1.0267	1.515	1.555	31267	0.152

1.0389	1.515	1.574	31888	0.152
1.0511	1.515	1.592	32513	0.152
1.0633	1.515	1.611	33141	0.152
1.0756	1.515	1.629	33774	0.152
1.0878	1.515	1.648	34411	0.152
1.1000	1.515	1.666	35051	0.152

Trapezoidal Pond 2

Bottom Length:	1300.00 ft.	
Bottom Width:	20.00 ft.	
Depth:	1.1 ft.	
Volume at riser head:	0.0657 acre-feet.	
Infiltration On		
Infiltration rate:	0.1	
Infiltration safety factor:	1	
Total Volume Infiltrated (ac-ft.):		0.123
Total Volume Through Riser (ac-ft.):		0
Total Volume Through Facility (ac-ft.):		0.123
Percent Infiltrated:		100
Total Precip Applied to Facility:		0
Total Evap From Facility:		0
Side slope 1:	0 To 1	
Side slope 2:	0 To 1	
Side slope 3:	0 To 1	
Side slope 4:	0 To 1	
Discharge Structure		
Riser Height:	0.1 ft.	
Riser Diameter:	15600 in.	
Element Flows To:		
Outlet 1	Outlet 2	

Pond Hydraulic Table

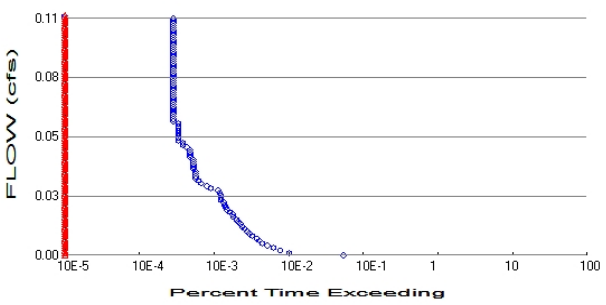
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.596	0.000	0.000	0.000
0.0122	0.596	0.007	0.000	0.060
0.0244	0.596	0.014	0.000	0.060
0.0367	0.596	0.021	0.000	0.060
0.0489	0.596	0.029	0.000	0.060
0.0611	0.596	0.036	0.000	0.060
0.0733	0.596	0.043	0.000	0.060
0.0856	0.596	0.051	0.000	0.060
0.0978	0.596	0.058	0.000	0.060
0.1100	0.596	0.065	13.80	0.060
0.1222	0.596	0.073	45.74	0.060
0.1344	0.596	0.080	88.27	0.060
0.1467	0.596	0.087	139.2	0.060
0.1589	0.596	0.094	197.3	0.060
0.1711	0.596	0.102	261.8	0.060
0.1833	0.596	0.109	332.1	0.060
0.1956	0.596	0.116	407.8	0.060
0.2078	0.596	0.124	488.5	0.060
0.2200	0.596	0.131	574.0	0.060
0.2322	0.596	0.138	663.9	0.060
0.2444	0.596	0.145	758.0	0.060
0.2567	0.596	0.153	856.2	0.060
0.2689	0.596	0.160	958.4	0.060
0.2811	0.596	0.167	1064.	0.060
0.2933	0.596	0.175	1173.	0.060
0.3056	0.596	0.182	1286.	0.060
0.3178	0.596	0.189	1403.	0.060
0.3300	0.596	0.197	1523.	0.060
0.3422	0.596	0.204	1646.	0.060

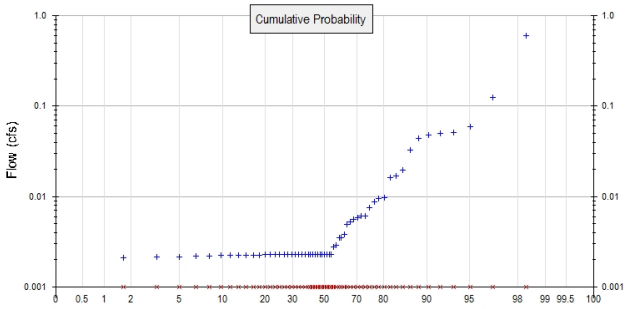
0.3544	0.596	0.211	1772.	0.060
0.3667	0.596	0.218	1901.	0.060
0.3789	0.596	0.226	2033.	0.060
0.3911	0.596	0.233	2168.	0.060
0.4033	0.596	0.240	2306.	0.060
0.4156	0.596	0.248	2447.	0.060
0.4278	0.596	0.255	2591.	0.060
0.4400	0.596	0.262	2737.	0.060
0.4522	0.596	0.269	2886.	0.060
0.4644	0.596	0.277	3038.	0.060
0.4767	0.596	0.284	3192.	0.060
0.4889	0.596	0.291	3348.	0.060
0.5011	0.596	0.299	3507.	0.060
0.5133	0.596	0.306	3669.	0.060
0.5256	0.596	0.313	3833.	0.060
0.5378	0.596	0.321	3999.	0.060
0.5500	0.596	0.328	4168.	0.060
0.5622	0.596	0.335	4339.	0.060
0.5744	0.596	0.342	4512.	0.060
0.5867	0.596	0.350	4687.	0.060
0.5989	0.596	0.357	4865.	0.060
0.6111	0.596	0.364	5045.	0.060
0.6233	0.596	0.372	5227.	0.060
0.6356	0.596	0.379	5411.	0.060
0.6478	0.596	0.386	5598.	0.060
0.6600	0.596	0.393	5786.	0.060
0.6722	0.596	0.401	5977.	0.060
0.6844	0.596	0.408	6169.	0.060
0.6967	0.596	0.415	6364.	0.060
0.7089	0.596	0.423	6560.	0.060
0.7211	0.596	0.430	6759.	0.060
0.7333	0.596	0.437	6959.	0.060
0.7456	0.596	0.445	7162.	0.060
0.7578	0.596	0.452	7366.	0.060
0.7700	0.596	0.459	7572.	0.060
0.7822	0.596	0.466	7780.	0.060
0.7944	0.596	0.474	7990.	0.060
0.8067	0.596	0.481	8202.	0.060
0.8189	0.596	0.488	8416.	0.060
0.8311	0.596	0.496	8631.	0.060
0.8433	0.596	0.503	8849.	0.060
0.8556	0.596	0.510	9068.	0.060
0.8678	0.596	0.518	9289.	0.060
0.8800	0.596	0.525	9512.	0.060
0.8922	0.596	0.532	9736.	0.060
0.9044	0.596	0.539	9962.	0.060
0.9167	0.596	0.547	10190	0.060
0.9289	0.596	0.554	10420	0.060
0.9411	0.596	0.561	10651	0.060
0.9533	0.596	0.569	10884	0.060
0.9656	0.596	0.576	11119	0.060
0.9778	0.596	0.583	11355	0.060
0.9900	0.596	0.590	11593	0.060
1.0022	0.596	0.598	11833	0.060
1.0144	0.596	0.605	12074	0.060
1.0267	0.596	0.612	12317	0.060
1.0389	0.596	0.620	12561	0.060
1.0511	0.596	0.627	12807	0.060

1.0633	0.596	0.634	13055	0.060
1.0756	0.596	0.642	13304	0.060
1.0878	0.596	0.649	13555	0.060
1.1000	0.596	0.656	13807	0.060

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 2.86
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.12
Total Impervious Area: 0.6

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.004161
5 year	0.013008
10 year	0.026083
25 year	0.059273
50 year	0.105318
100 year	0.182094

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1949	0.002	0.000
1950	0.003	0.000
1951	0.050	0.000
1952	0.002	0.000
1953	0.005	0.000
1954	0.017	0.000
1955	0.002	0.000
1956	0.051	0.000
1957	0.002	0.000
1958	0.002	0.000

1959	0.002	0.000
1960	0.002	0.000
1961	0.004	0.000
1962	0.002	0.000
1963	0.002	0.000
1964	0.004	0.000
1965	0.002	0.000
1966	0.003	0.000
1967	0.002	0.000
1968	0.002	0.000
1969	0.006	0.000
1970	0.600	0.000
1971	0.002	0.000
1972	0.016	0.000
1973	0.002	0.000
1974	0.033	0.000
1975	0.006	0.000
1976	0.006	0.000
1977	0.002	0.000
1978	0.006	0.000
1979	0.002	0.000
1980	0.002	0.000
1981	0.010	0.000
1982	0.009	0.000
1983	0.124	0.000
1984	0.002	0.000
1985	0.002	0.000
1986	0.002	0.000
1987	0.009	0.000
1988	0.002	0.000
1989	0.002	0.000
1990	0.002	0.000
1991	0.002	0.000
1992	0.002	0.000
1993	0.002	0.000
1994	0.002	0.000
1995	0.002	0.000
1996	0.044	0.000
1997	0.048	0.000
1998	0.002	0.000
1999	0.020	0.000
2000	0.008	0.000
2001	0.002	0.000
2002	0.060	0.000
2003	0.002	0.000
2004	0.002	0.000
2005	0.002	0.000
2006	0.005	0.000
2007	0.002	0.000
2008	0.003	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	0.6000	0.0000
2	0.1243	0.0000
3	0.0597	0.0000
4	0.0514	0.0000

5	0.0496	0.0000
6	0.0480	0.0000
7	0.0442	0.0000
8	0.0326	0.0000
9	0.0197	0.0000
10	0.0169	0.0000
11	0.0161	0.0000
12	0.0097	0.0000
13	0.0094	0.0000
14	0.0086	0.0000
15	0.0076	0.0000
16	0.0061	0.0000
17	0.0060	0.0000
18	0.0058	0.0000
19	0.0056	0.0000
20	0.0052	0.0000
21	0.0050	0.0000
22	0.0038	0.0000
23	0.0035	0.0000
24	0.0035	0.0000
25	0.0029	0.0000
26	0.0028	0.0000
27	0.0023	0.0000
28	0.0023	0.0000
29	0.0023	0.0000
30	0.0023	0.0000
31	0.0023	0.0000
32	0.0023	0.0000
33	0.0023	0.0000
34	0.0023	0.0000
35	0.0023	0.0000
36	0.0023	0.0000
37	0.0023	0.0000
38	0.0023	0.0000
39	0.0023	0.0000
40	0.0023	0.0000
41	0.0023	0.0000
42	0.0023	0.0000
43	0.0023	0.0000
44	0.0023	0.0000
45	0.0023	0.0000
46	0.0023	0.0000
47	0.0023	0.0000
48	0.0023	0.0000
49	0.0023	0.0000
50	0.0023	0.0000
51	0.0022	0.0000
52	0.0022	0.0000
53	0.0022	0.0000
54	0.0022	0.0000
55	0.0022	0.0000
56	0.0022	0.0000
57	0.0021	0.0000
58	0.0021	0.0000
59	0.0021	0.0000
60	0.0021	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0021	1125	0	0	Pass
0.0031	213	0	0	Pass
0.0042	162	0	0	Pass
0.0052	131	0	0	Pass
0.0063	109	0	0	Pass
0.0073	93	0	0	Pass
0.0083	86	0	0	Pass
0.0094	78	0	0	Pass
0.0104	68	0	0	Pass
0.0115	63	0	0	Pass
0.0125	58	0	0	Pass
0.0136	54	0	0	Pass
0.0146	50	0	0	Pass
0.0156	47	0	0	Pass
0.0167	44	0	0	Pass
0.0177	42	0	0	Pass
0.0188	38	0	0	Pass
0.0198	37	0	0	Pass
0.0209	34	0	0	Pass
0.0219	31	0	0	Pass
0.0229	30	0	0	Pass
0.0240	29	0	0	Pass
0.0250	28	0	0	Pass
0.0261	26	0	0	Pass
0.0271	26	0	0	Pass
0.0282	26	0	0	Pass
0.0292	25	0	0	Pass
0.0302	24	0	0	Pass
0.0313	19	0	0	Pass
0.0323	17	0	0	Pass
0.0334	14	0	0	Pass
0.0344	13	0	0	Pass
0.0355	12	0	0	Pass
0.0365	12	0	0	Pass
0.0375	12	0	0	Pass
0.0386	12	0	0	Pass
0.0396	11	0	0	Pass
0.0407	11	0	0	Pass
0.0417	11	0	0	Pass
0.0427	11	0	0	Pass
0.0438	11	0	0	Pass
0.0448	10	0	0	Pass
0.0459	10	0	0	Pass
0.0469	10	0	0	Pass
0.0480	10	0	0	Pass
0.0490	9	0	0	Pass
0.0500	8	0	0	Pass
0.0511	8	0	0	Pass
0.0521	7	0	0	Pass
0.0532	7	0	0	Pass
0.0542	7	0	0	Pass
0.0553	7	0	0	Pass
0.0563	7	0	0	Pass

0.0573	7	0	0	Pass
0.0584	7	0	0	Pass
0.0594	7	0	0	Pass
0.0605	6	0	0	Pass
0.0615	6	0	0	Pass
0.0626	6	0	0	Pass
0.0636	6	0	0	Pass
0.0646	6	0	0	Pass
0.0657	6	0	0	Pass
0.0667	6	0	0	Pass
0.0678	6	0	0	Pass
0.0688	6	0	0	Pass
0.0699	6	0	0	Pass
0.0709	6	0	0	Pass
0.0719	6	0	0	Pass
0.0730	6	0	0	Pass
0.0740	6	0	0	Pass
0.0751	6	0	0	Pass
0.0761	6	0	0	Pass
0.0772	6	0	0	Pass
0.0782	6	0	0	Pass
0.0792	6	0	0	Pass
0.0803	6	0	0	Pass
0.0813	6	0	0	Pass
0.0824	6	0	0	Pass
0.0834	6	0	0	Pass
0.0845	6	0	0	Pass
0.0855	6	0	0	Pass
0.0865	6	0	0	Pass
0.0876	6	0	0	Pass
0.0886	6	0	0	Pass
0.0897	6	0	0	Pass
0.0907	6	0	0	Pass
0.0918	6	0	0	Pass
0.0928	6	0	0	Pass
0.0938	6	0	0	Pass
0.0949	6	0	0	Pass
0.0959	6	0	0	Pass
0.0970	6	0	0	Pass
0.0980	6	0	0	Pass
0.0991	6	0	0	Pass
0.1001	6	0	0	Pass
0.1011	6	0	0	Pass
0.1022	6	0	0	Pass
0.1032	6	0	0	Pass
0.1043	6	0	0	Pass
0.1053	6	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Trapezoidal Pond 1 POC	☐	108.00			☐	100.00			
Trapezoidal Pond 2 POC	☐	0.11			☐	98.26			
Total Volume Infiltrated		108.11	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

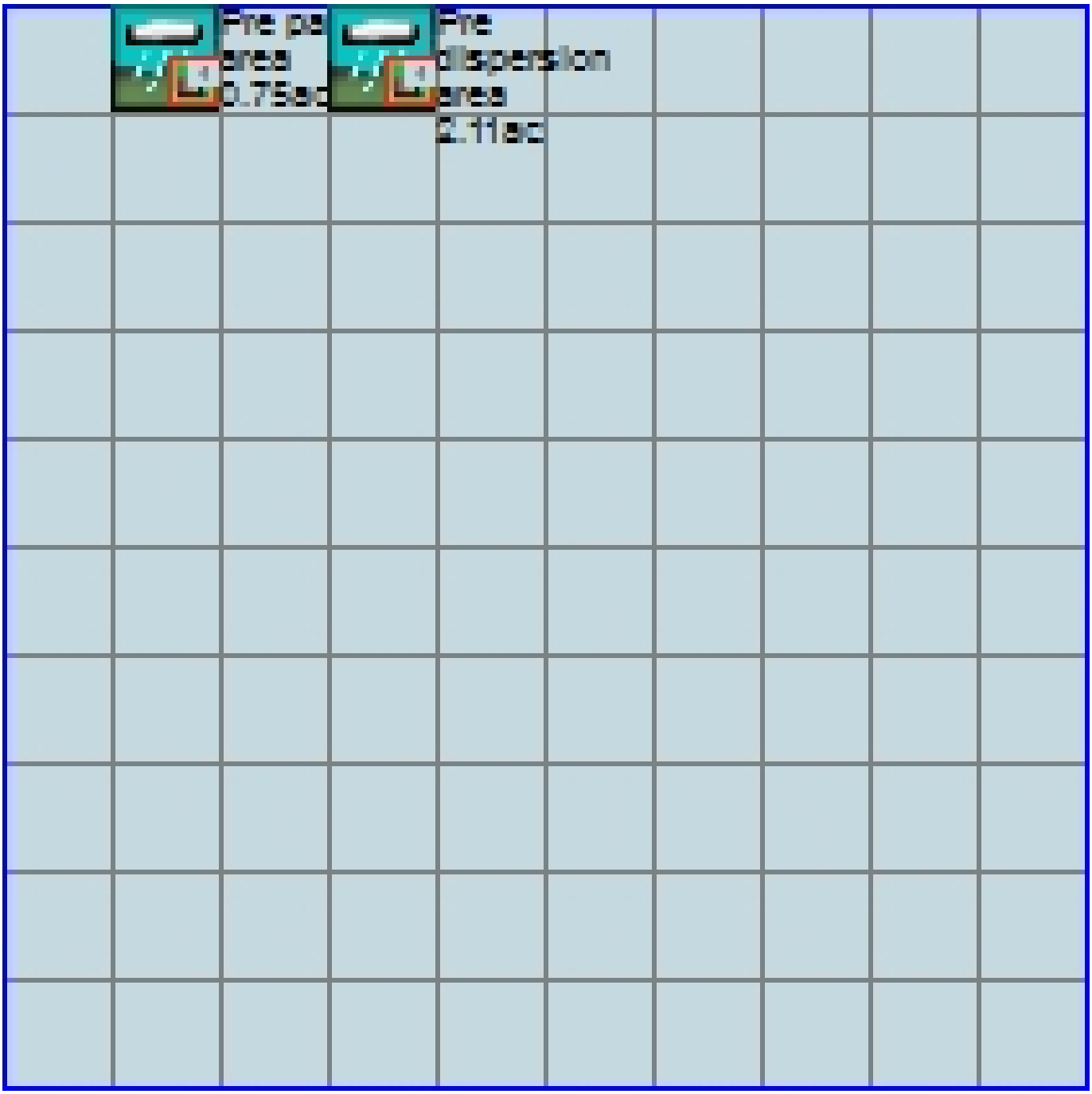
No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2008 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   CAM-11A WWHM.wdm
MESSU       25   PreCAM-11A WWHM.MES
            27   PreCAM-11A WWHM.L61
            28   PreCAM-11A WWHM.L62
            30   POCCAM-11A WWHM1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      PERLND       1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Pre path area               MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                       in  out           ***
    1     A/B, Forest, Flat       1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    1         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    1         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO
```

```
  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    1         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    1               0         5         2       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    1              0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    1          0.2       0.5      0.35         0       0.7       0.7
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
               ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    1              0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                      in  out           ***
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
  END IWAT-STATE1
```

```
END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Pre path area***
PERLND   1                        0.75     COPY   501     12
PERLND   1                        0.75     COPY   501     13
Pre dispersion area***
PERLND   1                        2.11     COPY   501     12
PERLND   1                        2.11     COPY   501     13

******Routing******
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *         ***
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                     ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
```

```
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    1.3            PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    1.3            IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.8            PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.8            IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    501 FLOW     ENGL      REPL
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK       12
PERLND     PWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13


END MASS-LINK

END RUN
```

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1948 10 01        END    2008 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                    UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                              ***
WDM         26   CAM-11A WWHM.wdm
MESSU       25   MitCAM-11A WWHM.MES
            27   MitCAM-11A WWHM.L61
            28   MitCAM-11A WWHM.L62
            30   POCCAM-11A WWHM1.dat
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:15
      IMPLND       8
      PERLND       7
      RCHRES       1
      RCHRES       2
      COPY         1
      COPY       501
      DISPLY       1
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
    1        Trapezoidal Pond  1         MAX                    1    2   30    9
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  501         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
  END OPCODE
  PARM
    #    #         K ***
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
                                          in  out           ***
    7     A/B, Lawn, Flat         1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************ Active Sections ******************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
    7         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags **************************** PIVL  PYR
```

```
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
    7         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
    7         0    0    0    0    0    0    0    0    0    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
    7             0         5       0.8       400      0.05       0.3     0.996
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
    7             0         0         2         2         0         0         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                              ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
    7          0.1       0.5      0.25         0       0.7      0.25
  END PWAT-PARM4

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
             ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
    7             0         0         0         0         3         1         0
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                     in  out           ***
    8      SIDEWALKS/FLAT         1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
    <PLS > ************* Active Sections ******************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    8         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    8         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    8         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    8            400      0.01       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
```

```
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    8             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    8             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
Main Trail***
IMPLND   8                        0.6     RCHRES   1      5
Basin  2***
PERLND   7                       0.12     RCHRES   2      2
PERLND   7                       0.12     RCHRES   2      3

******Routing******
IMPLND   8                        0.6     COPY     1     15
PERLND   7                       0.12     COPY     1     12
PERLND   7                       0.12     COPY     1     13
RCHRES   1                          1     COPY   501     17
RCHRES   2                          1     COPY   501     17
END SCHEMATIC

NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
COPY   501 OUTPUT MEAN   1 1   48.4        DISPLY   1     INPUT  TIMSER 1



<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG           ***
                                       in  out                              ***
    1     Trapezoidal Pond-009    2    1    1    1   28    0    1
    2     Trapezoidal Pond-010    2    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************ Active Sections ****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR  *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                  ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *       *  *  *  *  *        ***
```

```
    1        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
    2        0  1  0  0    4  5  0  0  0       0  0  0  0  0       2  2  2  2  2
  END HYDR-PARM1

  HYDR-PARM2
    # -  #    FTABNO       LEN      DELTH     STCOR        KS      DB50        ***
  <------><--------><--------><--------><--------><--------><-------->        ***
    1              1      0.63       0.0       0.0       0.5       0.0
    2              2      0.25       0.0       0.0       0.5       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                          ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit        for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2            0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
END SPEC-ACTIONS
FTABLES
  FTABLE      1
   90    5
     Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
  0.000000  1.515152  0.000000  0.000000  0.000000
  0.012222  1.515152  0.018519  0.000000  0.152778
  0.024444  1.515152  0.037037  0.000000  0.152778
  0.036667  1.515152  0.055556  0.000000  0.152778
  0.048889  1.515152  0.074074  0.000000  0.152778
  0.061111  1.515152  0.092593  0.000000  0.152778
  0.073333  1.515152  0.111111  0.000000  0.152778
  0.085556  1.515152  0.129630  0.000000  0.152778
  0.097778  1.515152  0.148148  0.000000  0.152778
  0.110000  1.515152  0.166667  35.05269  0.152778
  0.122222  1.515152  0.185185  116.1188  0.152778
  0.134444  1.515152  0.203704  224.0784  0.152778
  0.146667  1.515152  0.222222  353.3712  0.152778
  0.158889  1.515152  0.240741  500.9230  0.152778
  0.171111  1.515152  0.259259  664.7020  0.152778
  0.183333  1.515152  0.277778  843.2354  0.152778
  0.195556  1.515152  0.296296  1035.391  0.152778
  0.207778  1.515152  0.314815  1240.265  0.152778
  0.220000  1.515152  0.333333  1457.110  0.152778
  0.232222  1.515152  0.351852  1685.299  0.152778
  0.244444  1.515152  0.370370  1924.294  0.152778
  0.256667  1.515152  0.388889  2173.627  0.152778
  0.268889  1.515152  0.407407  2432.885  0.152778
  0.281111  1.515152  0.425926  2701.702  0.152778
  0.293333  1.515152  0.444444  2979.750  0.152778
  0.305556  1.515152  0.462963  3266.731  0.152778
  0.317778  1.515152  0.481481  3562.377  0.152778
  0.330000  1.515152  0.500000  3866.439  0.152778
  0.342222  1.515152  0.518519  4178.691  0.152778
  0.354444  1.515152  0.537037  4498.924  0.152778
  0.366667  1.515152  0.555556  4826.943  0.152778
  0.378889  1.515152  0.574074  5162.568  0.152778
  0.391111  1.515152  0.592593  5505.630  0.152778
  0.403333  1.515152  0.611111  5855.971  0.152778
  0.415556  1.515152  0.629630  6213.444  0.152778
  0.427778  1.515152  0.648148  6577.907  0.152778
  0.440000  1.515152  0.666667  6949.231  0.152778
  0.452222  1.515152  0.685185  7327.290  0.152778
  0.464444  1.515152  0.703704  7711.967  0.152778
  0.476667  1.515152  0.722222  8103.149  0.152778
  0.488889  1.515152  0.740741  8500.731  0.152778
  0.501111  1.515152  0.759259  8904.609  0.152778
  0.513333  1.515152  0.777778  9314.689  0.152778
```

```
0.525556  1.515152  0.796296  9730.878  0.152778
0.537778  1.515152  0.814815  10153.09  0.152778
0.550000  1.515152  0.833333  10581.23  0.152778
0.562222  1.515152  0.851852  11015.23  0.152778
0.574444  1.515152  0.870370  11455.00  0.152778
0.586667  1.515152  0.888889  11900.48  0.152778
0.598889  1.515152  0.907407  12351.59  0.152778
0.611111  1.515152  0.925926  12808.25  0.152778
0.623333  1.515152  0.944444  13270.41  0.152778
0.635556  1.515152  0.962963  13738.00  0.152778
0.647778  1.515152  0.981481  14210.95  0.152778
0.660000  1.515152  1.000000  14689.21  0.152778
0.672222  1.515152  1.018519  15172.72  0.152778
0.684444  1.515152  1.037037  15661.42  0.152778
0.696667  1.515152  1.055556  16155.25  0.152778
0.708889  1.515152  1.074074  16654.17  0.152778
0.721111  1.515152  1.092593  17158.12  0.152778
0.733333  1.515152  1.111111  17667.06  0.152778
0.745556  1.515152  1.129630  18180.93  0.152778
0.757778  1.515152  1.148148  18699.69  0.152778
0.770000  1.515152  1.166667  19223.29  0.152778
0.782222  1.515152  1.185185  19751.68  0.152778
0.794444  1.515152  1.203704  20284.83  0.152778
0.806667  1.515152  1.222222  20822.70  0.152778
0.818889  1.515152  1.240741  21365.23  0.152778
0.831111  1.515152  1.259259  21912.40  0.152778
0.843333  1.515152  1.277778  22464.16  0.152778
0.855556  1.515152  1.296296  23020.47  0.152778
0.867778  1.515152  1.314815  23581.31  0.152778
0.880000  1.515152  1.333333  24146.62  0.152778
0.892222  1.515152  1.351852  24716.38  0.152778
0.904444  1.515152  1.370370  25290.55  0.152778
0.916667  1.515152  1.388889  25869.10  0.152778
0.928889  1.515152  1.407407  26452.00  0.152778
0.941111  1.515152  1.425926  27039.21  0.152778
0.953333  1.515152  1.444444  27630.70  0.152778
0.965556  1.515152  1.462963  28226.44  0.152778
0.977778  1.515152  1.481481  28826.40  0.152778
0.990000  1.515152  1.500000  29430.55  0.152778
1.002222  1.515152  1.518519  30038.87  0.152778
1.014444  1.515152  1.537037  30651.32  0.152778
1.026667  1.515152  1.555556  31267.88  0.152778
1.038889  1.515152  1.574074  31888.51  0.152778
1.051111  1.515152  1.592593  32513.20  0.152778
1.063333  1.515152  1.611111  33141.92  0.152778
1.075556  1.515152  1.629630  33774.64  0.152778
1.087778  1.515152  1.648148  34411.33  0.152778
END FTABLE  1
FTABLE      2
 90    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
0.000000  0.596878  0.000000  0.000000  0.000000
0.012222  0.596878  0.007295  0.000000  0.060185
0.024444  0.596878  0.014590  0.000000  0.060185
0.036667  0.596878  0.021886  0.000000  0.060185
0.048889  0.596878  0.029181  0.000000  0.060185
0.061111  0.596878  0.036476  0.000000  0.060185
0.073333  0.596878  0.043771  0.000000  0.060185
0.085556  0.596878  0.051066  0.000000  0.060185
0.097778  0.596878  0.058361  0.000000  0.060185
0.110000  0.596878  0.065657  13.80863  0.060185
0.122222  0.596878  0.072952  45.74373  0.060185
0.134444  0.596878  0.080247  88.27320  0.060185
0.146667  0.596878  0.087542  139.2066  0.060185
0.158889  0.596878  0.094837  197.3329  0.060185
0.171111  0.596878  0.102132  261.8517  0.060185
0.183333  0.596878  0.109428  332.1828  0.060185
0.195556  0.596878  0.116723  407.8802  0.060185
0.207778  0.596878  0.124018  488.5874  0.060185
```

0.220000	0.596878	0.131313	574.0107	0.060185
0.232222	0.596878	0.138608	663.9028	0.060185
0.244444	0.596878	0.145903	758.0517	0.060185
0.256667	0.596878	0.153199	856.2729	0.060185
0.268889	0.596878	0.160494	958.4040	0.060185
0.281111	0.596878	0.167789	1064.301	0.060185
0.293333	0.596878	0.175084	1173.834	0.060185
0.305556	0.596878	0.182379	1286.886	0.060185
0.317778	0.596878	0.189675	1403.351	0.060185
0.330000	0.596878	0.196970	1523.131	0.060185
0.342222	0.596878	0.204265	1646.138	0.060185
0.354444	0.596878	0.211560	1772.289	0.060185
0.366667	0.596878	0.218855	1901.507	0.060185
0.378889	0.596878	0.226150	2033.721	0.060185
0.391111	0.596878	0.233446	2168.864	0.060185
0.403333	0.596878	0.240741	2306.875	0.060185
0.415556	0.596878	0.248036	2447.696	0.060185
0.427778	0.596878	0.255331	2591.270	0.060185
0.440000	0.596878	0.262626	2737.546	0.060185
0.452222	0.596878	0.269921	2886.476	0.060185
0.464444	0.596878	0.277217	3038.012	0.060185
0.476667	0.596878	0.284512	3192.111	0.060185
0.488889	0.596878	0.291807	3348.731	0.060185
0.501111	0.596878	0.299102	3507.832	0.060185
0.513333	0.596878	0.306397	3669.375	0.060185
0.525556	0.596878	0.313692	3833.324	0.060185
0.537778	0.596878	0.320988	3999.645	0.060185
0.550000	0.596878	0.328283	4168.304	0.060185
0.562222	0.596878	0.335578	4339.269	0.060185
0.574444	0.596878	0.342873	4512.509	0.060185
0.586667	0.596878	0.350168	4687.995	0.060185
0.598889	0.596878	0.357464	4865.699	0.060185
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WDM      2 PREC     ENGL    1.3            IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    0.8            PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    0.8            IMPLND   1 999 EXTNL  PETINP

END EXT SOURCES

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RCHRES   1 HYDR   O      1 1        1      WDM   1001 FLOW     ENGL      REPL
RCHRES   1 HYDR   O      2 1        1      WDM   1002 FLOW     ENGL      REPL
RCHRES   1 HYDR   STAGE  1 1        1      WDM   1003 STAG     ENGL      REPL
COPY     1 OUTPUT MEAN   1 1     48.4      WDM    701 FLOW     ENGL      REPL
COPY   501 OUTPUT MEAN   1 1     48.4      WDM    801 FLOW     ENGL      REPL
RCHRES   2 HYDR   RO     1 1        1      WDM   1004 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      1 1        1      WDM   1005 FLOW     ENGL      REPL
RCHRES   2 HYDR   O      2 1        1      WDM   1006 FLOW     ENGL      REPL
RCHRES   2 HYDR   STAGE  1 1        1      WDM   1007 STAG     ENGL      REPL
END EXT TARGETS

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  MASS-LINK        3
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  END MASS-LINK    3

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK       12
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  END MASS-LINK   12

  MASS-LINK       13
PERLND     PWATER IFWO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   13

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IMPLND     IWATER SURO       0.083333      COPY           INPUT  MEAN
  END MASS-LINK   15

  MASS-LINK       17
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  END MASS-LINK   17


END MASS-LINK

END RUN
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Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

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Olympia, WA. 98501
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Local (360)943-0304

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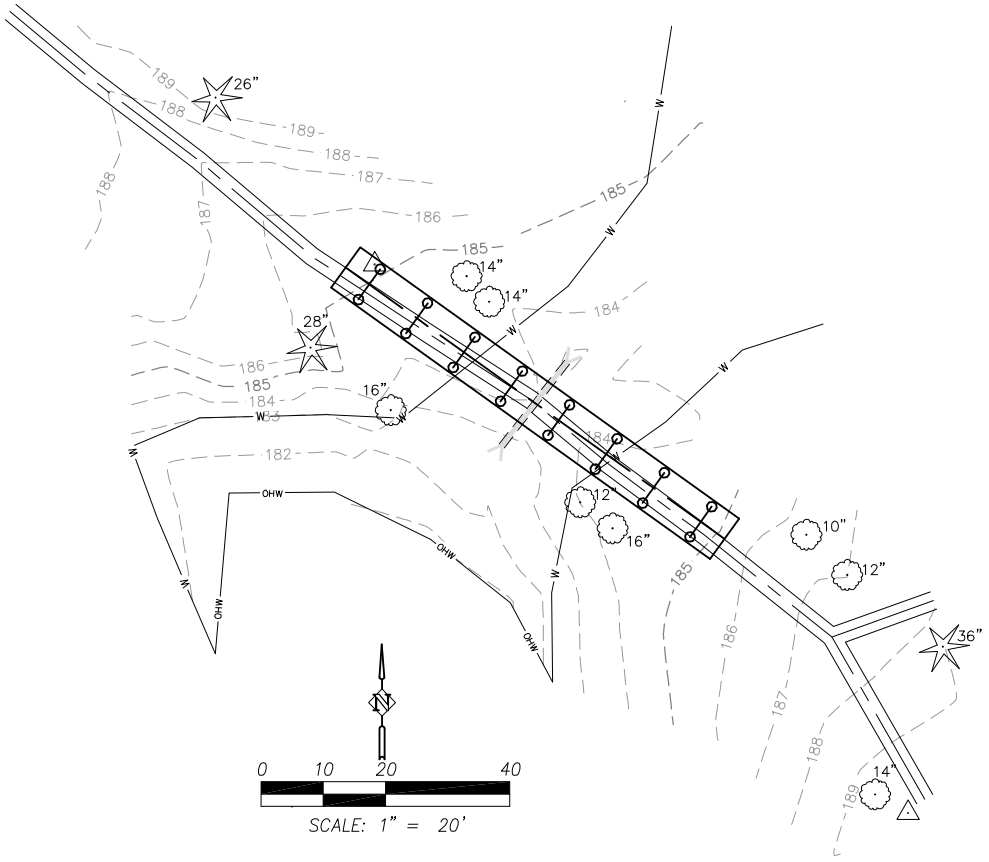
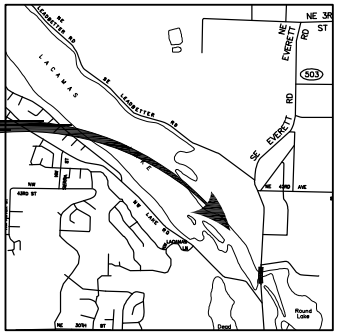
APPENDIX 3 – Project Plan Set

LACAMAS NORTH SHORE TRAIL

CAMAS, WASHINGTON



PROJECT LOCATION



VICINITY MAP

N.T.S.

OWNER

CITY OF CAMAS
CONTACT: JERRY ACHESON
616 NE 4TH AVENUE
CAMAS, WA 98607
TEL: 360-834-7092
FAX: 360-834-1535
EMAIL: JACHESON@CITYOFCAMAS.US

CIVIL ENGINEER

HARPER HOUF PETERSON RIGHELLIS INC.
CONTACT: ROB VANDERZANDEN, P.E.
1104 MAIN STREET, SUITE 100
VANCOUVER, WA 98660
TEL: 360-750-1131
FAX: 360-750-1141
EMAIL: ROBV@HHPR.COM

SHEET INDEX

C0 COVER SHEET
C1 BOARDWALK PLAN
C2 BOARWALK
C3 TRAIL SECTIONS

ROBERT A. VANDERZANDEN
STATE OF WASHINGTON
23841
REGISTERED
PROFESSIONAL ENGINEER

PRELIMINARY

PRELIMINARY REVIEW ONLY
NOT FOR CONSTRUCTION

DATE	NO.	DESCRIPTION
		REVISIONS

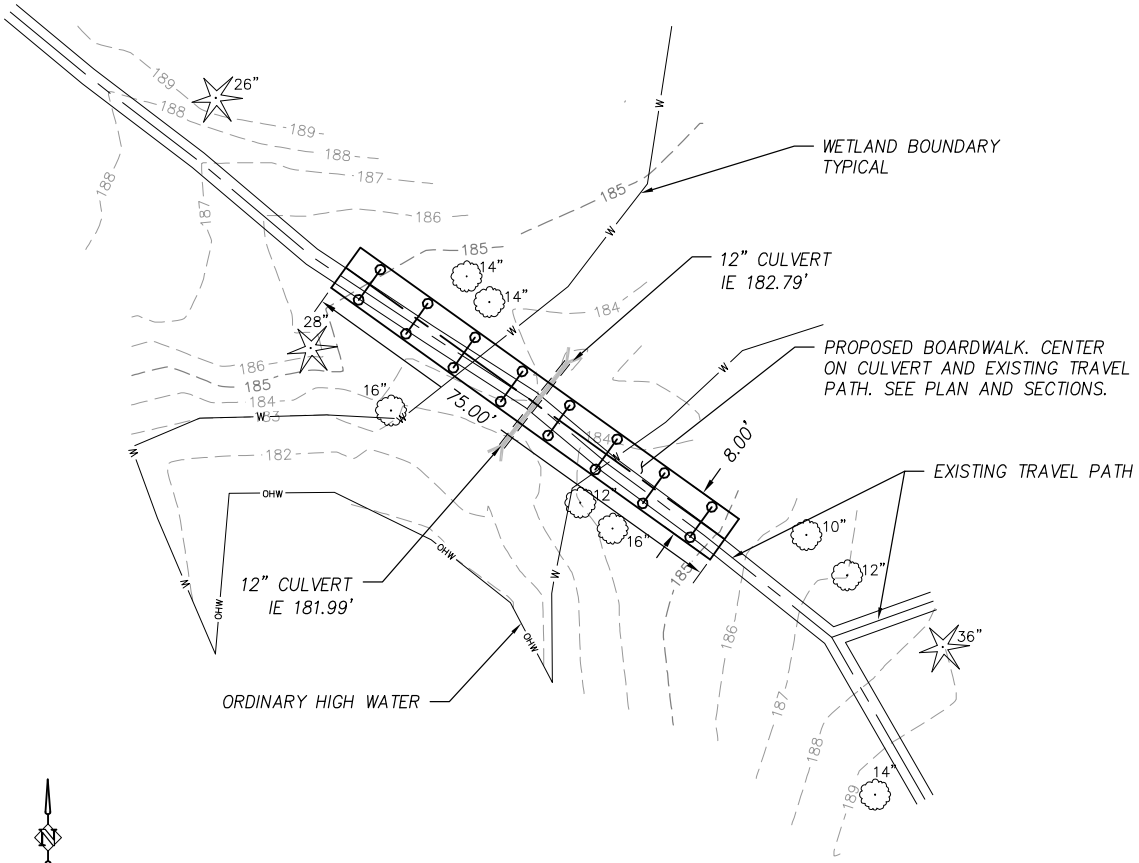
DESIGNED: RAV
DRAWN: JDB
CHECKED: RAV
DATE: 02/XX/2018

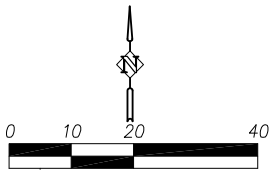
Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
1104 Main Street, Suite 100, Vancouver, WA 98660
phone: 360.750.1131 www.hhpr.com fax: 360.750.1141

COVER SHEET
NORTH SHORE TRAIL
CAMAS, WASHINGTON

SHEET NO. C0

JOB NO. CAM-11A





SCALE: 1" = 20'

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CHECKED: RAV
DATE: 02/XX/2018

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ROBERT A. VANDERZANDEN
STATE OF WASHINGTON
23841
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PROFESSIONAL ENGINEER

PRELIMINARY

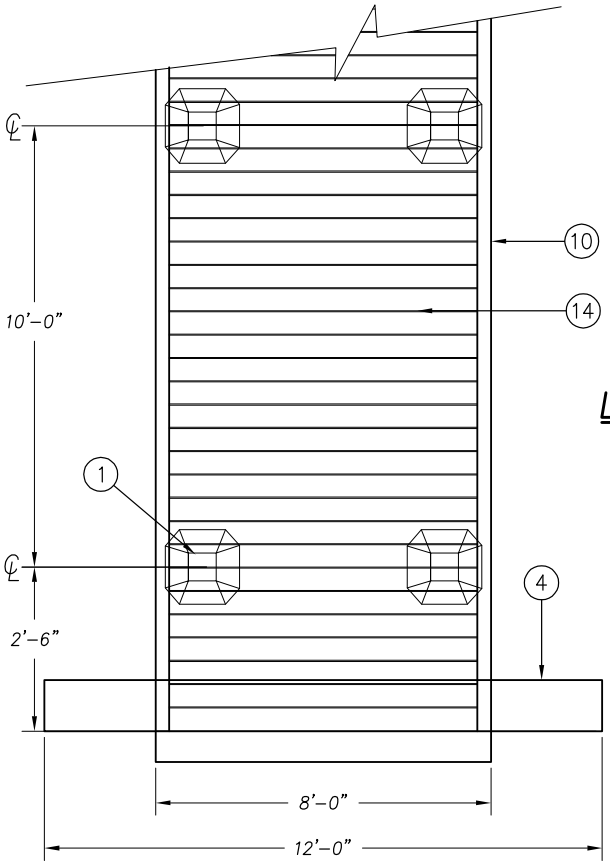
LACAMAS TRAIL BOARDWALK PLAN

NORTH SHORE TRAIL

CAMAS, WASHINGTON

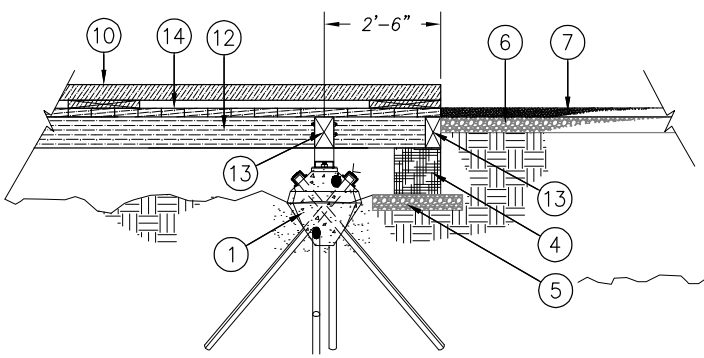
SHEET NO.
C1

JOB NO.
CAM-11A



PLAN VIEW

N.T.S.



LONGITUDINAL SECTION VIEW

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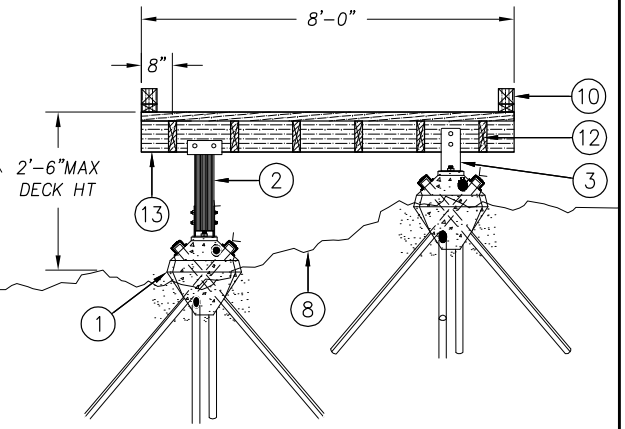

CROSS SECTION VIEW

N.T.S.

1. PIN PIER FOOTING W/ "DP-50" UNIT, 4 PINS EACH @ 48" (GALVANIZED SCHEDULE 40) INSTALL PER MANUFACTURER SPECIFICATIONS.
2. POST AND BEAM WHERE SURFACE GRADE REQUIRES, CONSTRUCT SUPPORT USING SIMPSON ABU44 (OR APPROVED EQUAL) FOR POST BASE. USE SIMPSON PC44 TO CONNECT AT BEAM 4x6 PT POST.
3. BEAM SADDLE - AS GRADES ALLOW USE SIMPSON ABU44 (OR APPROVED EQUAL) AS A BEAM SADDLE - FASTEN TO PIN PIER.
4. CONCRETE MASONRY WALL UNITS 12" HIGH.
5. 4" THICK COMPACTED CRUSHED SURFACING BASE COURSE (1 1/4 - 0) PER WSDOT SECTION 9-03.9(3).
6. 4" THICK 1 1/4 MINUS CRUSHED ROCK PATHWAY BASE.
7. 2" THICK 3/8" - #4 CRUSHED ROCK PATHWAY PAVING.
8. COMPACTED NATIVE SOILS.
10. 4x4 PT KICK RAIL (BOTH SIDES TYP.) ON 18" - 2x4 PT LIFT SPACED 6'0" O.C. w/2-1/2" GALV. HEX BOLTS.
12. 2X8 PT JOISTS @ 16" O.C. (TYP.)
13. 4x8 PT BEAMS (TYP.)
14. 2x6 PT DECKING WITH 1/8" GAPS (TYP.)

ROBERT A. VANDERZANDEN
STATE OF WASHINGTON
23841
REGISTERED
PROFESSIONAL ENGINEER

PRELIMINARY

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DATE	NO.	DESCRIPTION
		REVISIONS

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CHECKED: RAV
DATE: 02/XX/2018

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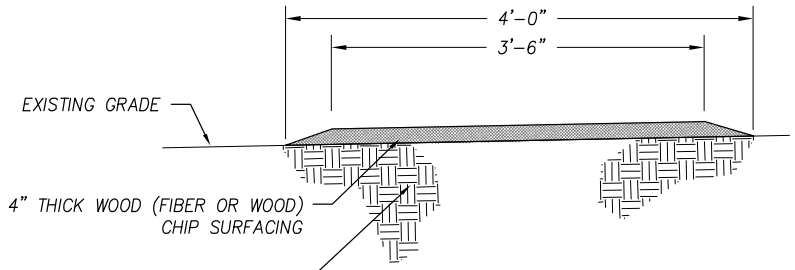
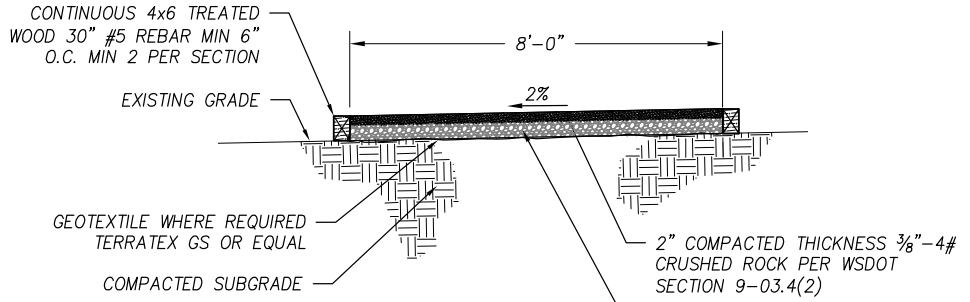
BOARDWALK
NORTH SHORE TRAIL
CAMAS, WASHINGTON

SHEET NO. C2
JOB NO. CAM-11A



WOOD CHIP TRAIL SECTION

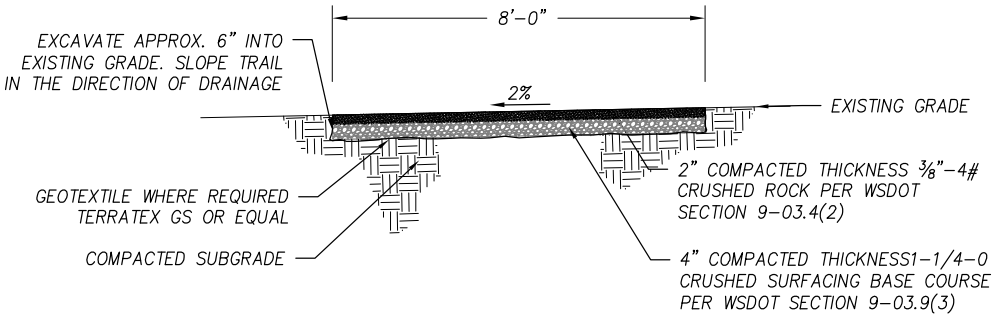
N.T.S.



NOTE:
THIS SECTION TO BE USED FOR THE FIRST 250 FEET OF THE TRAIL BEGINNING AT NE EVERETT STREET.

CRUSHED SURFACING TRAIL CAUSEWAY SECTION

N.T.S.



CRUSHED SURFACING TRAIL EXCAVATED SECTION

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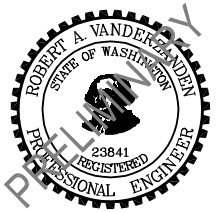

PRELIMINARY

PRELIMINARY REVIEW ONLY
NOT FOR CONSTRUCTION

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: RAV
DRAWN: JDB
CHECKED: RAV
DATE: 02/XX/2018

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TRAIL SECTIONS
NORTH SHORE TRAIL
CAMAS, WASHINGTON

SHEET NO.
C3

JOB NO.
CAM-11A

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WETLAND REPORT

Lacamas North Shore Trail Project
City of Camas Project P1005

Prepared for:
City of Camas
Parks and Recreation Department
616 NE 4th Avenue
Camas, Washington 98607

Prepared by:
Harper Houf Peterson Righellis Inc.
1104 Main Street, Suite 100
Vancouver, Washington 98660

February 14, 2018

Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

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1. INTRODUCTION

The City of Camas (City) proposes to extend the existing trail system at the south end of Lacamas Lake (Figure 1, Appendix A). The new trails would be located within City property on the northeast side of Lacamas Lake, from the Round Lake Loop Trail east of NE Everett Street (State Route 500) to a natural area on the lakeshore. The main trail, approximately 3,300 feet, would traverse northwest from NE Everett Street, following the alignment of an abandoned access road. The main trail would include a 75-foot-long boardwalk, 25 feet of which would lie above a wetland. This is the only portion of the trail system that would be within wetland or Ordinary High Water Mark (OHWM) boundaries. The boardwalk would be supported on 16 pin piers (six would be within wetland). A shorter loop trail, approximately 1,120 feet in length, would connect to the main trail to create a loop in the natural area. A spur trail, approximately 180 feet in length, would follow the path of an existing packed dirt trail from the south end of the loop trail to a viewpoint of Lacamas Lake. The main trail would be 8 feet wide and constructed of impervious material (geotextile and a gravel cover); the spur and loop trails would be 4-feet wide and pervious.

2. GENERAL SITE DESCRIPTION

2.1 Land Use and Landscape Setting

Lacamas Lake, a man-made lake, lies to the west of the proposed trail alignment, which traverses an eroded stream terrace. The route is typically through Douglas fir stands (Photograph 1, Appendix B), except for a 450-feet long segment that passes through mowed lawns (Photograph 2). The southerly portion, from NE Everett Street northward for approximately 1,200 feet, traverses City property abutting single family residences. The trails would pass through parcels 178099-000, 124244-000, and 177896-000 within: the NW ¼ of Section 2 of Township 1 North, Range 3 East; SW ¼ of Section 35 of Township 2 North, Range 3 East; and SE ¼ of Section 34 of Township 2 North, Range 3 East. These parcels are owned by the City and zoned Open Space (Camas 2017).

2.2 Soils

The Clark County soil survey (Soil Survey Staff, accessed December 29, 2017) identifies two map units in the wetland study area (Figure 2): 1) Washougal gravelly loam, 0 to 8% slopes, which is somewhat excessively well drained; and 2) Odne silt loam, 0 to 5% slopes, which is poorly drained. Washougal soils are non-hydric and Odne soils are hydric.

2.3 Lacamas Lake

The project alignment is typically between 50 and 100 feet from the OHWM of Lacamas Lake and approximately 20 feet at the nearest point. Thus, the project is within Water Resource Inventory Area (WRIA) 28 and the 6th field Hydrologic Unit Code (HUC) Lower Columbia/Sandy 170800010606. Except for the southerly 1,200 feet, the project is within the 100-year floodplain of Lacamas Lake (FEMA 2012). Lacamas Lake flows southeast and discharges into Round Lake, which in turn discharges to Lacamas Creek. The lake is listed as

habitat for resident fish (WDFW 2018); however, anadromous fishes are prevented from entering Lacamas Lake by Lacamas Lake and Round Lake dams (WDFW 2018).

Lacamas Lake is regulated as a shoreline under the City of Camas Shoreline Master Program (SMP). Project elements within 200 feet of the OHWM, associated wetlands, and their buffers are within City regulated shorelands (SMP 2015). The project is within the Urban Conservancy shoreline designation (Camas 2017).

3. METHODS

3.1 Office Review

Staff reviewed the following resources to assess the presence of wetlands in the study area:

- Clark County GIS (2017) topography;
- Clark County GIS (2017) wetland data and Wetland Inventory maps from the City (http://www.cityofcamas.us/images/DOCS/MAPS/wetlandsmap.pdf);
- USDA Natural Resources Conservation Service (NRCS) Web Soil Survey; and
- Precipitation and climate data from the NOAA National Weather Service (NOAA NWS 2017).

The City's Wetland Inventory is based on the National Wetland Inventory (NWI) data (Clark County GIS 2017), which broadly maps wetland in the northern portion of the proposed alignment (Figure 3). Clark County's modeled wetland data (Clark County GIS 2017) shows a similar pattern. However, both the NWI and modeled wetland are inconsistent with elongate ridges of non-hydric soils mapped by USDA NRCS in the same area.

Rainfall was evaluated for the three months preceding the wetland field visit as measured at the Portland International Airport weather station (Table 1, NOAA NWS 2017). The precipitation for July through October was slightly above average (18%) for that time period. While July and August were drier than the normal range, precipitation in September and October were wetter than normal, thus starting the fall recharge cycle after summer. In October, 98% of the precipitation fell before October 26. A total of 3.83 inches of precipitation fell in the 7 days prior to October 26 and approximately half of that (2.13 inches) was associated with a storm on October 21. Based on this analysis, climatic and hydrologic conditions at the time of the delineation are considered normal.

Table 1. Summary of Monthly Precipitation at Portland International Airport (NOAA NWS 2017).

Month	Precipitation (inches)	Normal Range WETS (inches)	Within Normal Range	Average (inches)
July	T	0.33 – 0.86	Drier	0.72
August	0.06	0.35 – 1.09	Drier	0.93
September	2.38	0.72 – 1.93	Wetter	1.65
October 1-25	4.56	1.57 – 3.52	Wetter	2.88
Totals for July through October	7.01	N/A	N/A	6.18

The growing season recorded in the Portland International Airport Station WETS table, based on 28°F for the 50 percentile, is 288 days, beginning February 15 and ending November 30 (USDA NRCS 2017).

3.2 Field Wetland Delineation

The three-parameter wetland delineation method approach was used as described in the *Corps of Engineers Wetland Delineation Manual* (US Army Corps of Engineers [USACE] 1987) and guidance in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region* (USACE 2010). This method is consistent with the requirements of the City's Shoreline Master Program critical areas code (SMP 16.53).

Data plots were recorded on Regional Supplement (USACE 2010) data forms. Plant names and wetland indicator status on the data forms follow the 2016 National Wetland Plant List (NWPL) (Lichvar et.al. 2016). Wetland boundaries and data plots were flagged with sequentially numbered flagging tape. In the vicinity of potential wetland impacts, the wetland boundary was located by HHPR professional land surveyors. In locations where the wetland boundary and shoreline boundary were only needed to establish buffer limits, a handheld GPS unit with sub-meter accuracy was used.

Delineated wetland habitats were classified according to the system outlined in *Classification of Wetlands and Deepwater Habitats of the United States* (Federal Geographic Data Committee 2013) and rated using the *Washington State Wetland Rating System for Western Washington—2014 Update* (Hruby 2014).

3.3 Field Ordinary High Water Mark Delineation

The OHWM of Lacamas Lake was evaluated following methods in *Determining the Ordinary High Water Mark for Shoreline Management Act Compliance in Washington State* (Anderson, et al. 2016). The OHWM for Lacamas Lake in the study area, was consistent with the three primary indicators—break-in-slope, change in sediment texture, and change in vegetation characteristics—applied by the USACE.

4. WETLAND DELINEATION RESULTS

HHPR staff (Kent Snyder, PhD, CPSS and/or Ivy Watson) made reconnaissance visits on November 10 and December 1, 2016 to review a preliminary trail alignment, wetlands, and the OHWM of Lacamas Lake. Wetland boundaries and the Lacamas Lake OHWM were identified on October 26 and 30, 2017. Two wetlands were identified (Figure 4).

4.1 Location and General Description

Approximately two-thirds of the proposed trails are laid out on a northwest-southeast oriented gravel ridge with wetlands or open water along the margins. The East wetland is a forested wetland along the east and south sides of the ridge (Table 2; Photograph 3). This wetland intersects the proposed main trail in a broad swale at the south end of the ridge, where a 12-inch steel culvert lies beneath the access road (Photographs 4 and 5). The second wetland, the Lake wetland, is a scrub-shrub fringe along Lacamas Lake at the northwest and north side of the ridge, extending into a wide aquatic bed in the lake (Table 2; Photographs 6 and 7).

Table 2. Summary of the wetlands in study area.

Wetland	Size (acres)†	HGM Classification	Cowardin Class
East	4.5	Depressional	Palustrine Forested
Lake	5.5	Lacustrine Fringe	Palustrine Scrub-shrub/ Aquatic bed

† Acreage within the study area, although wetlands extend beyond.

The wetland-upland boundary of East wetland is typically defined by a distinct break in topography and associated parameters: change in dominant vegetation (from hydrophytic to upland), soils (hydric to non-hydric), and lack of wetland hydrology (Photograph 8). The boundary of the lake fringe wetland is similarly distinct as that of the East wetland.

4.2 Vegetation

The core of the East wetland is dominated by a dense canopy of Oregon ash (*Fraxinus latifolia*, FACW), with occasional red alder, and an understory of slough sedge (*Carex obnupta*, OBL) (Photograph 3). At the northwest and southeast ends, the tree canopy thins and a shrub understory is present (Photograph 9), composed of salmonberry (*Rubus spectabilis*, FAC), twinberry (*Lonicera involucrata*, FAC), redosier dogwood (*Cornus alba*, FACW), Douglas spirea (*Spiraea douglasii*, FACW), Pacific ninebark (*Physocarpus capitatus*, FACW), and occasional Himalayan blackberry (*Rubus armeniacus*, FAC). In these areas, Western lady fern (*Athyrium cyclosorum*, FAC), piggyback plant (*Tolmiea menziesii*, FAC), tall mannagrass (*Glyceria elata*, FACW), skunk cabbage (*Lysichiton americanus*, OBL), and reed canarygrass (*Phalaris arundinacea*, FACW) join slough sedge in herbaceous openings and understory.

The Lake wetland contains a scrub-shrub area along the upland boundary, above the OHWM (Photograph 6). Vegetation in this area, sometimes heavily shaded by Douglas fir in adjacent uplands, is composed of a variety of shrub species, including salmonberry, redosier dogwood, Pacific ninebark, and Himalayan blackberry. Waterward of the scrub-shrub vegetation, the wetland can include a strip of reed canarygrass along the OHWM (Photograph 10). Below the OHWM, aquatic bed vegetation, dominated by yellow pond lily (*Nuphar polysepala*, OBL), extends into the lake (Photograph 7). Small, discontinuous pockets of wetland may be present along the lake below the OHWM.

Backwater areas, where water is shallow and vegetation is shaded by fir trees and protected from the fetch of the lake, are dominated by emergent species, including skunk cabbage, lady fern, reed canarygrass, slough sedge, and water parsley (*Oenanthe sarmentosa*, OBL); although, the amount of vegetation may vary (Photographs 11 and 12).

Tree canopy in the upland forest on the ridge between the two wetlands is dominated by Douglas fir and bigleaf maple (*Acer macrophyllum*, FACU), interspersed with occasional western hemlock (*Tsuga heterophylla*) (Photographs 1 and 8). There is a diverse shrub layer—including vine maple (*Acer circinatum*), beaked hazelnut (*Corylus cornuta*), Pacific ninebark (*Physocarpus capitatus*), salmonberry, common snowberry (*Symphoricarpos albus*), salal (*Gaultheria shallon*), and mock orange (*Philadelphus lewisii*)—with sword fern (*Polystichum munitum*), dull Oregon grape (*Mahonia nervosa*), fringe cup (*Tellima grandiflora*), threeleaf foamflower (*Tiarella trifoliata*), and other herbs in the understory. Invasive upland species, including English holly (*Ilex aquifolium*), ivy (*Hedera spp.*), periwinkle (*Vinca sp.*), and shiny geranium (*Geranium lucidum*), are well established in some locations, but generally not dominant.

4.3 Soils

The proposed main trail is proposed to cross the East wetland with a boardwalk. Wetland soils have black to very dark grayish brown (10YR2/1 and 3/1-2) surface horizons with common, distinct or prominent (10YR3-4/4-3, 10YR5/6-8) redox concentrations and faint (10YR4/1) redox depletions in the matrix (Data Forms K8-W and K5-W, Appendix C). The lower soil horizons are similar in matrix color and redox features or have a depleted matrix (10YR4/1) with common, prominent (10YR5-6/6-8 and 7.5YR2.5/2) redox concentrations in the matrix (e.g., Data Form K8-W). Textures throughout are typically silt loam, but may vary to loam and/or have greater than 15% gravel or cobbles.

4.4 Hydrology

Hydrology of the East wetland appears to be driven by a high water table resulting from the surrounding upland of the gravel ridges to the west and east, stream flow from the hills to the southeast, and possibly backwater from Lacamas Lake when the water level is above full summer pool elevation (181 feet, which is the OHWM elevation). Extensive surface water ponding and saturated soils were observed during the fall 2016 site visits. During the 2017 delineation, when the pool had been lowered, the wetland soil was moist to ponded on the surface depending on the location (Photograph 3).

Hydrology of the Lake wetland is driven by the high water table associated with the seasonal (full pool) elevation of Lacamas Lake.

4.5 Wetland Rating

The East and Lake wetlands were rated (Appendix D) following Hruby (2014). Overall, these wetlands have a score of 19 and 21 points, Category III and II respectively (Table 3). These wetlands score moderate to high water quality function (score of 7 and 8), with moderate hydrologic function (score of 6), and moderate to high habitat function (score of 6 and 7).

Table 3. Summary of the Wetland Ratings and Buffer Widths.

Wetland	Wetland Rating	Habitat Score	Maximum Wetland Buffer Width (ft)§
East	III	6	65 for pervious trail (low intensity use) 100 for impervious trail (moderate intensity use)
Lake	II	7	110 for pervious trail (low intensity use) 165 for impervious trail (moderate intensity use)

§ SMP Tables 16.53.040-2 and -3 applying uses per SMP Table 16.53.040-4

Wetland buffer widths are based on the rating and the habitat score for each wetland (SMP Tables 16.53.040-2 and 16.53.040-3) and the intensity of the proposed land use (SMP Table 16.53.040-4 Land Use Intensity Matrix). Pervious trails are considered a low intensity land use and impervious trails are considered a moderate intensity use. Thus, as shown in Table 3, the buffers designated by the City vary from 65 to 165 feet wide depending on the wetland and the type of trail proposed in the buffer.

4.6 Lacamas Lake

The OHWM was evaluated along Lacamas Lake and mapped via GPS. The boundary character varies depending on the precise location (Photographs 13, 14 and 15), but typically integrates three or more of the following:

- A vegetation change from lacustrine or wetland to upland community;
- An abrupt topographic break;
- A sediment change from gravel beach to soil with a developed soil profile;
- Watermarks on boulders and dock structures along the bank;
- Wrack accumulation;
- Full pool elevation of Lacamas Lake (181 feet).

Two backwater areas are protected from the fetch of the lake and thus vegetation and sediment below the OHWM is somewhat different than typical. In these backwaters there are large areas of bare ground (leaf litter) and herbaceous vegetation (Photograph 11). The vegetation above the OHWM is similar to other areas in the study area: a canopy dominated by Douglas fir and other upland species, and an understory of vine maple, sword fern, salal, and dull Oregon grape. Below the OHWM the sediment is finer in texture and soils with hydric characteristics may be present.

5. CONCLUSIONS

One depressional, forested wetland (East wetland) and one lake fringe, scrub-shrub wetland (Lake wetland) were identified in the study area. These two wetlands rate, respectively, as a Category III and Category II wetland, with habitat scores of 6 and 7 (Hruby 2014).

The City's wetland buffer width (SMP 16.53) also depends on the type of trail—pervious versus impervious. Therefore, the buffers required to protect habitat function varies from 65 feet for pervious trails near the East wetland to 165 feet for impervious trails near the Lake wetland. The entire project is within 200 feet of the OHWM and buffers of associated wetlands are within City regulated shorelands (SMP 2015). The OHWM was evaluated and mapped along Lacamas Lake.

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Appendix A – Figures

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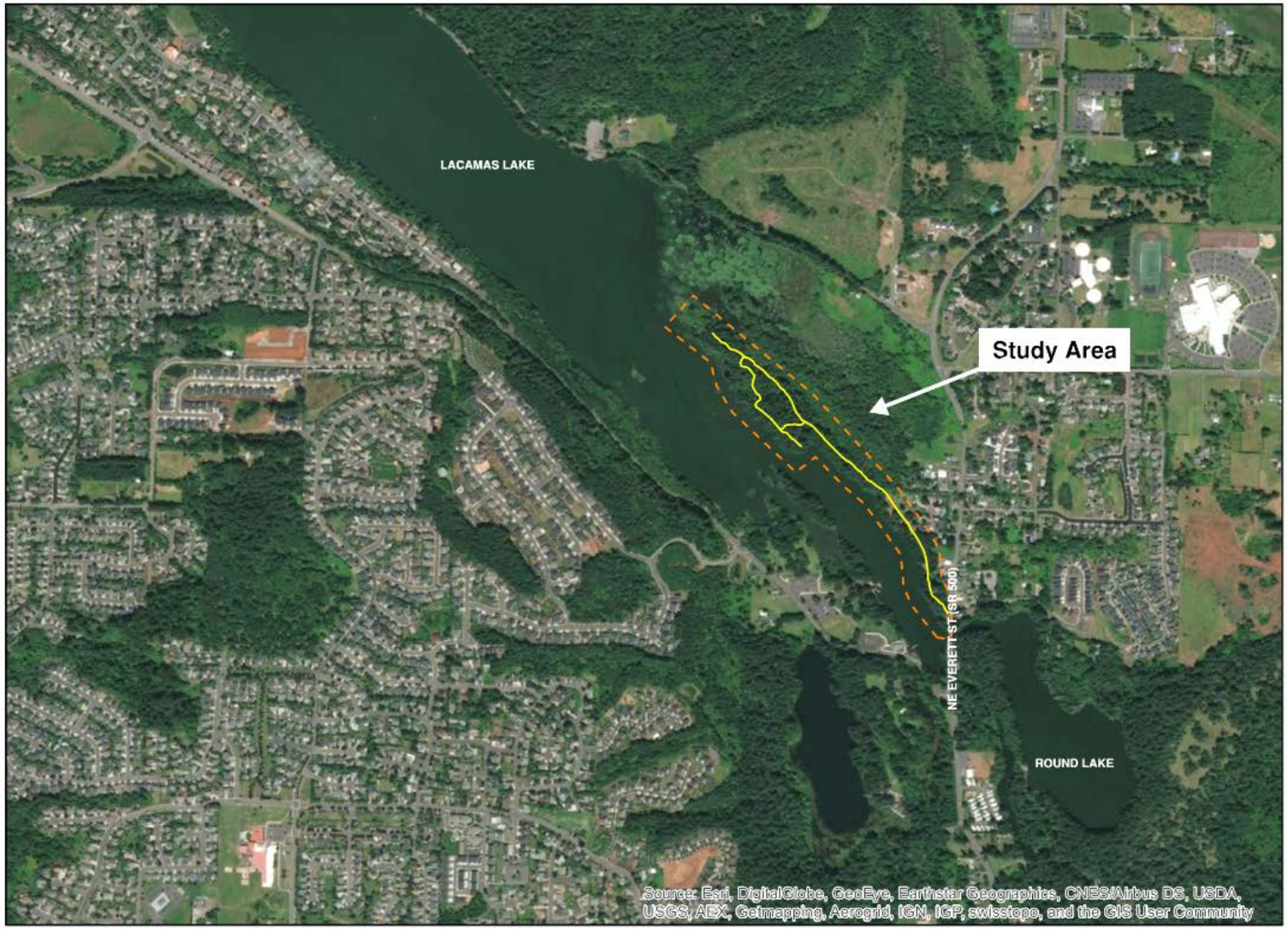
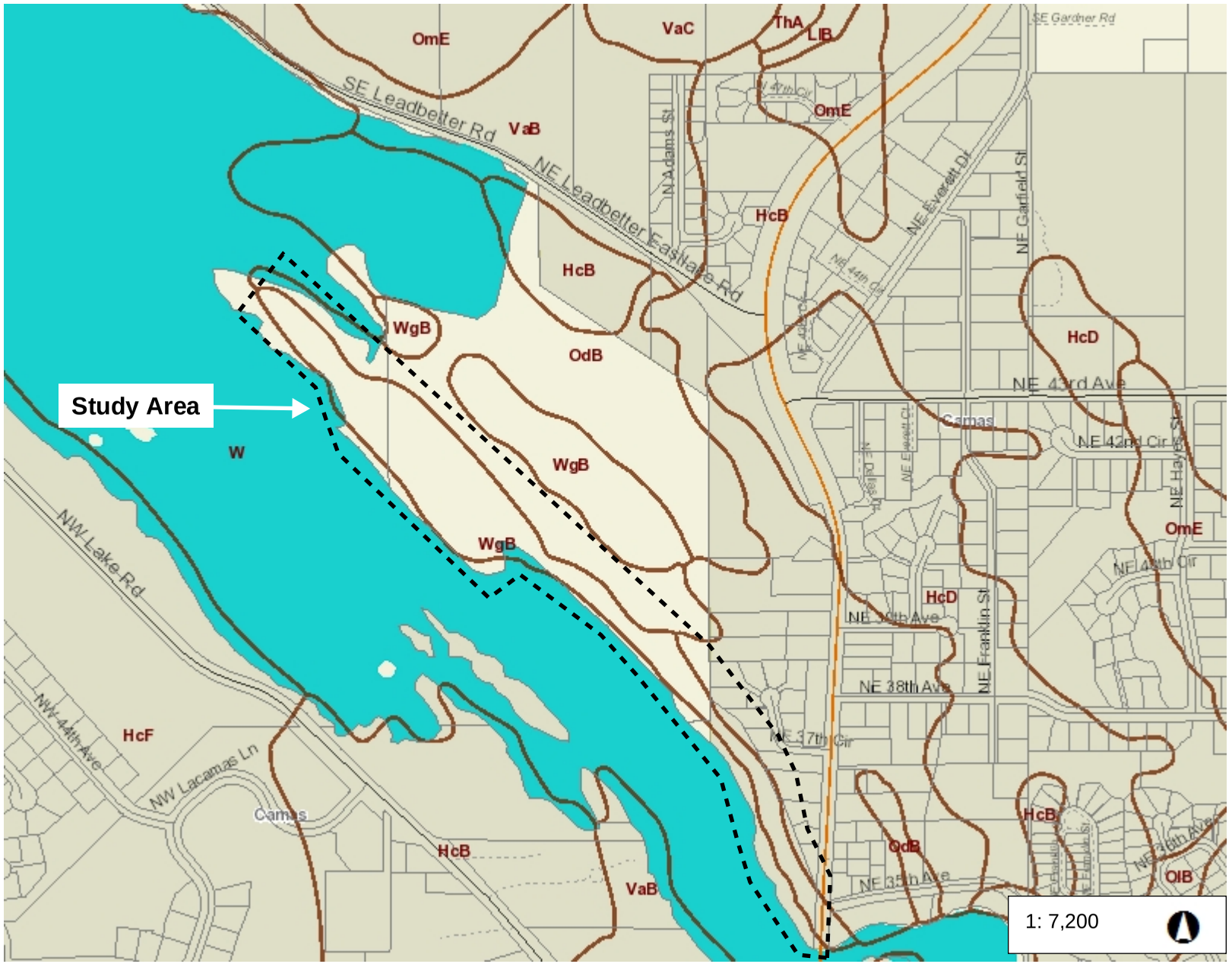


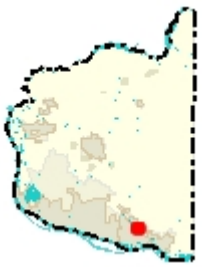
Figure 1: Vicinity Map

Lacamas North Shore Trail
Camas, Washington

Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

Figure 2: Soil Map Units within the Study Area





Legend

- Taxlots
- Soil Map Units

Soil Map Units in Study Area

WgB - Washougal Gravelly Loam, 0 to 8 percent slopes, well drained.

OdB - Odne silt loam, 0 to 5 percent slopes, poorly drained.

HcB - Hesson Clay Loam, 0 to 8 percent slopes, well drained.

Notes:

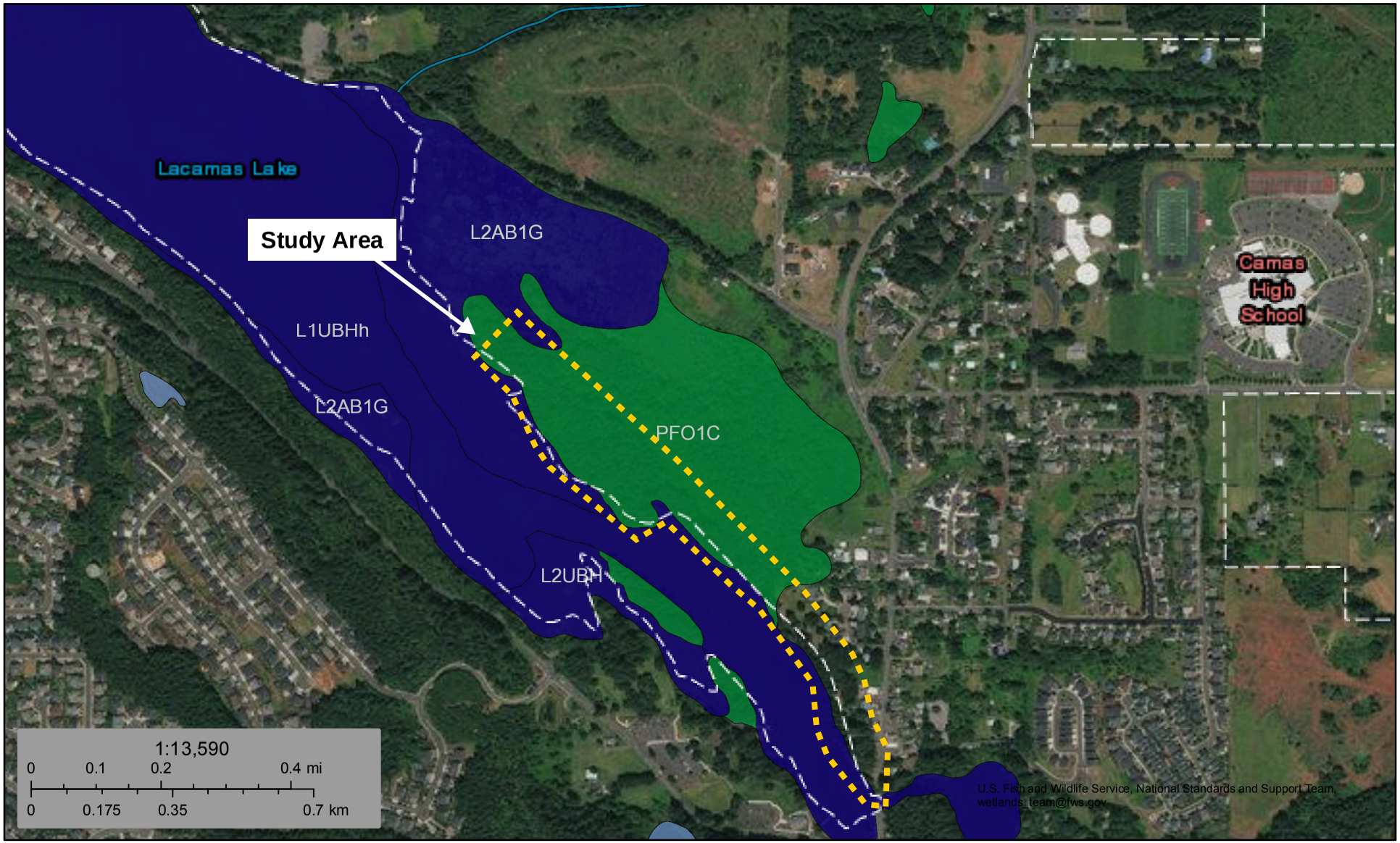
1,200.0 0 600.00 1,200.0 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - http://gis.clark.wa.gov

U.S. Fish and Wildlife Service

National Wetlands Inventory

Figure 3: National Wetlands Inventory



January 4, 2018

Wetlands

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

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

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

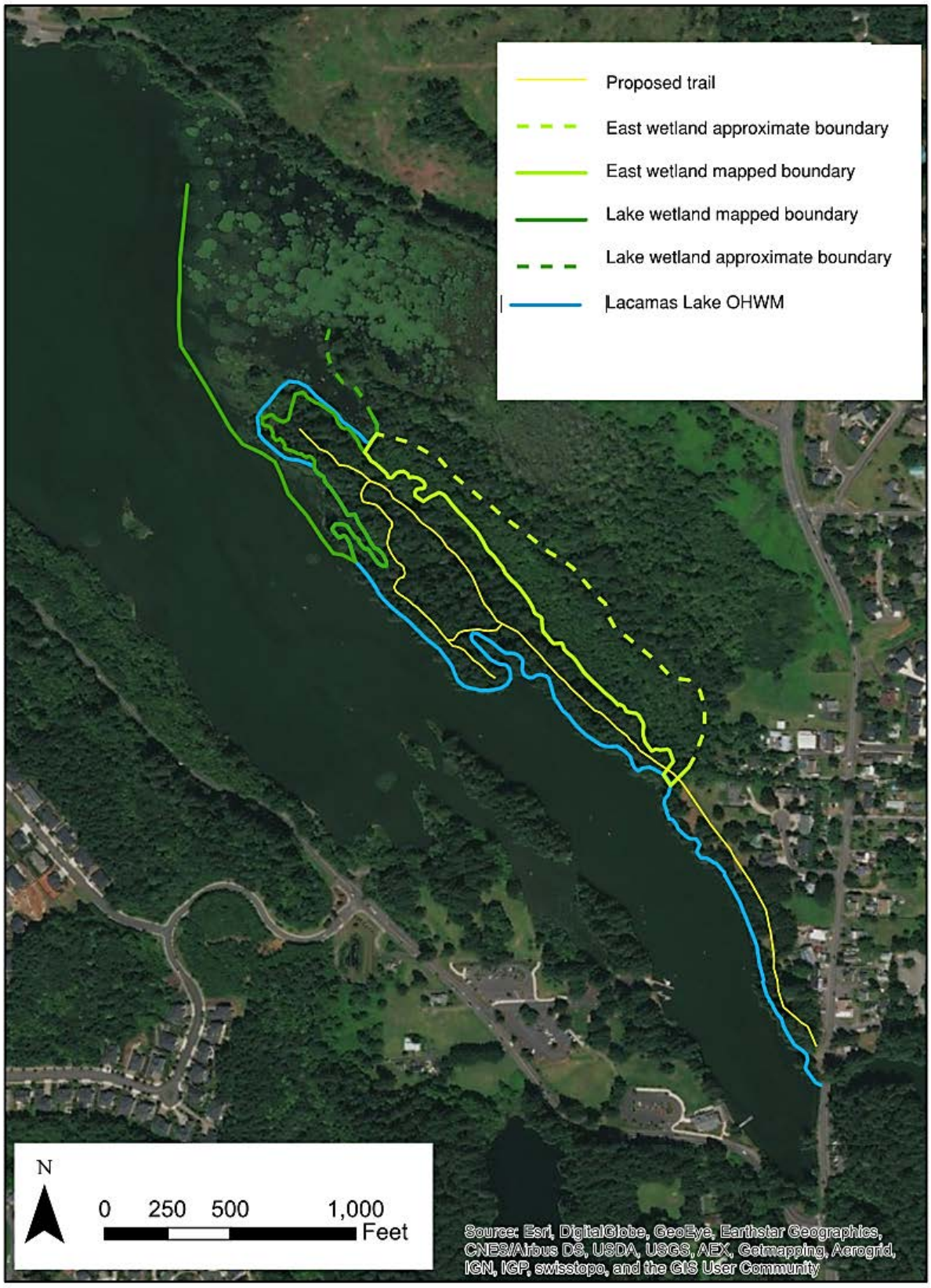


Figure 4: Wetlands and Waters

Lacamas North Shore Trail
Camas, Washington

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

Appendix B – Photographs

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Photograph 1: View looking north showing abandoned access road and typical Douglas fir forest present along the majority of the proposed trail alignment. Photograph taken December 1, 2016.

Photograph 2: View looking south where the proposed alignment crosses mowed lawns. In this area, private residences (left) are close to the shore. Photograph taken January 14, 2018.

Photograph 3: View looking south, showing typical forest in core of East wetland: dense Oregon ash canopy and slough sedge understory, with areas of ponded water. Photograph taken October 30, 2017.

Photograph 4: Culvert outfall (bottom left) from East wetland at the abandoned access road crossing, where boardwalk proposed. Photograph taken January 14, 2018.

Photograph 5: View south along the abandoned access road where it crosses East wetland, where boardwalk proposed. Photograph taken December 1, 2016.

Photograph 6: View looking southwest, towards Lacamas Lake, showing typical shrub-shrub fringe in Lake wetland: redosier dogwood and Himalayan blackberry with slough sedge interspersed, shaded by trees in adjacent upland. Photograph taken October 30, 2017.

Photograph 7: View looking northwest, showing exposed aquatic bed plants in the Lake wetland when Lacamas Lake is drawn down. Photograph taken October 30, 2017.

Photograph 8: View looking north along the boundary of East wetland, showing the distinct topographic break and associated change in vegetation from wetland (slough sedge, right) to upland (sword fern, left). Photograph taken January 14, 2018.

Photograph 9: View looking north, showing typical vegetation at the north and south ends of East wetland: thinner tree canopy and thickets of shrubs intermixed with patches of bare ground/open water and herbaceous vegetation. Photograph taken October 26, 2017.

Photograph 10: View looking east, showing a strip of reed canarygrass along the OHWM of Lacamas Lake, part of Lake wetland. Bare ground (center) is below the OHWM. Photograph taken October 30, 2017.

Photograph 11: View looking northwest along one of the backwaters, showing areas of bare ground, open water, and patches of herbaceous vegetation below the OHWM of Lacamas Lake. Photograph taken December 1, 2016.

Photograph 12: View looking southeast along one of the backwaters, showing areas of bare ground and patches of herbaceous vegetation below the OHWM of Lacamas Lake. Backwater is 950 feet northwest of the proposed boardwalk. Photograph taken December 1, 2016.

Photograph 13: View looking southeast showing watermarks on a large boulder on the shore of Lacamas Lake. Photograph taken October 30, 2017.

Photograph 14: View looking southeast along the shore of Lacamas Lake, showing watermarks on a dock. Photograph taken October 30, 2017.

Photograph 15: View east from Lacamas Lake towards the trail alignment. Wrack accumulation and change in vegetation from bare or herbaceous to scrub-shrub can be seen at the OHWM. Photograph taken October 26, 2017.

Appendix C – Wetland Data Forms

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

Project/Site: Lacamas North Shore Trail City/County: Camas Sampling Date: 10/26/2017
Applicant/Owner: City of Camas State: WA Sampling Point: K5-W
Investigator(s): Kent Snyder and Ivy Watson Section, Township, Range: SW ¼ S35 T2N R3E
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): <5%
Subregion (LRR): LRR A Lat: 45.60777064 Long: -122.40988791 Datum:
Soil Map Unit Name: WgB, Washougal gravelly loam, 0 to 8% slope NWI classification: PFO1C
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: West of trail

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Alnus rubra*	30	Y	FAC
2. *Fraxinus latifolia*	30	Y	FACW
3.			
4.			
	60	= Total Cover	

Sapling/Shrub Stratum (Plot size: 5 ft)			
1. *Physocarpus capitatus*	35	Y	FACW
2. *Rubus armeniacus*	40	Y	FAC
3. *Rubus spectabilus*	5	N	FAC
4.			
5.			
	80	= Total Cover	

Herb Stratum (Plot size: 5 ft)			
1. *Carex obnupta*	45	Y	OBL
2. *Rubus ursinus*	2	N	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	47	= Total Cover	

Woody Vine Stratum (Plot size: 30 ft)			
1. None.	0		
2.			
	45	= Total Cover	

% Bare Ground in Herb Stratum 55

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 1.0 (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: K5-W

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	10YR3/2		10YR3/3	20	C	M	Gravelly loam	
4-8	10YR3/2		10YR5/8	2	C	M	Gravelly loam	
			10YR3/4	35	C	M		
			10YR4/1	10	D	M		
8-15	10YR3/1		10YR4/6	15	C	M	Gravelly loam	
			7.5YR3/4	10	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)
- ___ 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)
- ___ 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**)
- x 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	___	No	x	Depth (inches):	___

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

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

Remarks: Lake level has been lowered for winter.

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

Project/Site: Lacamas North Shore Trail City/County: Camas Sampling Date: 10/30/2017
Applicant/Owner: City of Camas State: WA Sampling Point: K8-W
Investigator(s): Kent Snyder and Ivy Watson Section, Township, Range: SW ¼ S35 T2N R3E
Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): none Slope (%): 2
Subregion (LRR): LRR A Lat: 45.60791325 Long: -122.40972698 Datum:
Soil Map Unit Name: WgB, Washougal gravelly loam, 0 to 8% slope NWI classification: PFO1C
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: East of trail

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fraxinus latifolia*	5	Y	FACW
2. *Alnus rubra*	5	Y	FAC
3.			
4.			
	10	= Total Cover	

Sapling/Shrub Stratum (Plot size: 5 ft)			
1. *Rubus spectabilis*	35	Y	FAC
2. *Rubus armeniacus*	15	Y	FAC
3. *Symphoricarpos albus*	1	N	FACU
4. *Acer circinatum*	2	N	FAC
5.			
	50	= Total Cover	

Herb Stratum (Plot size: 5 ft)			
1. *Athyrium cyclosorum*	40	Y	FAC
2. *Tolmiea menziesii*	30	Y	FAC
3. *Glyceria elata*	2	N	FACW
4. *Hedera helix*	2	N	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	74	= Total Cover	

Woody Vine Stratum (Plot size: 30 ft)			
1. None.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 35

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)
Total Number of Dominant Species Across All Strata: 6 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 1.0 (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: K8-W

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
0-7	10YR2/1						Silt loam	
7-11	10YR3/1		10YR5/6	10	C	M	Silt loam	
			10YR4/1	15	D	M		
			10YR4/3	15	C	M		
11-16	10YR4/1		10YR5/6	15	C	M	Cobbly silt loam	Wet colors & texture
			10YR6/8	5	C	M		
			7.5YR2.5/2	5	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)
- ___ 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: Probably more redox features in 11-16 inch, but saturation makes difficult to identify.

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**)
- x 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):	9

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

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

Remarks:

Appendix D – Wetland Rating Forms

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Wetland name or number East

RATING SUMMARY – Western Washington

Name of wetland (or ID #): East wetland Date of site visits: 12/1/16 & 10/30/17

Rated by Kent Snyder Trained by Ecology? x Yes ___No Date of training 11/05/14

HGM Class used for rating Depressional Wetland has multiple HGM classes? x Y ____N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.

Source of base aerial photo/map ESRI

OVERALL WETLAND CATEGORY III (based on functions x or special characteristics___)

1. Category of wetland based on FUNCTIONS

_____**Category I** – Total score = 23 - 27

_____**Category II** – Total score = 20 - 22

__x__**Category III** – Total score = 16 - 19

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

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
	Circle the appropriate ratings			
Site Potential	H (M) L	H M (L)	H (M) L	
Landscape Potential	H (M) L	H (M) L	H (M) L	
Value	(H) M L	(H) M L	H (M) L	**TOTAL**
Score Based on Ratings	7	6	6	19

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

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

Wetland name or number East

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

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

Riverine Wetlands

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

Lake Fringe Wetlands

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

Slope Wetlands

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

Wetland name or number East

HGM Classification of Wetlands in Western Washington

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

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

   NO – go to 2 x **YES** – the wetland class is **Tidal Fringe** – go to 1.1

   1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**
   *If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   NO – go to 3 x **YES** – The wetland class is **Flats**
   *If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?
   ___The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
   ___At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 x **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?
   ___The wetland is on a slope (*slope can be very gradual*),
   ___The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
   ___The water leaves the wetland **without being impounded**.

   NO – go to 5 x **YES –** The wetland class is **Slope**

   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
   ___The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
   ___The overbank flooding occurs at least once every 2 years.

Wetland name or number East

NO – go to 6 x **YES** – The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7 **YES** – The wetland class is **Depressional** x

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional x
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number East

DEPRESSIONAL AND FLATS WETLANDS

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

D 1.0. Does the site have the potential to improve water quality?	
D 1.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1	2
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions).* Yes = 4 No = 0	0
D 1.3. Characteristics and distribution of persistent plants (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area points = 5 Wetland has persistent, ungrazed, plants > ½ of area points = 3 Wetland has persistent, ungrazed plants > $^1/_{10}$ of area points = 1 Wetland has persistent, ungrazed plants < $^1/_{10}$ of area points = 0	3
D 1.4. Characteristics of seasonal ponding or inundation: *This is the area that is ponded for at least 2 months. See description in manual.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0	4
Total for D 1 Add the points in the boxes above	9

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

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	0
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	0
D 2.3. Are there septic systems within 250 ft of the wetland? Yes = 1 No = 0	0
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1-D 2.3? Source phosphorous Yes = 1 No = 0	1
Total for D 2 Add the points in the boxes above	1

Rating of Landscape Potential If score is: ___ **3 or 4 = H** _X_ **1 or 2 = M** ___ **0 = L** *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	1
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list? Yes = 1 No = 0	1
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the basin in which the unit is found*)? Yes = 2 No = 0	2
Total for D 3 Add the points in the boxes above	4

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

Wetland name or number East

DEPRESSIONAL AND FLATS WETLANDS

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

D 4.0. Does the site have the potential to reduce flooding and erosion?	
D 4.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0	2
D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.* Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 The wetland is a "headwater" wetland points = 3 Wetland is flat but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft (6 in) points = 0	3
D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of the unit points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire wetland is in the Flats class points = 5	0
Total for D 4 Add the points in the boxes above	5

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

D 5.0. Does the landscape have the potential to support hydrologic functions of the site?	
D 5.1. Does the wetland receive stormwater discharges? Yes = 1 No = 0	0
D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff? Yes = 1 No = 0	0
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)? Yes = 1 No = 0	1
Total for D 5 Add the points in the boxes above	1

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

D 6.0. Are the hydrologic functions provided by the site valuable to society?	
D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.* The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds): • Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2 • Surface flooding problems are in a sub-basin farther down-gradient. points = 1 Flooding from groundwater is an issue in the sub-basin. points = 1 The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. *Explain why* _____ points = 0 There are no problems with flooding downstream of the wetland. points = 0	2
D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? Yes = 2 No = 0	0
Total for D 6 Add the points in the boxes above	2

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

Wetland name or number _____

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.*

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

If the unit has a Forested class, check if:

x____The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

1

H 1.2. Hydroperiods

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

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

1

H 1.3. Richness of plant species

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

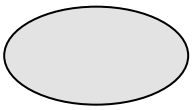
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

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

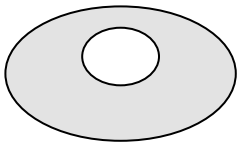
1

H 1.4. Interspersion of habitats

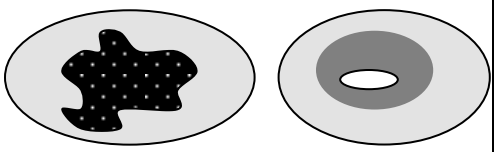
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always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



None = 0 points

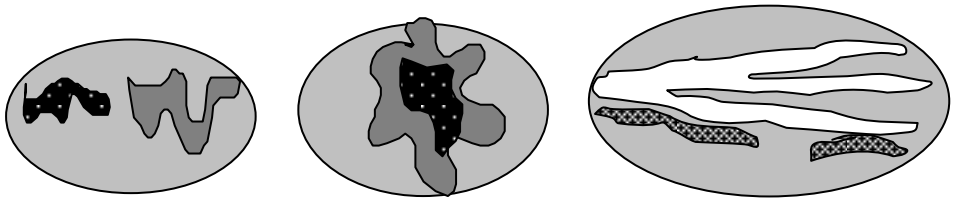


Low = 1 point



Moderate = 2 points

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



0

Wetland name or number East

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* x ___Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). x ___Standing snags (dbh > 4 in) within the wetland ____Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* x ___At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* x ___Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	4
Total for H 1 Add the points in the boxes above	7

Rating of Site Potential If score is:___**15-18 = H** X **7-14 = M** ___**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat 2 **+** [(% moderate and low intensity land uses)/2] 10 **=** 12 % If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	1
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat 16 **+** [(% moderate and low intensity land uses)/2] 26 **=** 42 % Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	2
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km Polygon is high intensity points = 0	0
Total for H 2 Add the points in the boxes above	3

Rating of Landscape Potential If score is:___**4-6 = H** X **1-3 = M** ___**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: points = 2 — It has 3 or more priority habitats within 100 m (see next page) — It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) — It is mapped as a location for an individual WDFW priority species — It is a Wetland of High Conservation Value as determined by the Department of Natural Resources — It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	1

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

Wetland name or number East

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE:*** *This question is independent of the land use between the wetland unit and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

— **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

— **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).

— **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).*

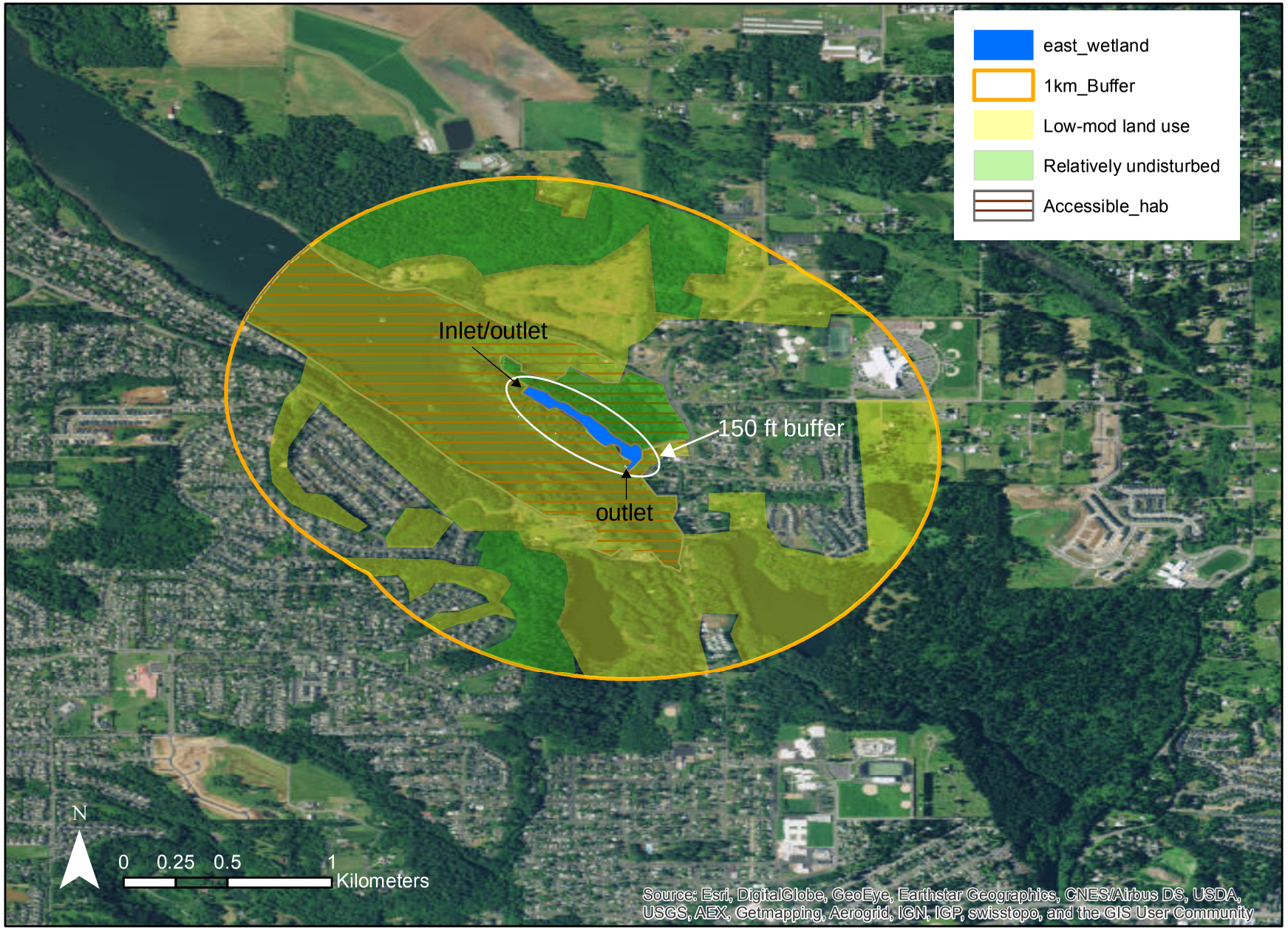
— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

X **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.


east_wetland
1km_Buffer
Low-mod land use
Relatively undisturbed
Accessible_hab
Inlet/outlet
150 ft buffer
outlet
N
0 0.25 0.5 1
Kilometers
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

StreamStats Report

Region ID:
WA
Workspace ID:
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Clicked Point (Latitude, Longitude):
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Time:
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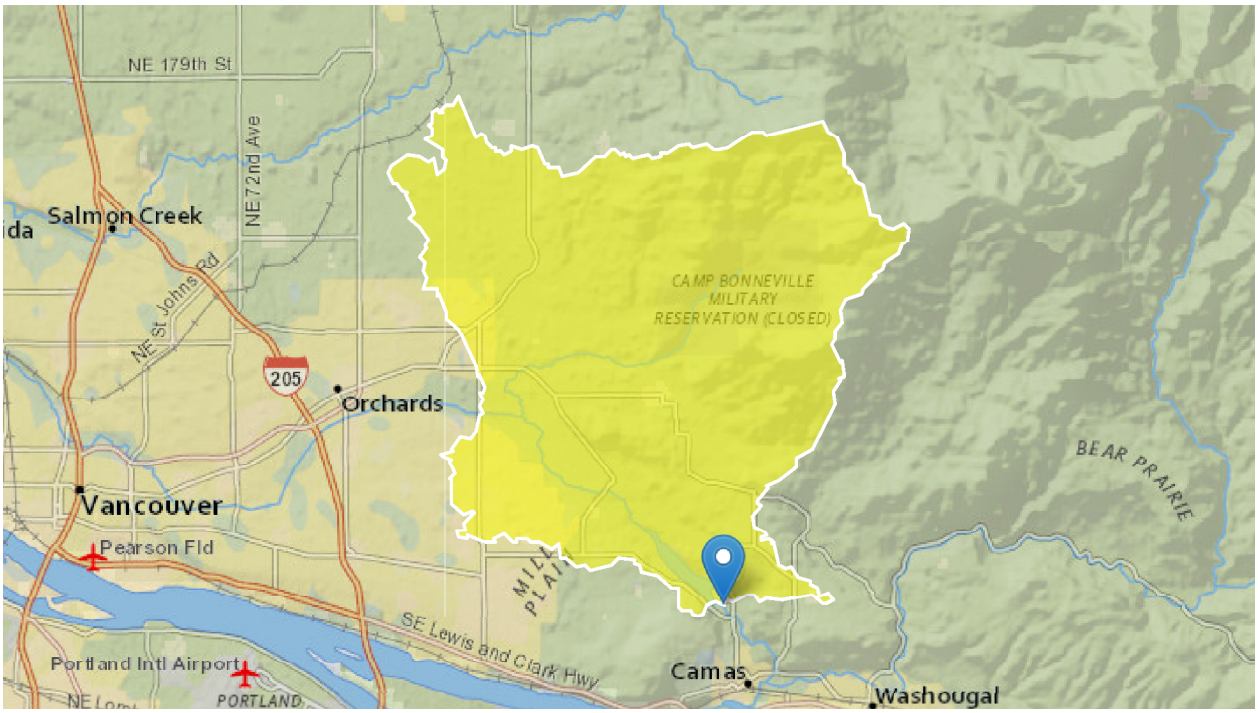

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	58.69	square miles

DEPARTMENT OF ECOLOGY State of Washington

Washington State Water Quality Atlas

Home | Add Map Data | Clear Map Data

Legend | Filter Data | Zoom To | Tools

Add or remove map data

Assessed Waters/Sediment

Water

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Change map data transparency

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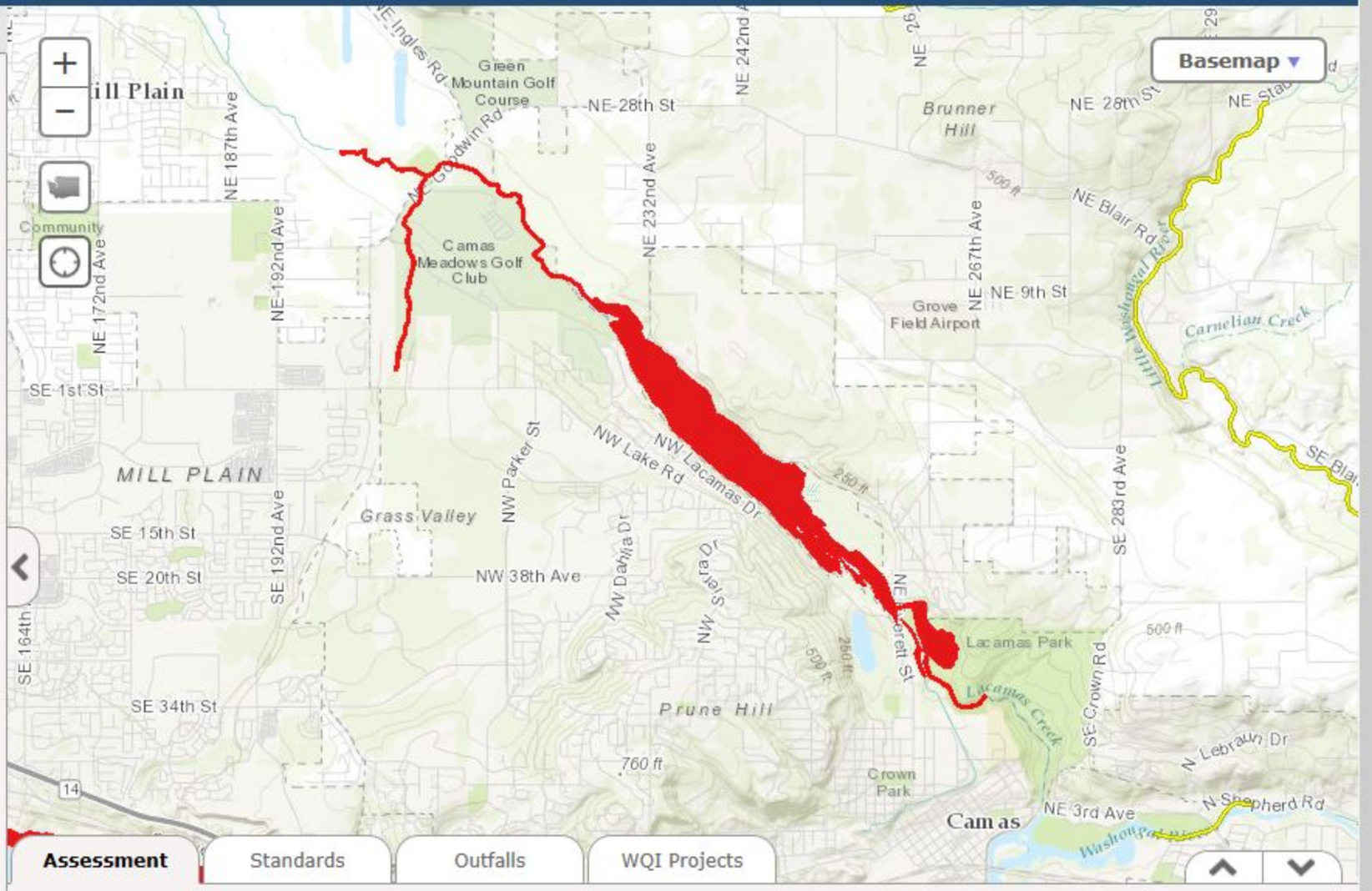


Assessment | Standards | Outfalls | WQI Projects

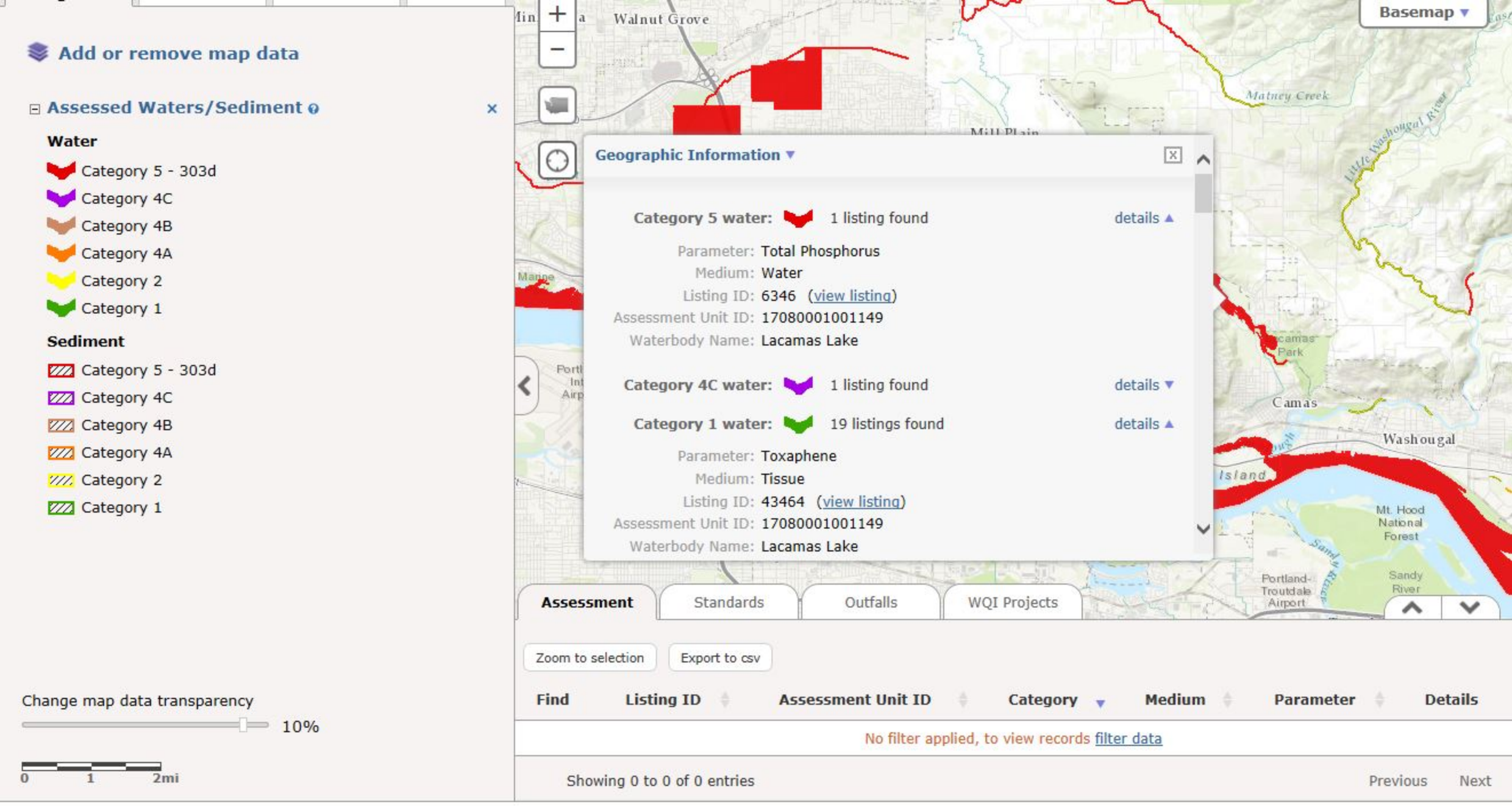
Zoom to selection | Export to csv

Find	Listing ID	Assessment Unit ID	Category	Medium	Parameter	Details

No filter applied, to view records filter data

Showing 0 to 0 of 0 entries

Previous Next



DEPARTMENT OF ECOLOGY
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Home | Add Map Data | Clear Map Data

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Assessed Waters/Sediment

Water

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

WQ Improvement Projects

- Approved
- In Development

Change map data transparency

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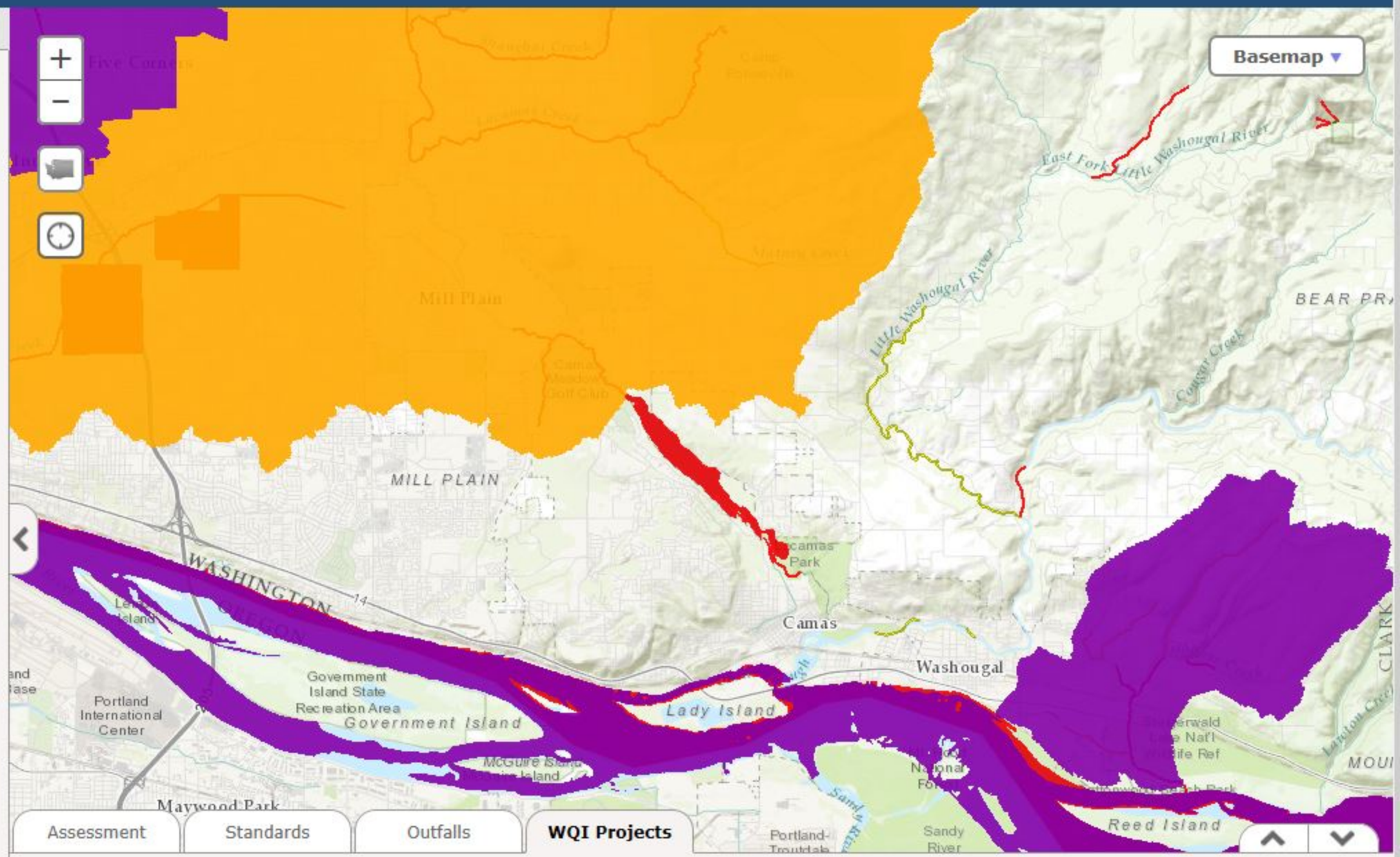


Assessment | Standards | Outfalls | **WQI Projects**

Zoom to selection | Export to csv

Find	Name	Type	Status	Parameters	Webpage	Report
No filter applied, to view records filter data						

Showing 0 to 0 of 0 entries

Previous Next

Wetland name or number Lake

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Lake wetland Date of site visit: 12/1/16 & 10/30/17

Rated by Ivy Watson Trained by Ecology? __ Yes _x_ No Date of training 11/8-9/16

HGM Class used for rating Lake Fringe Wetland has multiple HGM classes? ___Y _x_N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.

Source of base aerial photo/map ESRI

OVERALL WETLAND CATEGORY II (based on functions x or special characteristics___)

1. Category of wetland based on FUNCTIONS

_____**Category I** – Total score = 23 - 27

___x___**Category II** – Total score = 20 - 22

_____**Category III** – Total score = 16 - 19

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

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

Score for each function based on three ratings *(order of ratings is not important)*

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

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

Wetland name or number Lake

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

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

Riverine Wetlands

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

Lake Fringe Wetlands

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

Slope Wetlands

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

Wetland name or number Lake

HGM Classification of Wetlands in Western Washington

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

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

   NO – go to 2 x **YES** – the wetland class is **Tidal Fringe** – go to 1.1

   1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

   NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**
   *If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

   NO – go to 3 x **YES** – The wetland class is **Flats**
   *If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?
   x The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
   x At least 30% of the open water area is deeper than 6.6 ft (2 m).

   NO – go to 4 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe) x

4. Does the entire wetland unit **meet all** of the following criteria?
   ___ The wetland is on a slope (*slope can be very gradual*),
   ___ The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
   ___ The water leaves the wetland **without being impounded**.

   NO – go to 5 **YES –** The wetland class is **Slope**

   NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
   ___ The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
   ___ The overbank flooding occurs at least once every 2 years.

Wetland name or number Lake

NO – go to 6 **YES** – The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7 **YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

*If you are still unable to determine which of the above criteria apply to your wetland, or if you have **more than 2 HGM classes** within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number Lake

LAKE FRINGE WETLANDS

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

L 1.0. Does the site have the potential to improve water quality?	
L 1.1. Average width of plants along the lakeshore *(use polygons of Cowardin classes)*: Plants are more than 33 ft (10 m) wide points = 6 Plants are more than 16 ft (5 m) wide and <33 ft points = 3 Plants are more than 6 ft (2 m) wide and <16 ft points = 1 Plants are less than 6 ft wide points = 0	6
L 1.2. Characteristics of the plants in the wetland: Choose the appropriate description that results in the highest points, and do not include any open water in your estimate of coverage. The herbaceous plants can be either the dominant form or as an understory in a shrub or forest community. *These are not Cowardin classes. Area of cover is total cover in the unit, but it can be in patches. Herbaceous does not include aquatic bed.* Cover of herbaceous plants is >90% of the vegetated area points = 6 Cover of herbaceous plants is >$^{2}/_{3}$ of the vegetated area points = 4 Cover of herbaceous plants is >$^{1}/_{3}$ of the vegetated area points = 3 Other plants that are not aquatic bed > $^{2}/_{3}$ unit points = 3 Other plants that are not aquatic bed in > $^{1}/_{3}$ vegetated area points = 1 Aquatic bed plants and open water cover > $^{2}/_{3}$ of the unit points = 0	1
Total for L 1 Add the points in the boxes above	7

Rating of Site Potential If score is: ___ **8-12 = H** _X_ **4-7 = M** ___ **0-3 = L** *Record the rating on the first page*

L 2.0. Does the landscape have the potential to support the water quality function of the site?	
L 2.1. Is the lake used by power boats? Yes = 1 No = 0	1
L 2.2. Is > 10% of the area within 150 ft of wetland unit on the upland side in land uses that generate pollutants? Yes = 1 No = 0	0
L 2.3. Does the lake have problems with algal blooms or excessive plant growth such as milfoil? Yes = 1 No = 0	1
Total for L 2 Add the points in the boxes above	2

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

L 3.0. Is the water quality improvement provided by the site valuable to society?	
L 3.1. Is the lake on the 303(d) list of degraded aquatic resources? Yes = 1 No = 0	1
L 3.2. Is the lake in a sub-basin where water quality is an issue (at least one aquatic resource in the basin is on the 303(d) list)? Yes = 1 No = 0	1
L 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? *Answer YES if there is a TMDL for the lake or basin in which the unit is found.* Yes = 2 No = 0	2
Total for L 3 Add the points in the boxes above	4

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

Wetland name or number Lake

LAKE FRINGE WETLANDS

Hydrologic Functions - Indicators that the wetland unit functions to reduce shoreline erosion

L 4.0. Does the site have the potential to reduce shoreline erosion?	
L 4.1. Distance along shore and average width of Cowardin classes along the lakeshore (**do not** include Aquatic bed): *Choose the highest scoring description that matches conditions in the wetland.*	
> ¾ of distance is Scrub-shrub or Forested at least 33 ft (10 m) wide — points = 6	6
> ¾ of distance is Scrub-shrub or Forested at least 6 ft (2 m) wide — points = 4	
> ¼ distance is Scrub-shrub or Forested at least 33 ft (10 m) wide — points = 4	
Plants are at least 6 ft (2 m) wide (any type except Aquatic bed) — points = 2	
Plants are less than 6 ft (2 m) wide (any type except Aquatic bed) — points = 0	

Rating of Site Potential: If score is: X **6 = M** ___ **0-5 = L** *Record the rating on the first page*

L 5.0. Does the landscape have the potential to support the hydrologic functions of the site?		
L 5.1. Is the lake used by power boats with more than 10 hp?	Yes = 1 No = 0	1
L 5.2. Is the fetch on the lake side of the unit at least 1 mile in distance?	Yes = 1 No = 0	0
Total for L 5	Add the points in the boxes above	1

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

L 6.0. Are the hydrologic functions provided by the site valuable to society?	
L 6.1. Are there resources along the shore that can be impacted by erosion? If more than one resource is present, choose the one with the highest score.	
There are human structures or old growth/mature forests within 25 ft of OHWM of the shore in the unit — points = 2	1
There are nature trails or other paths and recreational activities within 25 ft of OHWM — points = 1	
Other resources that could be impacted by erosion — points = 1	
There are no resources that can be impacted by erosion along the shores of the unit — points = 0	

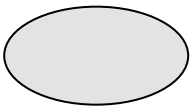
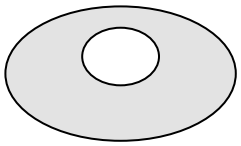
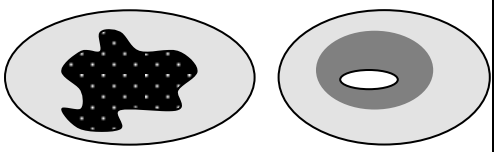
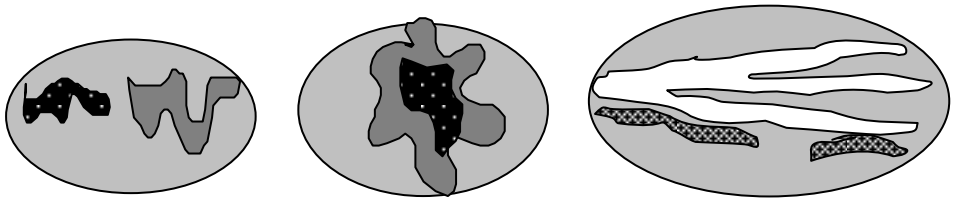
Rating of Value: If score is: ___ **2 = H** X **1 = M** ___ **0 = L** *Record the rating on the first page*

NOTES and FIELD OBSERVATIONS:

L.6.1. There are some large fir trees (>50 dbh) at the edge of the wetland. They are part of a younger forest, rather than part of a old growth/mature forest, so 1 point rather than 2.

L.5.2. There is one small window to the northwest with a 1 mile fetch. Most of the wind from this direction is blocked from the wetland by a small point of land.

Wetland name or number Lake

These questions apply to wetlands of all HGM classes. **HABITAT FUNCTIONS** - Indicators that site functions to provide important habitat	
H 1.0. Does the site have the potential to provide habitat?	
H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.* x ___Aquatic bed — 4 structures or more: points = 4 x ___Emergent — 3 structures: points = 2 x ___Scrub-shrub (areas where shrubs have > 30% cover) — 2 structures: points = 1 ____Forested (areas where trees have > 30% cover) — 1 structure: points = 0 *If the unit has a Forested class, check if:* ____The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon	2
H 1.2. Hydroperiods Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*). ____Permanently flooded or inundated — 4 or more types present: points = 3 ____Seasonally flooded or inundated — 3 types present: points = 2 ____Occasionally flooded or inundated — 2 types present: points = 1 ____Saturated only — 1 type present: points = 0 ____Permanently flowing stream or river in, or adjacent to, the wetland ____Seasonally flowing stream in, or adjacent to, the wetland x ___**Lake Fringe wetland** — **2 points** ____**Freshwater tidal wetland** — **2 points**	2
H 1.3. Richness of plant species Count the number of plant species in the wetland that cover at least 10 ft^2. *Different patches of the same species can be combined to meet the size threshold and you do not have to name the species.* ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle*** If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0	1
H 1.4. Interspersion of habitats Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*  **None** = 0 points  **Low** = 1 point  **Moderate** = 2 points All three diagrams in this row are **HIGH** = 3points 	3

Wetland name or number Lake

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* x ___Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ____Standing snags (dbh > 4 in) within the wetland ____Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* x ___At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* ____Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	2
Total for H 1 Add the points in the boxes above	10

Rating of Site Potential If score is:___**15-18 = H** X **7-14 = M** ___**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat 0 **+** [(% moderate and low intensity land uses)/2] 13 = 13 % If total accessible habitat is: > 1/3 (33.3%) of 1 km Polygon points = 3 20-33% of 1 km Polygon points = 2 10-19% of 1 km Polygon points = 1 < 10% of 1 km Polygon points = 0	1
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat 18 **+** [(% moderate and low intensity land uses)/2] 26 = 44 % Undisturbed habitat > 50% of Polygon points = 3 Undisturbed habitat 10-50% and in 1-3 patches points = 2 Undisturbed habitat 10-50% and > 3 patches points = 1 Undisturbed habitat < 10% of 1 km Polygon points = 0	2
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use points = (- 2) ≤ 50% of 1 km Polygon is high intensity points = 0	0
Total for H 2 Add the points in the boxes above	3

Rating of Landscape Potential If score is:___**4-6 = H** X **1-3 = M** ___**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: points = 2 — It has 3 or more priority habitats within 100 m (see next page) — It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) X It is mapped as a location for an individual WDFW priority species (residential cutthroat trout in Lacamas Lake) — It is a Wetland of High Conservation Value as determined by the Department of Natural Resources — It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1 Site does not meet any of the criteria above points = 0	2

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

Wetland name or number Lake

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE:*** *This question is independent of the land use between the wetland unit and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

— **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

— **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).

— **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).*

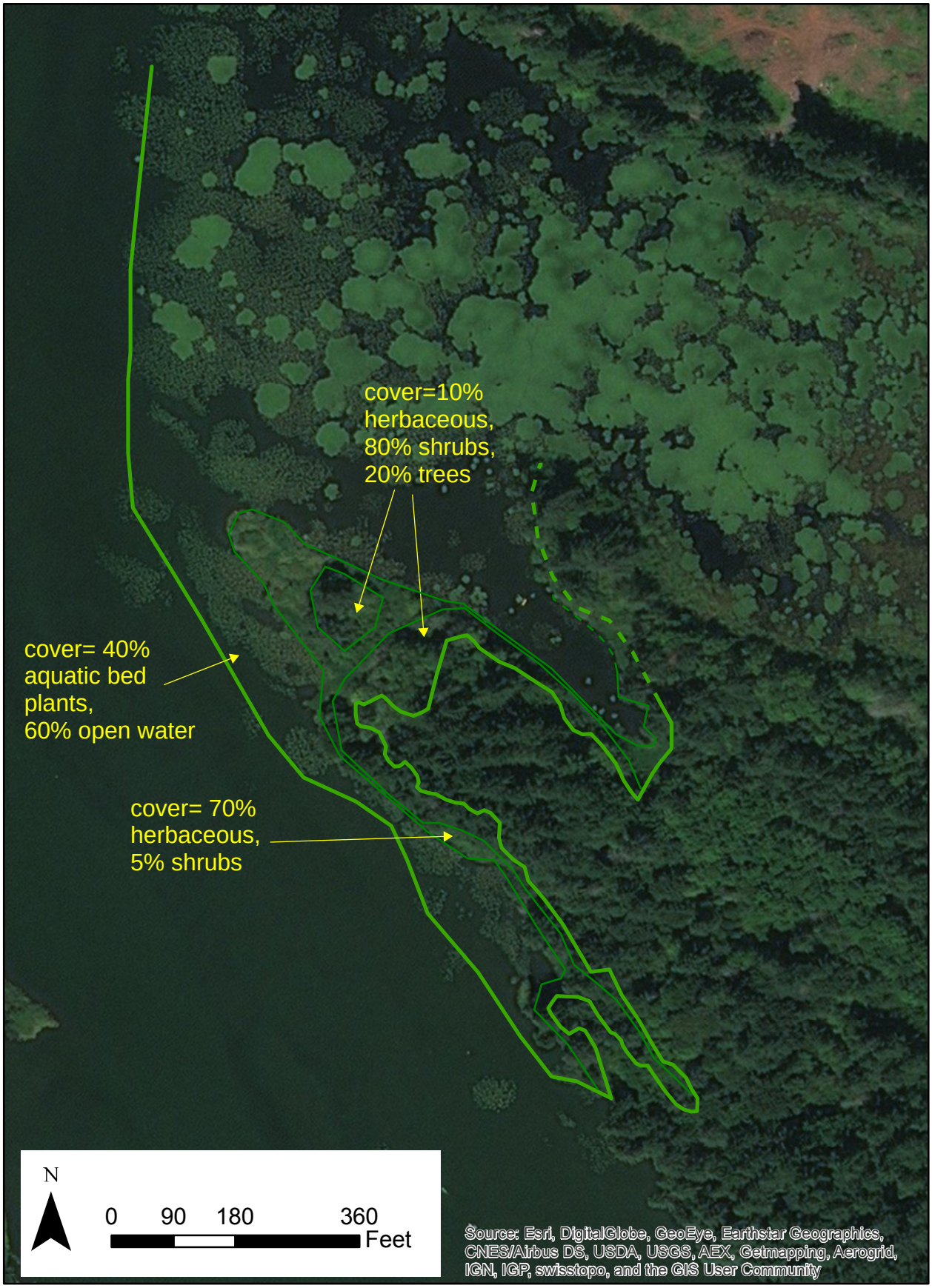
— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

X **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.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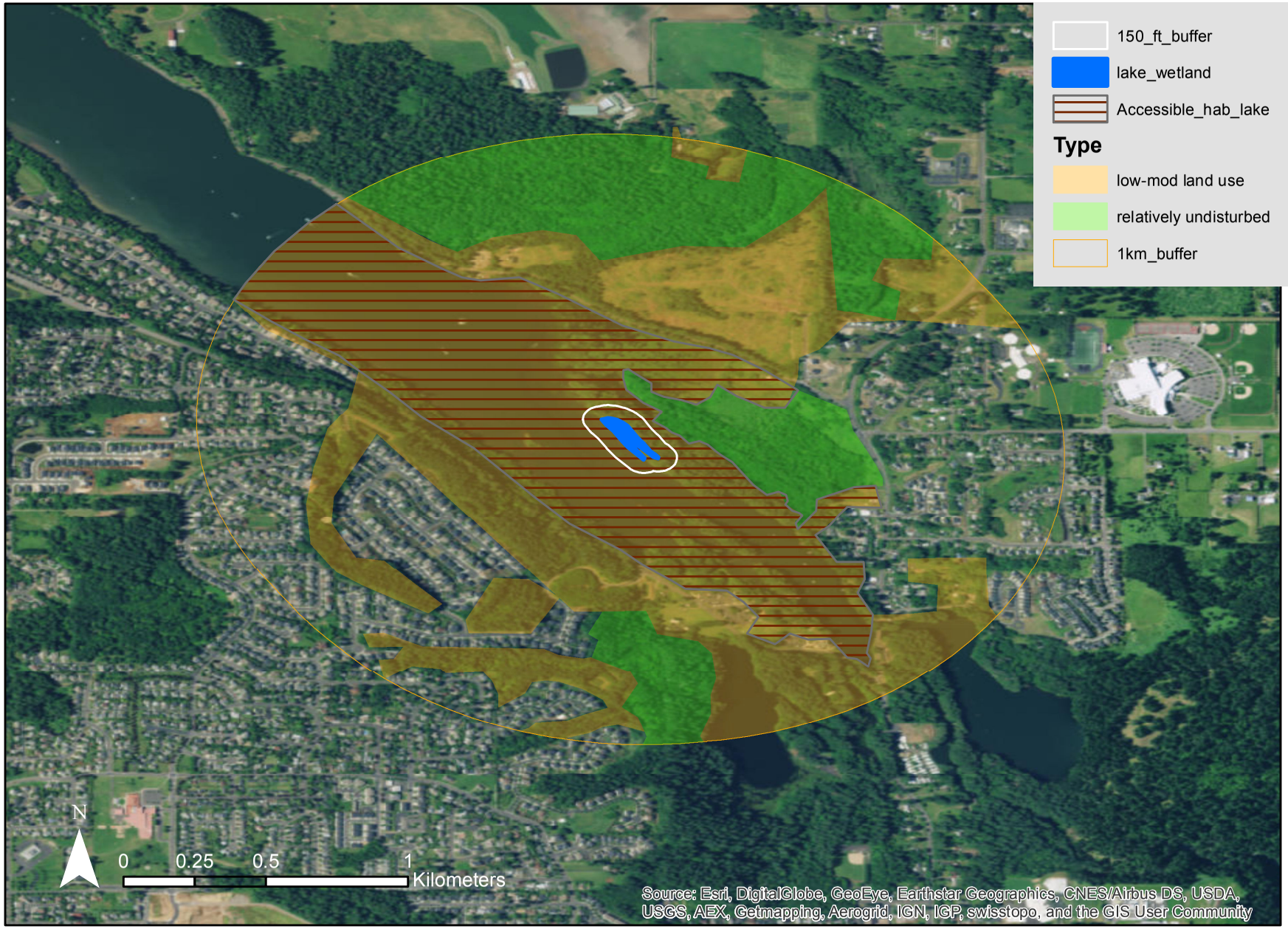
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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

StreamStats Report

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WA
Workspace ID:
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Clicked Point (Latitude, Longitude):
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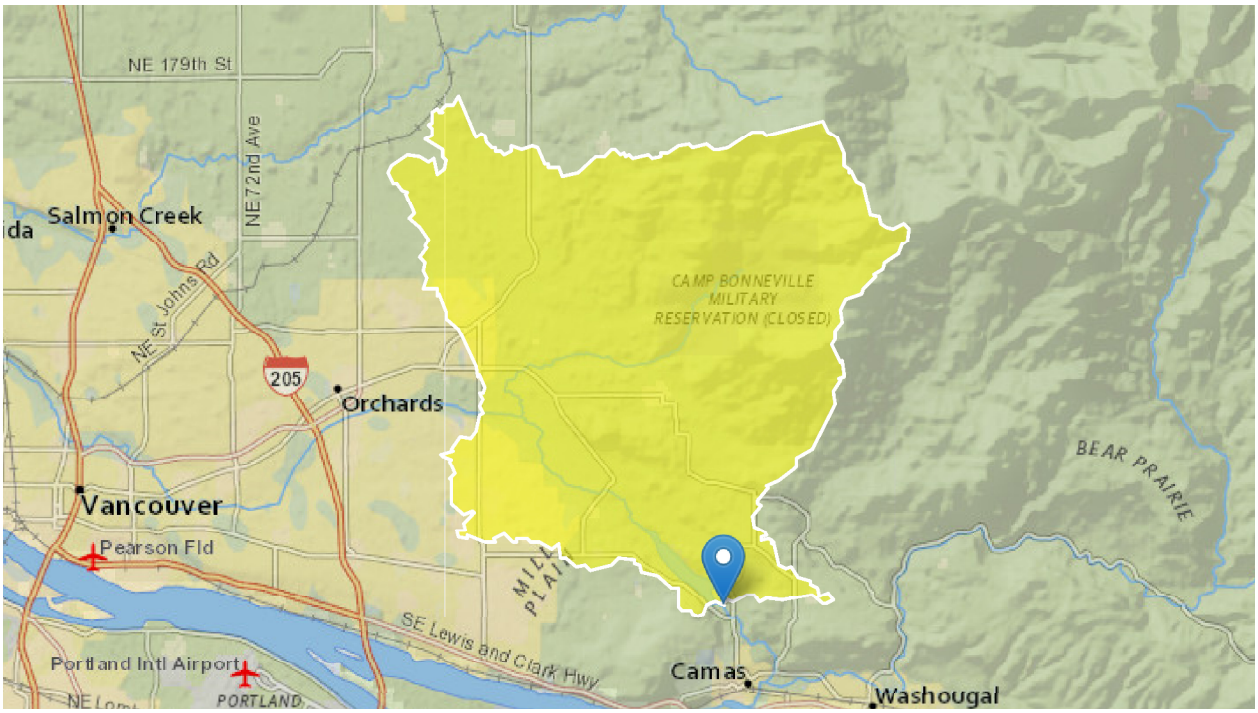
Time:
2017-07-07 11:57:40 -0700



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	58.69	square miles

DEPARTMENT OF ECOLOGY State of Washington

Washington State Water Quality Atlas

Home | Add Map Data | Clear Map Data

Legend | Filter Data | Zoom To | Tools

Add or remove map data

Assessed Waters/Sediment

Water

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

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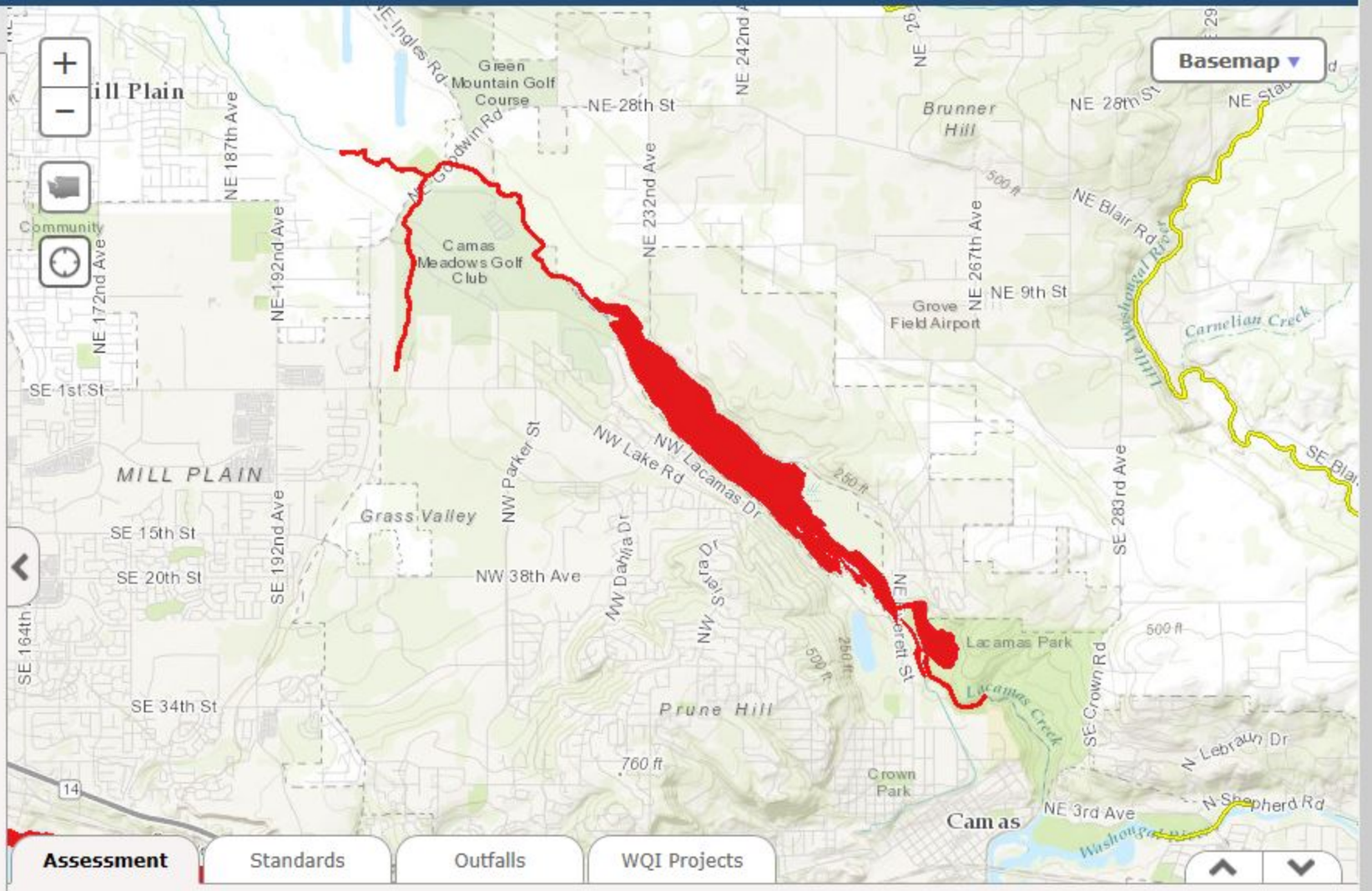

Assessment | Standards | Outfalls | WQI Projects

Zoom to selection | Export to csv

Find	Listing ID	Assessment Unit ID	Category	Medium	Parameter	Details

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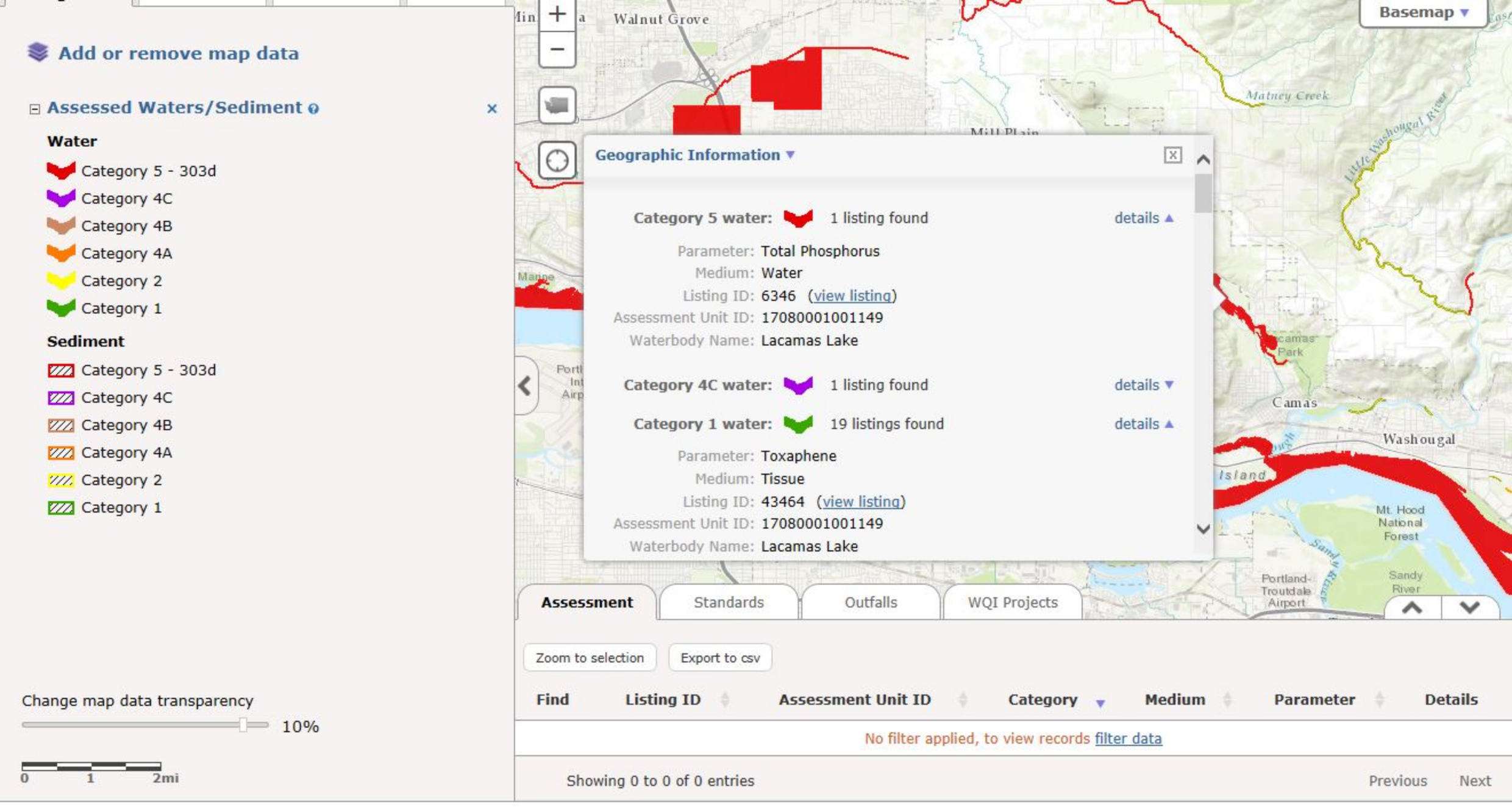
Previous Next



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Assessed Waters/Sediment

Water

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

Sediment

- Category 5 - 303d
- Category 4C
- Category 4B
- Category 4A
- Category 2
- Category 1

WQ Improvement Projects

- Approved
- In Development

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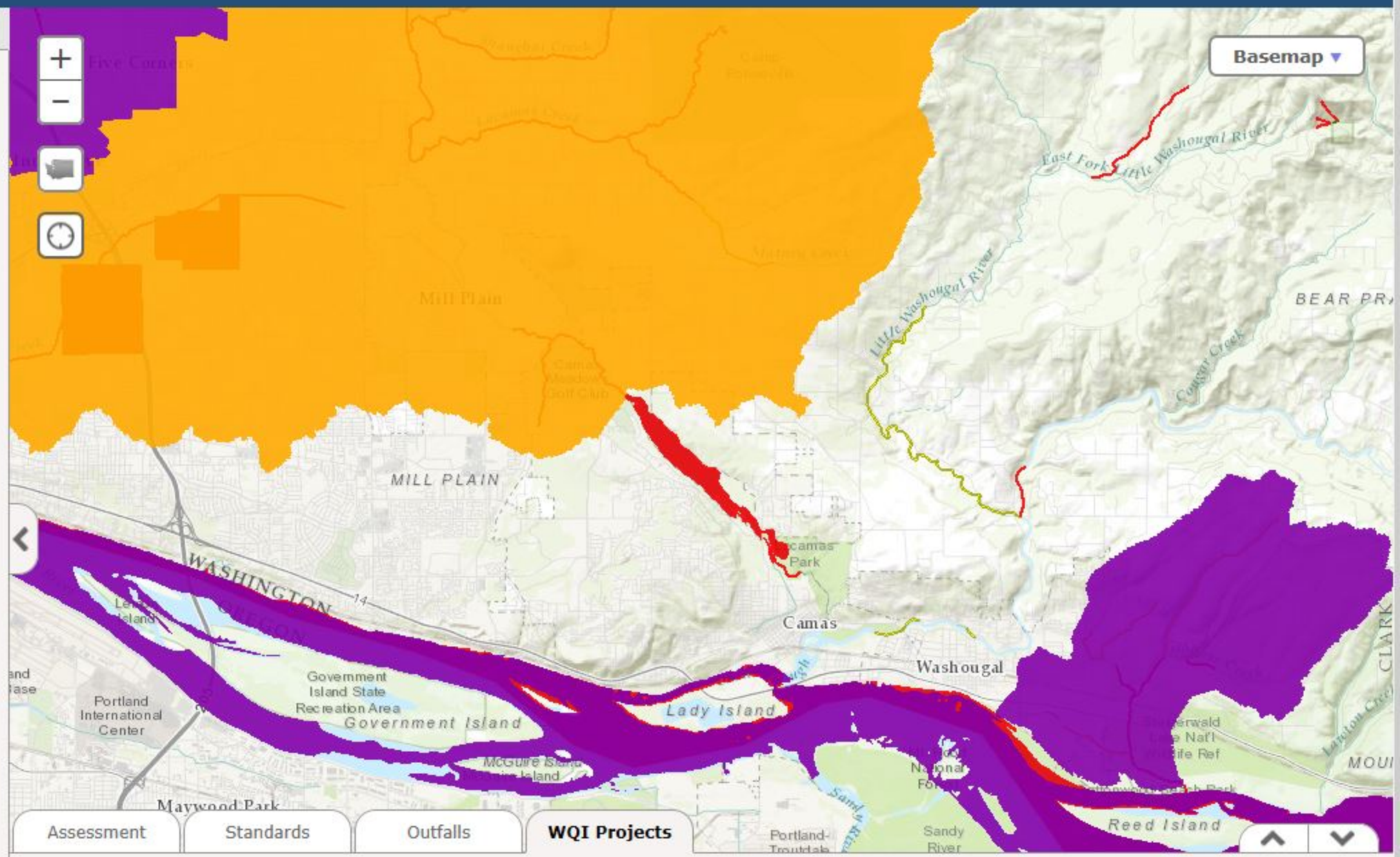

Assessment | Standards | Outfalls | **WQI Projects**

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Previous Next

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February 26, 2018

Mr. James Carsner
US Army Corps of Engineers – Seattle District
CENWS-OD-RG
PO Box 3755
Seattle, WA 98124-3755

Subject: Endangered Species Act No-effect Letter;
City of Camas Lacamas North Shore Trail Project P1005

Dear Mr. Carsner,

The City of Camas (City) proposes to extend the existing trail system at the south end of Lacamas Lake (Figures 1 and 2). The new trails would be located within City property on the northeast side of Lacamas Lake, from the Round Lake Loop Trail east of NE Everett Street (State Route 500) to a natural area on the lakeshore. The main trail, approximately 3,300 feet, would traverse northwest from NE Everett Street, following the alignment of an abandoned access road. The main trail would include a 75-foot-long boardwalk, 25 feet of which would lie above a wetland. This is the only portion of the trail system that would be within wetland or Ordinary High Water Mark (OHWM) boundaries. The boardwalk would be supported on sixteen pin piers (six within wetland) aligned in eight pairs. Each pin pier would require excavation of 1 cubic foot of soil from the abandoned access road.

A shorter loop trail, approximately 1,120 feet in length, would connect to the main trail to create a loop in the natural area. A spur trail, approximately 180 feet in length, would follow the path of an existing packed dirt trail from the south end of the loop trail to a Lacamas Lake viewpoint. The surface of the main trail would be 8-feet wide and constructed of impervious material (geotextile and a gravel cover); the spur and loop trails would be 4-feet wide and pervious (wood chips).

Construction of the trails (including boardwalk) is scheduled for summer or fall of 2018.

Location and Site Character

The trails would be in the NW ¼ of Section 02 of Township 1 North, Range 3 East; SW ¼ of Section 35 of Township 2 North, Range 3 East; and SE ¼ of Section 34 of Township 2 North, Range 3 East. The project area is within Water Resource Inventory Area (WRIA) 28 (Salmon-Washougal). Lacamas Lake, a man-made lake, lies to the west of the proposed trail alignment.

The lake is listed as fish habitat for resident fish (Washington Department of Fish and Wildlife [WDFW] Priority Habitat Species [PHS] 2018)[1].

The route is typically through upland Douglas fir forest (Photograph 1), except for a 450-foot-long segment that passes through mowed lawns (Photograph 2). The southerly portion, from NE Everett Street northward for approximately 1,200 feet, traverses City property abutting single family residences. This area is dominated by open grass (a mix of non-native pasture and lawn species) with scattered trees, primarily Douglas fir (*Pseudotsuga menziesii*), bigleaf maple (*Acer macrophyllum*), and Oregon white oak (*Quercus garryana*). North of this, the alignment enters a forested peninsula of upland between Lacamas Lake to the west, a forested wetland to the east (East wetland), and a scrub-shrub wetland to the north (Lake wetland).

Tree canopy in the upland (riparian) forest is dominated by Douglas fir and bigleaf maple, interspersed with occasional western hemlock (*Tsuga heterophylla*). The majority of the overstory trees are approximately 12 to 24 inches diameter breast height (dbh), though some Douglas fir are much larger (one measured greater than 50 inches dbh). There is a diverse shrub layer—including vine maple (*Acer circinatum*), beaked hazelnut (*Corylus cornuta*), Pacific ninebark (*Physocarpus capitatus*), salmonberry (*Rubus spectabilis*), common snowberry (*Symphoricarpos albus*), salal (*Gaultheria shallon*), and mock orange (*Philadelphus lewisii*)—with sword fern (*Polystichum munitum*), dull Oregon grape (*Mahonia nervosa*), fringe cup (*Tellima grandiflora*), threeleaf foamflower (*Tiarella trifoliata*), and other herbs in the understory. Invasive upland species, including English holly (*Ilex aquifolium*), ivy (*Hedera spp.*), periwinkle (*Vinca sp.*), and shiny geranium (*Geranium lucidum*), are well established in some locations, but generally not dominant.

Patches of red alder (*Alnus rubra*) and Oregon ash (*Fraxinus latifolia*) occur in moist areas along the edge of the lake, backwaters, and in wetlands, with an understory of redosier dogwood (*Cornus alba*), salmonberry, elderberry (*Sambucus sp.*), slough sedge (*Carex obnupta*), skunk cabbage (*Lysichiton americanus*), and Western lady fern (*Athyrium cyclosorum*). Invasive plant species in these areas include Himalayan blackberry (*Rubus armeniacus*), reed canarygrass (*Phalaris arundinacea*), and creeping buttercup (*Ranunculus repens*).

The core of the East wetland is dominated by a dense canopy of Oregon ash, with occasional red alder, and an understory of slough sedge (Photograph 3). At the northwest and southeast ends, the tree canopy thins and a shrub understory is present (Photograph 4), composed of salmonberry, twinberry (*Lonicera involucrata*), redosier dogwood, Douglas spirea (*Spiraea douglasii*), Pacific ninebark, and occasional Himalayan blackberry. In these areas, Western lady fern, piggyback plant (*Tolmiea menziesii*), tall mannagrass (*Glyceria elata*), skunk cabbage, and reed canarygrass join slough sedge in herbaceous openings and understory.

[1] WDFW. 2018. Priority Habitat and Species on the Web. Olympia, Washington. http://apps.wdfw.wa.gov/phsontheweb. Accessed January 5, 2018.

The Lake wetland contains a scrub-shrub area along the upland boundary, above the OHWM. Vegetation in this area, sometimes heavily shaded by Douglas fir in adjacent uplands, is composed of a variety of shrub species, including salmonberry, redosier dogwood, Pacific ninebark, and Himalayan blackberry. Waterward of the scrub-shrub vegetation, the wetland often includes a strip of reed canarygrass along the OHWM. Below the OHWM, aquatic bed vegetation, dominated by yellow pond lily (*Nuphar polysepala*), extends into the lake (Photograph 5). Backwater areas, where water is shallow and vegetation is shaded by fir trees and protected from the fetch of the lake, are dominated by emergent species, including skunk cabbage, lady fern, reed canarygrass, slough sedge, and water parsley (*Oenanthe sarmentosa*) (Photograph 6).

Assessment

This assessment has been prepared to address potential impacts of the proposed trail system on federally listed threatened, endangered, and proposed species under the jurisdiction of the US Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries). Pedestrian evaluations (November 10 and December 1, 2016; October 26 and 30, 2017; January 14, 2018) assessed site conditions, determined presence of wetland, conducted non-protocol plant surveys, conducted habitat assessment, and evaluated potential impacts of proposed project actions.

There are no Endangered Species Act (ESA)-listed fish species or associated Critical Habitat in Lacamas Lake, Round Lake, or their tributaries above Lacamas Dam[2]. The nearest location of listed fish species (including bull trout [*Salvelinus confluentus*]) is approximately 1 mile below Lacamas Lake Dam (which is a total passage barrier) in Lacamas Creek.

Lacamas Lake is within the Lower Columbia/Sandy basin (USGS HUC 170800010606) and thus, based on historical presence (pre-Lacamas Dam), is considered Essential Fish Habitat (EFH) for Chinook (*Oncorhynchus tshawytscha*) and coho (*O. kisutch*) salmon.[3] The project would have no impacts on waters or substrate of Lacamas Lake for spawning, breeding, feeding, or maturation of Chinook or coho salmon.

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[2] National Oceanic and Atmospheric Administration (NOAA) Fisheries. Status of ESA Listings & Critical Habitat Designations for West Coast Salmon & Steelhead. http://www.westcoast.fisheries.noaa.gov/publications/protected_species/salmon_steelhead/status_of_esa_salmon_listings_and_ch_designations_map.pdf. Accessed January 5, 2018.

US Fish and Wildlife Service (USFWS). GeoFin. Geospatial Fisheries Information Network. https://ecos.fws.gov/ipac/ Accessed January 11, 2018.

Washington Department of Fish and Wildlife (WDFW). 2018. Priority Habitat and Species on the Web. Olympia, Washington. http://apps.wdfw.wa.gov/phsontheweb. Accessed January 5, 2018.

[3] NOAA Fisheries. Essential Fish Habitat. http://www.westcoast.fisheries.noaa.gov/maps_data/essential_fish_habitat.html

An official ESA species list for the project area was obtained from the USFWS IPaC service (Table 1), indicates the potential presence of four federally listed terrestrial species: Oregon spotted frog (threatened), streaked horned lark (threatened), yellow-billed cuckoo (threatened), and golden paintbrush (threatened). The possible presence of federally listed species in the project area was evaluated through site visits and review of WDFW PHS data (January 5, 2018) and WDNR Natural Heritage Program (WNHP) rare plant data (WNHP Rare Plants and High Quality Ecosystems Dataset, updated February 2017).

Table 1. Potential US Fish and Wildlife Service listed species within the project area.

Species	ESU/DPS	Federal Status	Critical Habitat Designated
Oregon spotted frog *(Rana pretiosa)*	NA	Threatened	Yes
Streaked horned lark *(Eremophila alpestris strigata)*	NA	Threatened	Yes
Yellow-billed Cuckoo *(Coccyzus americanus)*	Western DPS	Threatened	Proposed
Golden paintbrush *(Castilleja levisecta)*	NA	Threatened	No

Habitat for Oregon spotted frogs is "an expansive meadow/wetland with a continuum of vegetation densities along edges and in pools and an absence of introduced predators."[4] No Critical Habitat was designated in Clark County for this species.[5]

Streaked horned larks nest and winter in flat, open areas with sparse low-stature vegetation and substantial areas of bare ground.[6] The closest reported Critical Habitat is at Portland International Airport[7], approximately 9 miles west.

Western yellow-billed cuckoos require relatively large (>50 acres) and contiguous patches of riparian habitat for nesting; cottonwood-willow forests (*Populus* spp. - *Salix* spp.) are typically used. No Critical Habitat is proposed for designation in either Washington or Oregon.[8]

[4] Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Oregon Spotted Frog. Federal Register 81:29335 – 29396. May 11, 2016.
[5] Ibid.
[6] Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Taylor's Checkerspot Butterfly and Streaked Horned Lark. Federal Register 78: 61506-61589. October 3, 2013.
[7] Proposed Habitat Conservation Plan and Draft Environmental Assessment for Streaked Horned Lark; Port of Portland Properties, Portland, Oregon. Federal Register 81:83865-83867. November 22, 2016.
[8] Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-billed Cuckoo; Proposed Rule. Federal Register 79:48548-48652. August 15, 2014.

Golden paintbrush occurs in upland prairies, on generally flat grasslands, including some characterized by mounded topography. All extant populations are located in the Puget Sound Lowlands.[9] No Critical Habitat has been designated for this species.

During the pedestrian site visits it was established that none of the necessary habitat conditions for these four listed species exist within the project action area. Additionally, the WDFW PHS database and WNHP dataset do not show the presence of these species within or near the project action area.

Conclusions

Based on this review, the project would have no effect on Oregon spotted frog, streaked horned lark, yellow-billed cuckoo, or golden paintbrush. The project would have no effect on previously mentioned fish or their critical habitat under jurisdiction of USFWS and NOAA Fisheries. The project would have no effect on EFH of Chinook or coho salmon as identified in the Magnuson Stevens Fishery Conservation and Management Act.

It is our understanding that this letter satisfies the City's responsibilities under Section 7(c) of the ESA at this time. We are sending you this copy of our assessment for your files. We will continue to remain aware of any change in status of these and other species and will be prepared to re-evaluate potential project impacts if necessary.

Sincerely,

Harper Houf Peterson Righellis Inc.

Ivy Watson

Natural Resources Scientist

Enclosures: figures, photographs, and federal species list

[9] Caplow, F. 2004. Reintroduction Plan for Golden Paintbrush (*Castilleja levisecta*). Washington Natural Heritage Program, Washington Department of Natural Resources. Prepared for US Fish and Wildlife Service (USFWS). https://www.fws.gov/oregonfwo/Species/Data/GoldenPaintbrush/Documents/DNRpaintbrushreintroduction.pdf

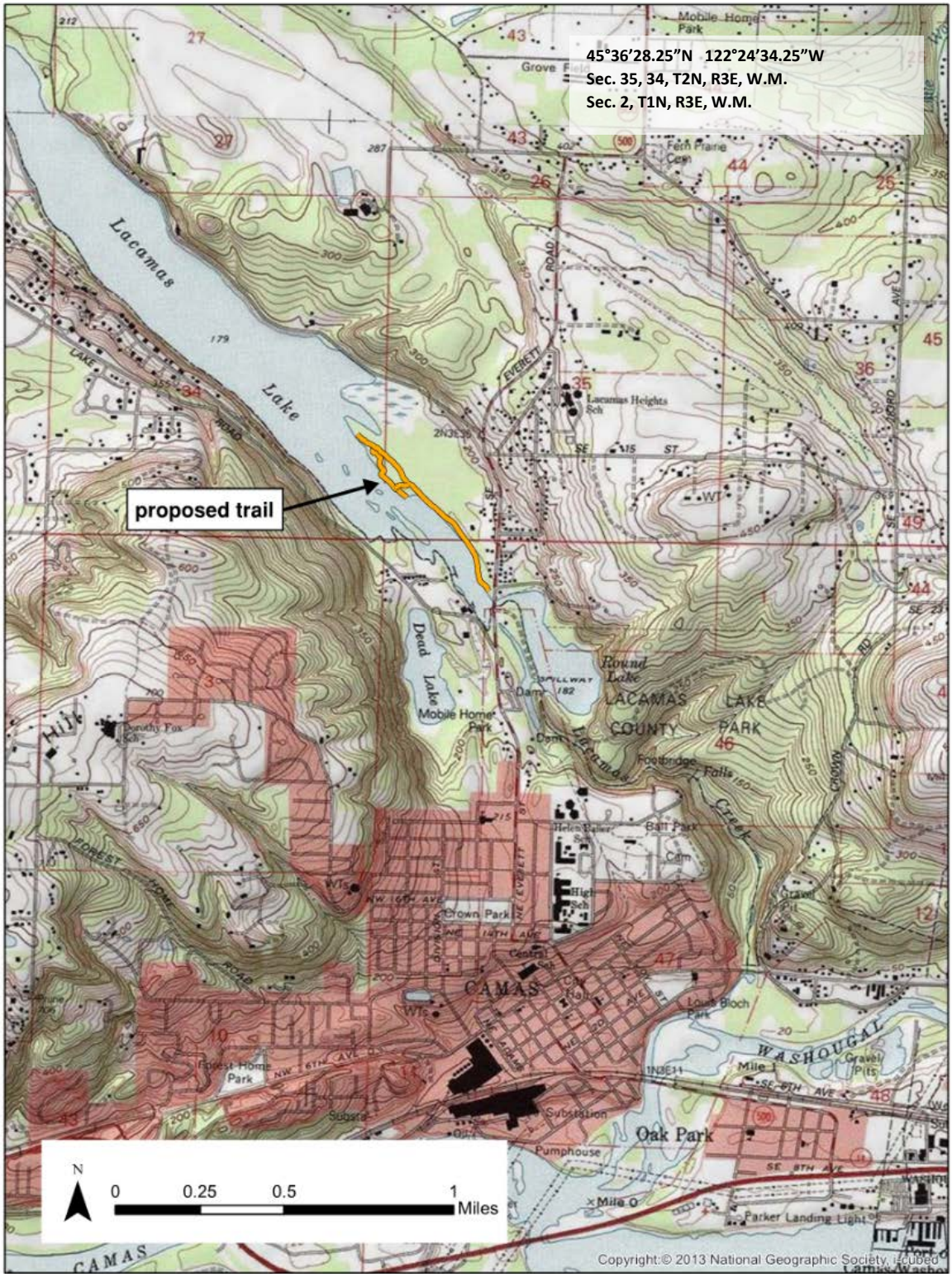


FIGURE 1. General location of Lacamas North Shore Trail Project, Camas Washington.

FIGURE 2. Location of proposed trails along the north shore of Lacamas Lake.

Photograph 1: View looking north along abandoned access road (at the northern junction of proposed Main and Loop trails) and typical Douglas fir forest present along the majority of the proposed trail alignment. Photograph taken January 14, 2018.

Photograph 2: View looking south where the proposed alignment crosses mowed lawns. In this area, private residences (left) are close to the shore. Photograph taken January 14, 2018.

Photograph 3: View looking south, showing typical forest in core of East wetland: dense Oregon ash canopy and slough sedge understory, with areas of ponded water. Photograph taken October 30, 2017.

Photograph 4: View looking north, showing typical vegetation at the north and south ends of East wetland: thinner tree canopy and thickets of shrubs intermixed with patches of bare ground/open water and herbaceous vegetation. Photograph taken October 26, 2017.

Photograph 5: View looking northwest, showing exposed aquatic bed plants in the Lake wetland when Lacamas Lake is drawn down. Photograph taken October 30, 2017.

Photograph 6: View looking northwest along one of the backwaters, showing areas of bareground/open water and patches of herbaceous vegetation below the OHWM of Lacamas Lake. Photograph taken December 1, 2016.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
Phone: (360) 753-9440 Fax: (360) 753-9405
http://www.fws.gov/wafwo/

In Reply Refer To: January 05, 2018
Consultation Code: 01EWFW00-2018-SLI-0443
Event Code: 01EWFW00-2018-E-00781
Project Name: Lacamas northshore trail

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated and proposed critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. The species list is currently compiled at the county level. Additional information is available from the Washington Department of Fish and Wildlife, Priority Habitats and Species website: http://wdfw.wa.gov/mapping/phs/ or at our office website: http://www.fws.gov/wafwo/species_new.html. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether or not the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). You may visit our website at http://www.fws.gov/pacific/eagle/for information on disturbance or take of the species and information on how to get a permit and what current guidelines and regulations are. Some projects affecting these species may require development of an eagle conservation plan: (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Also be aware that all marine mammals are protected under the Marine Mammal Protection Act (MMPA). The MMPA prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas. The importation of marine mammals and marine mammal products into the U.S. is also prohibited. More information can be found on the MMPA website: http://www.nmfs.noaa.gov/pr/laws/mmpa/.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Related website:
National Marine Fisheries Service:
http://www.nwr.noaa.gov/protected_species/species_list/species_lists.html

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
(360) 753-9440

Project Summary

Consultation Code: 01EWFW00-2018-SLI-0443

Event Code: 01EWFW00-2018-E-00781

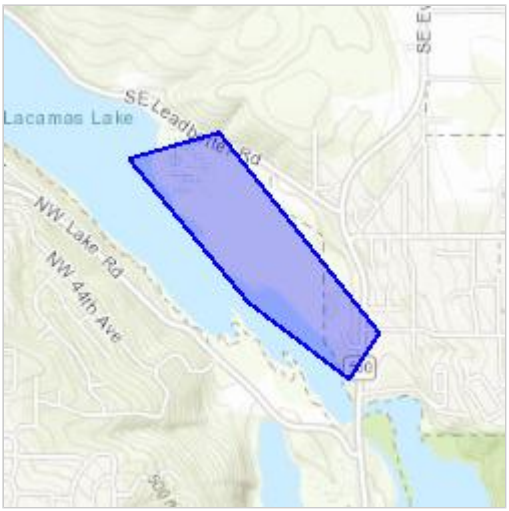
Project Name: Lacamas northshore trail

Project Type: RECREATION CONSTRUCTION / MAINTENANCE

Project Description: recreational trail

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/45.609954532676724N122.4119956647102W



Counties: Clark, WA

Endangered Species Act Species

There is a total of 5 threatened, endangered, or candidate species on this species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

Birds

NAME	STATUS
Streaked Horned Lark *Eremophila alpestris strigata* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7268	Threatened
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **proposed** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

Amphibians

NAME	STATUS
Oregon Spotted Frog *Rana pretiosa* There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6633	Threatened

Fishes

NAME	STATUS
Bull Trout *Salvelinus confluentus* Population: U.S.A., conterminous, lower 48 states There is **final** critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8212	Threatened

Flowering Plants

NAME	STATUS
Golden Paintbrush *Castilleja levisecta* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7706	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

Appendix E: Mailing List—Properties within 300 feet

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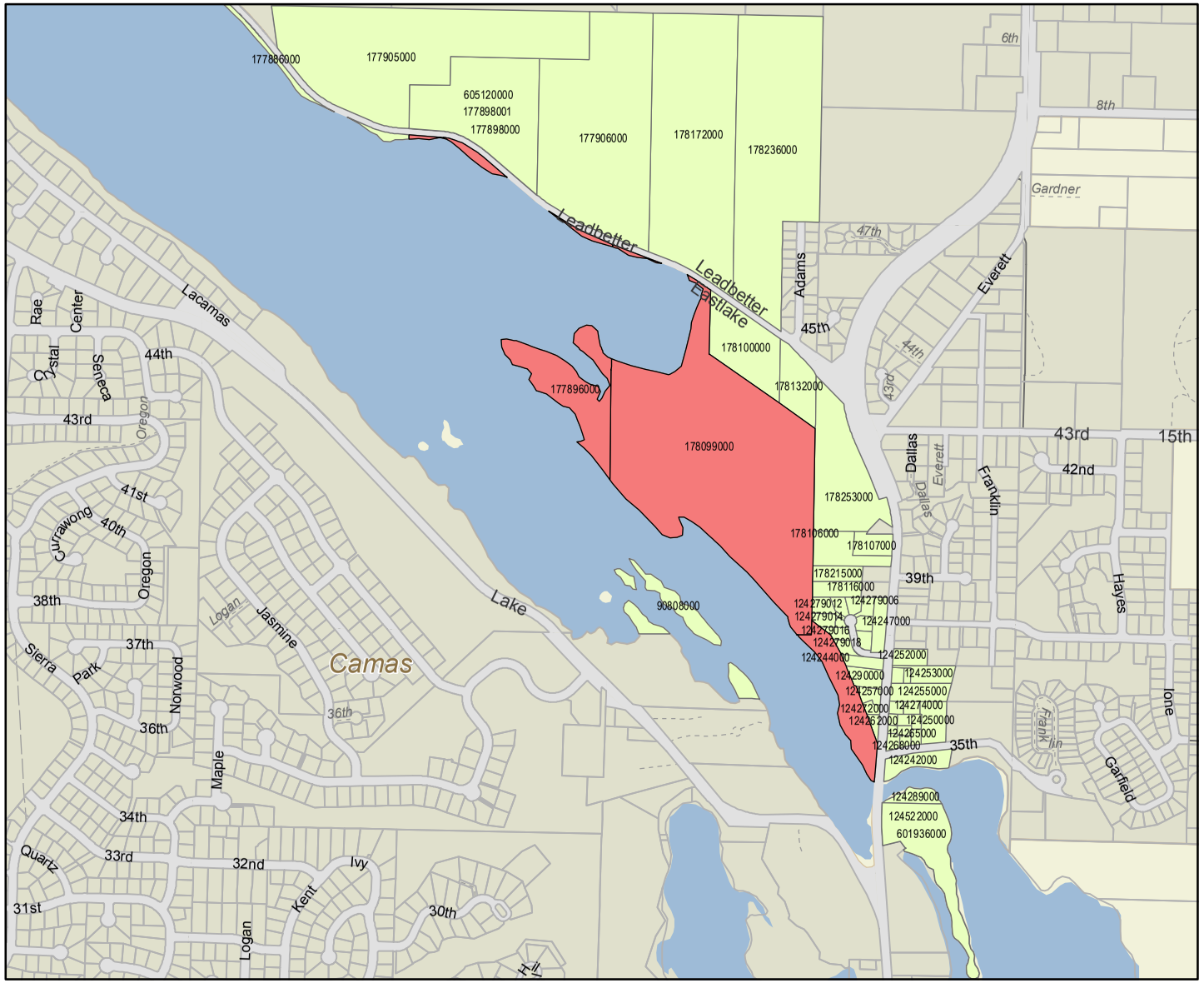
PID(s): 178099000,124244000,177896000 , 300 Foot Buffer



Locator

Legend

- Subject Property
- Buffer Selection
- Parcels
- Water Body
- Incorporated
- Urban Growth Area
- Unincorporated

N W E S

Scale: 1:12,324

NOTE: This data is compiled from many sources and scales. Clark county makes this information available as a service, and accepts no responsibility for any inaccuracy, actual or implied.

GIS Order Number: 195536

Printed: 2/22/2018

Path: c:\usr_proj\xxOrdID195536_673592\xx_649911\MailingListPacket.mxd

Owner Name	Mailing Address
BERRY BRYAN C	6504 NE 17TH AVE, VANCOUVER, WA, 98665
BEVANS JERRY L	355 NE 35TH AVE, CAMAS, WA, 98607
BJUR RANDY & BJUR SHIRLEY	131 NW 11TH AVE, CAMAS, WA, 98607
BROWN CHRISTOPHER DALE & BROWN PATRICIA P	225 NE 37TH CR, CAMAS, WA, 98607
BURTON CHAD MITCHELL & WILSON KELLI MAE	222 NE 37TH CIR, CAMAS, WA, 98607
CAMAS-WASHOUGAL WILDLIFE	811 SE LEADBETTER RD, CAMAS, WA, 98607
CAMAS-WASHOUGAL WILDLIFE LEAGUE	1401 SE 196TH AVE, CAMAS, WA, 98607
CITY OF CAMAS	430 NE EVERETT ST, CAMAS, WA, 98607
CITY OF CAMAS	616 NE 4TH AVE, CAMAS, WA, 98607
CJ DENS LACAMAS I LLC	PO BOX 2239, KALAMA, WA, 98625
CLARK COUNTY PARKS	4700 NE 78TH ST, VANCOUVER, WA, 98665
CLIFTON BRAD EDWARD & CLIFTON KAREN CHRISTINE	3711 NE 265TH CT, CAMAS, WA, 98607
COVE MAP FUND LLC	1140 AVENUE OF THE AMERICAS FL 7, NEW YORK, NY, 10036
FLEISCHMAN CURTIS J	3542 NE EVERETT STREET, CAMAS, WA, 98607
FRITZ ERIC & FRITZ JADA	3547 NE EVERETT ST, CAMAS, WA, 98607
GECHO CONSTRUCTION INC	5107 NE 81ST AVE, VANCOUVER, WA, 98662
HIDDEN OLIVER M	2610 KAUFFMAN AVE, VANCOUVER, WA, 98660
JONES KIM K	207 NE 37TH CR, CAMAS, WA, 98607
JONES ROBERT G	3929 NE EVERETT ST, CAMAS, WA, 98607
JUAREZ DAVID & JUAREZ REBECCA	2121 46TH AVE SW, SEATTLE, WA, 98116
KAYLOR BURGESS M	2111 DIVISION ST, CAMAS, WA, 98607
KROUT TIMOTHY & KROUT ROBERTA	811 SE LEADBETTER RD, CAMAS, WA, 98607
LAURITZEN PHILIP & LAURITZEN CHRISTINE	24022 NE WEAKLY RD, CAMAS, WA, 98607
MAGINNIS DANIEL J & MAGINNIS LORI ANN	203 NE 37TH CIR, CAMAS, WA, 98607
MARTLING GAIL	363 SE JAMES ST, CAMAS, WA, 98607
MOULTON DANA SCOTT	3606 SE EVERETT ST, CAMAS, WA, 98607
PICKERING KAREN I & STARRATT DYLAN L	25909 NE 52ND WAY, VANCOUVER, WA, 98682
PIDGEON JAMES & PIDGEON DOROTHY	11415 NE 23RD ST, VANCOUVER, WA, 98684
PLACE BRIAN & PLACE PATRICIA (C/B)	339 NE 35TH AVE, CAMAS, WA, 98607
PLACE BURTON & PLACE KAREN	26503 SE 8TH ST, CAMAS, WA, 98607
RAIMO STEVE W & RAIMO JUDITH J	3922 CEDAR ST, WASHOUGAL, WA, 98671
SARGENT BRIAN A & SARGENT JO	3718 NE EVERETT ST, CAMAS, WA, 98607
SEDLAK-FORD RANDALL L & SEDLAK-FORD GERALYN M	3921 NE EVERETT ST, CAMAS, WA, 98607
STANLEY NICHOLAS G & STANLEY PAULA A	3533 NE EVERETT ST, CAMAS, WA, 98607
STIEF DANIEL & STIEF KATHLEEN	PO BOX 1338, WASHOUGAL, WA, 98671
WATSON MARCY J	3705 NE EVERETT ST, CAMAS, WA, 98607
WRIGHT BRIAN DAVID	3552 NE EVERETT STREET, CAMAS, WA, 98607
ZEMLIN PAUL R & ZEMLIN RUTH A (C/B)	3228 VIRGINIA WAY, LONGVIEW, WA, 98632

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Number of records 38

Number of Pages 1

Date Created 2/22/18

Employee Signature 

Employee Name Bob Pool

PID	Situs Address	
177898000	811 SE LEADBETTER RD	CAMAS, WA 98607
605120000	811 SE LEADBETTER RD	CAMAS, WA 98607
177906000	715 SE LEADBETTER RD	CAMAS, WA 98625
178107000	4021 NE EVERETT ST	CAMAS, WA 98607
178215000	3929 NE EVERETT ST	CAMAS, WA 98607
178116000	3921 NE EVERETT ST	CAMAS, WA 98607
124247000	3805 NE EVERETT ST	CAMAS, WA 98671
124252000	3720 NE EVERETT ST	CAMAS, WA 98607
124253000	3718 NE EVERETT ST	CAMAS, WA 98607
124261000	3708 NE EVERETT ST	CAMAS, WA 98607
124286000	3705 NE EVERETT ST	CAMAS, WA 98607
124259000	3648 NE EVERETT ST	CAMAS, WA 98607
124290000	3631 NE EVERETT ST	CAMAS, WA 98662
124255000	3624 NE EVERETT ST	CAMAS, WA 98682
124257000	3615 NE EVERETT ST	CAMAS, WA 98632
124266000	3606 NE EVERETT ST	CAMAS, WA 98607
124274000	3552 NE EVERETT ST	CAMAS, WA 98607
124265000	355 NE 35TH AVE	CAMAS, WA 98607
124272000	3545 NE EVERETT ST	CAMAS, WA 98607
124276000	3542 NE EVERETT ST	CAMAS, WA 98607
124287000	3536 NE EVERETT ST	CAMAS, WA 98671
124262000	3533 NE EVERETT ST	CAMAS, WA 98607
124256000	3530 NE EVERETT ST	CAMAS, WA 98671
124270000	3524 NE EVERETT ST	CAMAS, WA 98671
124277000	3520 NE EVERETT ST	CAMAS, WA 98684
124268000	3510 NE EVERETT ST	CAMAS, WA 98684
601936000	3400 NE EVERETT ST	CAMAS, WA 98607
124273000	339 NE 35TH AVE	CAMAS, WA 98607
124522000	3344 NE EVERETT ST	CAMAS, WA 98665
124242000	308 NE 35TH AVE	CAMAS, WA 98607
124279018	230 NE 37TH CIR	CAMAS, WA 98665
124279002	225 NE 37TH CIR	CAMAS, WA 98607
124279016	222 NE 37TH CIR	CAMAS, WA 98607
124279020	218 NE 37TH CIR	CAMAS, WA 98607
124279014	212 NE 37TH CIR	CAMAS, WA 98665
124279004	211 NE 37TH CIR	CAMAS, WA 10036
124279006	207 NE 37TH CIR	CAMAS, WA 98607
124279012	206 NE 37TH CIR	CAMAS, WA 98607
124279008	203 NE 37TH CIR	CAMAS, WA 98607
124279010	200 NE 37TH CIR	CAMAS, WA 98116
178100000	100 NE LEADBETTER RD	CAMAS, WA 98660
90808000		, WA 98607
124244000		, WA 98607
124250000		, WA 98665
124289000		, WA 98665
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177896000		, WA 98607
177898001		, WA 98607

PID	Situs Address
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178106000	, WA 98607
178132000	, WA 98660
178172000	, WA 98625
178236000	, WA 98625
178253000	, WA 98607

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Number of Records: 55

Number of Pages: 2

Date Created: 02/22/18

Employee

Employee Name: Bob Pool

Appendix F: Engineering Drawings

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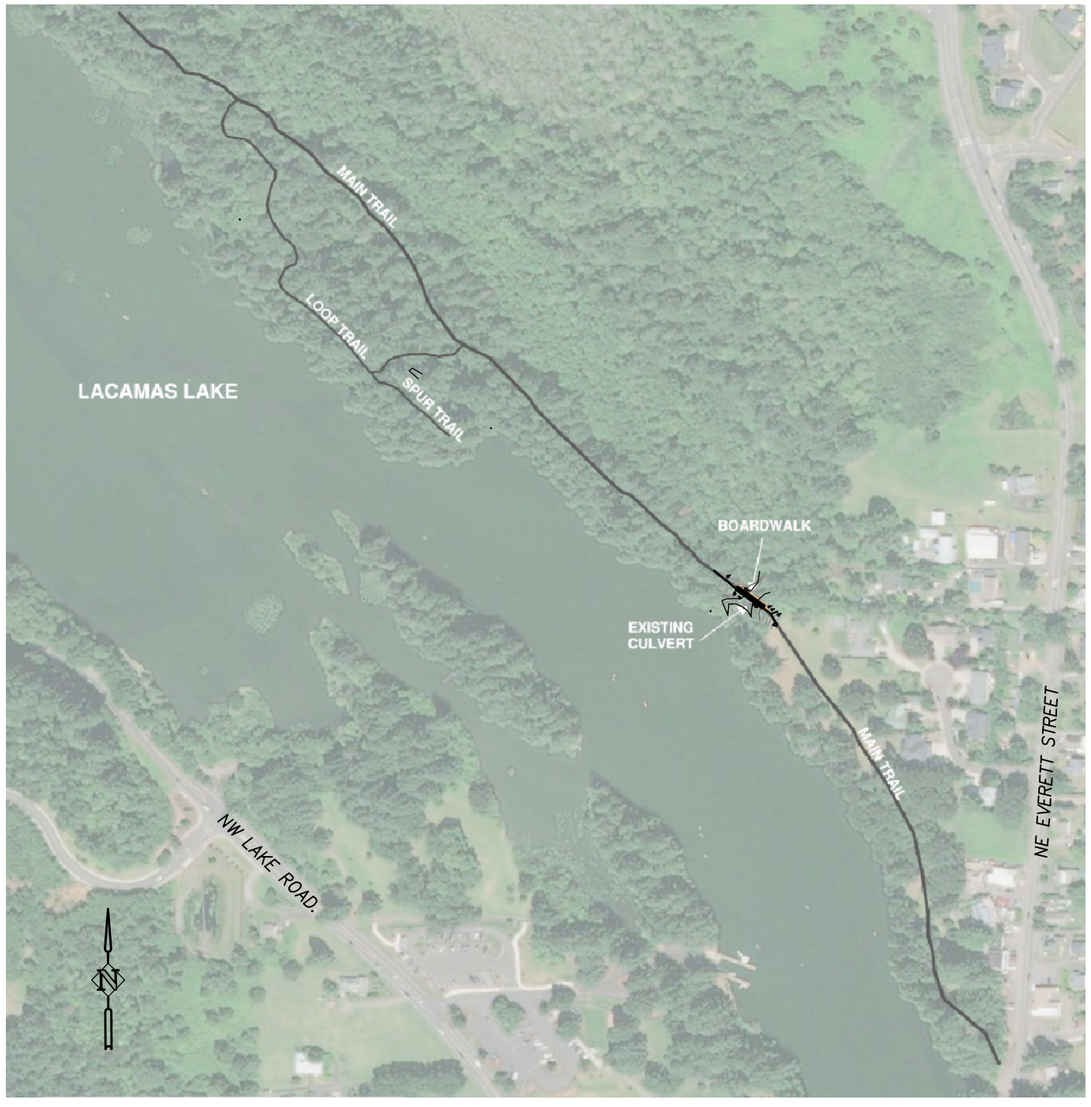
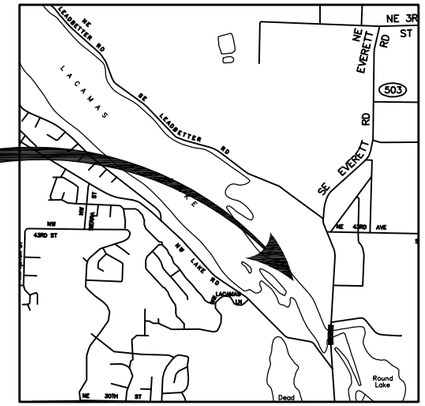
LACAMAS NORTH SHORE TRAIL

CAMAS, WASHINGTON



PROJECT LOCATION



VICINITY MAP

N.T.S.

OWNER

CITY OF CAMAS
CONTACT: JERRY ACHESON
616 NE 4TH AVENUE
CAMAS, WA 98607
TEL: 360-834-7092
FAX: 360-834-1535
EMAIL: JACHESON@CITYOFCAMAS.US

CIVIL ENGINEER

HARPER HOUF PETERSON RIGHELLIS INC.
CONTACT: ROB VANDERZANDEN, P.E.
1104 MAIN STREET, SUITE 100
VANCOUVER, WA 98660
TEL: 360-750-1131
FAX: 360-750-1141
EMAIL: ROBV@HHPR.COM

SHEET INDEX

C0 COVER SHEET
C1 BOARDWALK PLAN
C2 BOARWALK
C3 TRAIL SECTIONS

ROBERT A. VANDERZANDEN
STATE OF WASHINGTON
23841
REGISTERED
PROFESSIONAL ENGINEER
3-8-18

DATE	NO.	DESCRIPTION

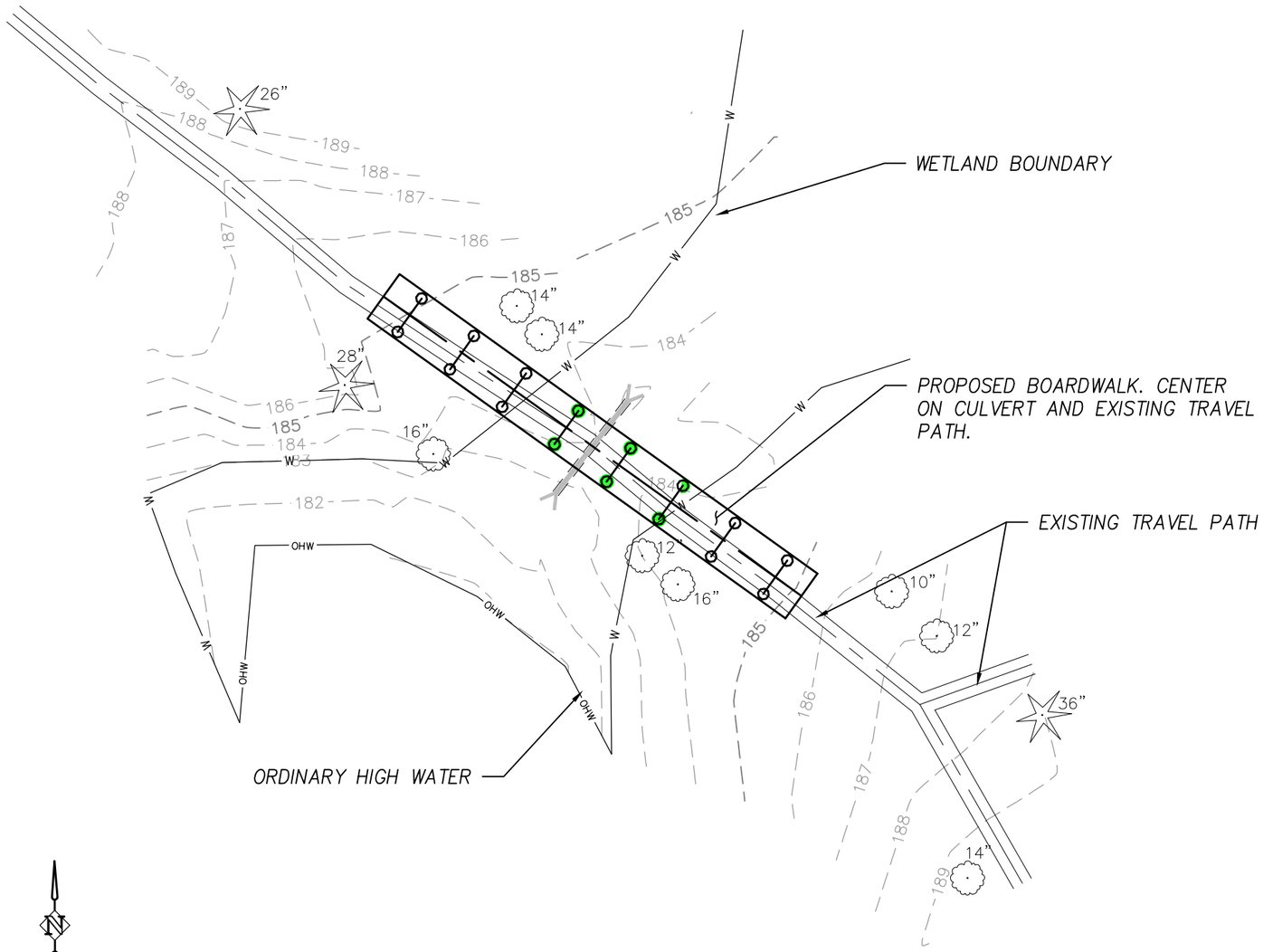
REVISIONS

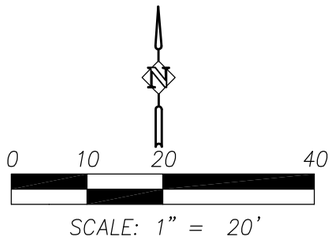
DESIGNED: RAV
DRAWN: JDB
CHECKED: RAV
DATE: 3/08/2018

Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
1104 Main Street, Suite 100, Vancouver, WA 98660
phone: 360.750.1131 www.hhpr.com fax: 360.750.1141

COVER SHEET
NORTH SHORE TRAIL
CAMAS, WASHINGTON

SHEET NO. C0
JOB NO. CAM-11A





6 SQFT TOTAL WETLAND IMPACT (SIX PIN PIERS)

ROBERT A. VANDERZANDEN
STATE OF WASHINGTON
23841
REGISTERED
PROFESSIONAL ENGINEER

3-8-18

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED:	RAV
DRAWN:	JDB
CHECKED:	RAV
DATE:	3/08/2018

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ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
1104 Main Street, Suite 100, Vancouver, WA 98660
phone: 360.750.1131 www.hhpr.com fax: 360.750.1141

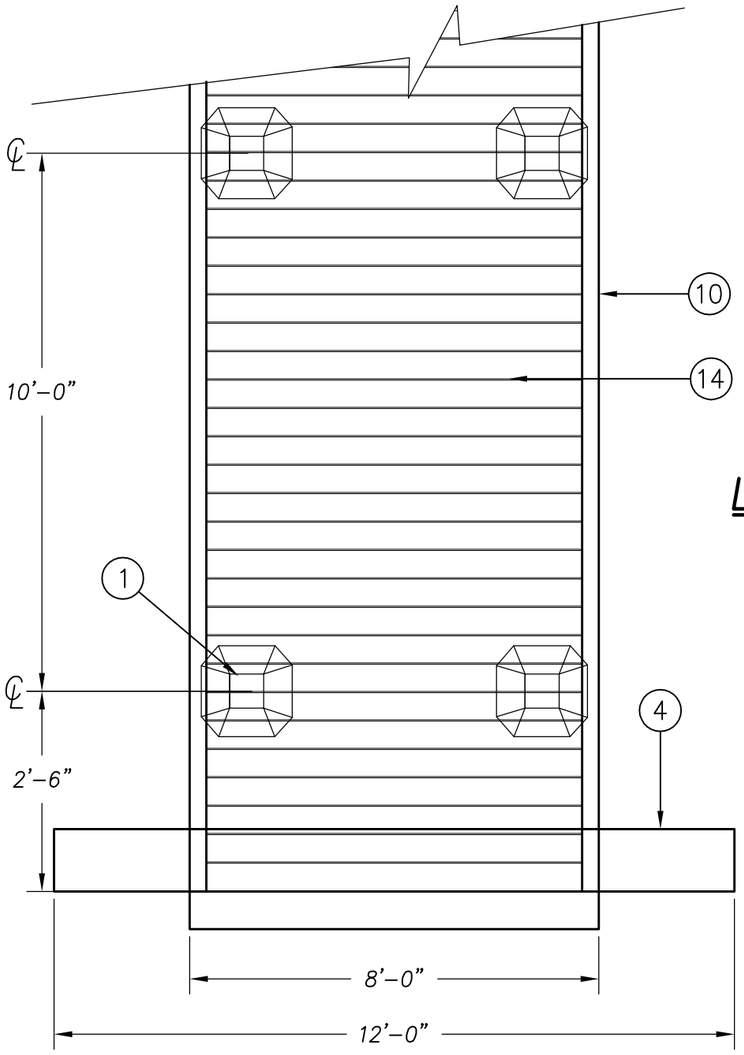
LACAMAS TRAIL BOARDWALK PLAN

NORTH SHORE TRAIL

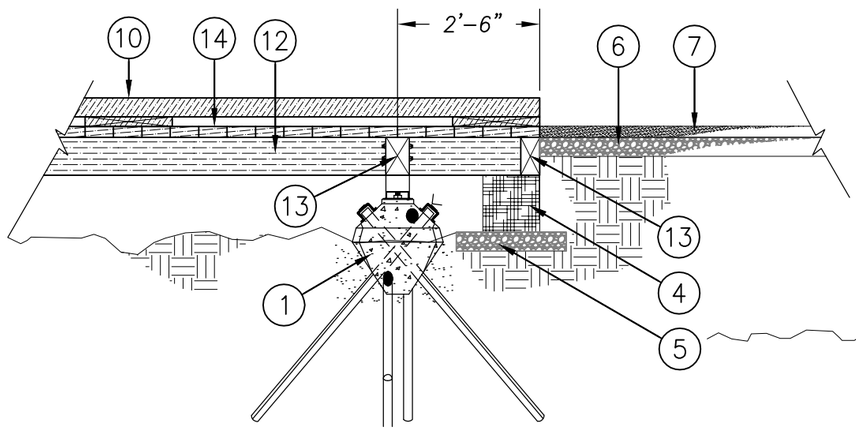
CAMAS, WASHINGTON

SHEET NO.
C1

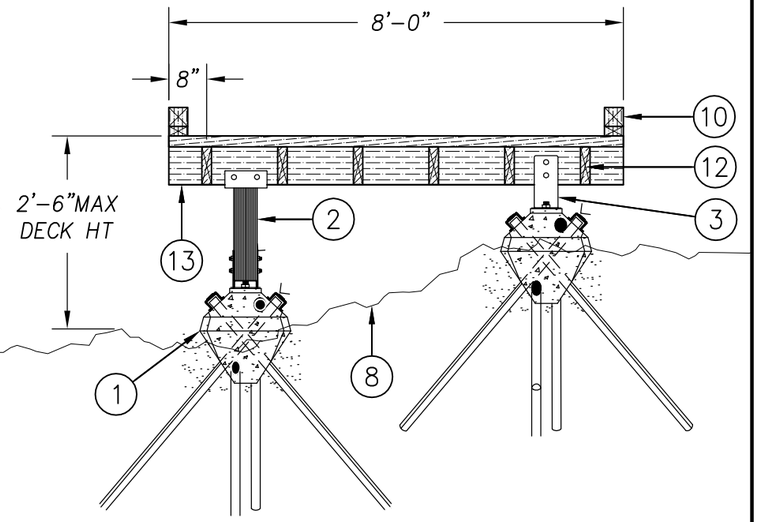
JOB NO.
CAM-11A



PLAN VIEW
N.T.S.



LONGITUDINAL SECTION VIEW
N.T.S.



CROSS SECTION VIEW
N.T.S.

1. PIN PIER FOOTING W/ "DP–50" UNIT, 4 PINS EACH @ 48" (GALVANIZED SCHEDULE 40) INSTALL PER MANUFACTURER SPECIFICATIONS.
2. POST AND BEAM WHERE SURFACE GRADE REQUIRES, CONSTRUCT SUPPORT USING SIMPSON ABU44 (OR APPROVED EQUAL) FOR POST BASE. USE SIMPSON PC44 TO CONNECT AT BEAM 4x6 PT POST.
3. BEAM SADDLE – AS GRADES ALLOW USE SIMPSON ABU44 (OR APPROVED EQUAL) AS A BEAM SADDLE – FASTEN TO PIN PIER.
4. CONCRETE MASONRY WALL UNITS 12" HIGH.
5. 4" THICK COMPACTED CRUSHED SURFACING BASE COURSE (1 1/4 – 0) PER WSDOT SECTION 9–03.9(3).
6. 4" THICK 1 1/4 MINUS CRUSHED ROCK PATHWAY BASE.
7. 2" THICK 3/8" – #4 CRUSHED ROCK PATHWAY PAVING.
8. COMPACTED NATIVE SOILS.
10. 4x4 PT KICK RAIL (BOTH SIDES TYP.) ON 18" – 2x4 PT LIFT SPACED 6'0" O.C. w/2–1/2" GALV. HEX BOLTS.
12. 2X8 PT JOISTS @ 16" O.C. (TYP.)
13. 4x8 PT BEAMS (TYP.)
14. 2x6 PT DECKING WITH 1/8" GAPS (TYP.)

DATE	NO.	DESCRIPTION

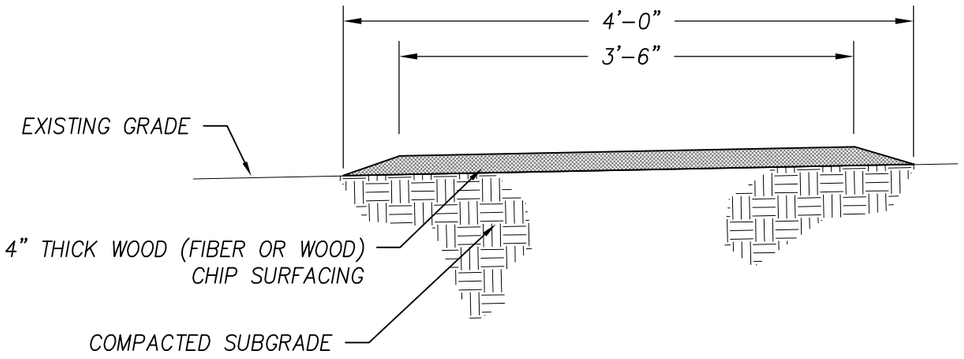
REVISIONS

DESIGNED: RAV
DRAWN: JDB
CHECKED: RAV
DATE: 3/08/2018

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
1104 Main Street, Suite 100, Vancouver, WA 98660
phone: 360.750.1131 www.hhpr.com fax: 360.750.1141

BOARDWALK
NORTH SHORE TRAIL
CAMAS, WASHINGTON

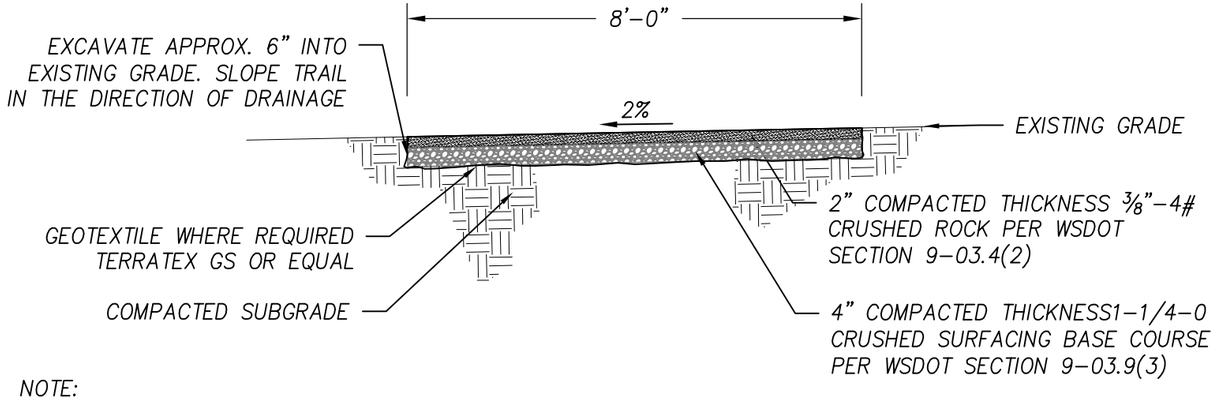
SHEET NO. C2
JOB NO. CAM-11A



NOTE:
THIS SECTION TO BE USED FOR THE LOOP AND SPUR TRAILS.

WOOD CHIP TRAIL SECTION

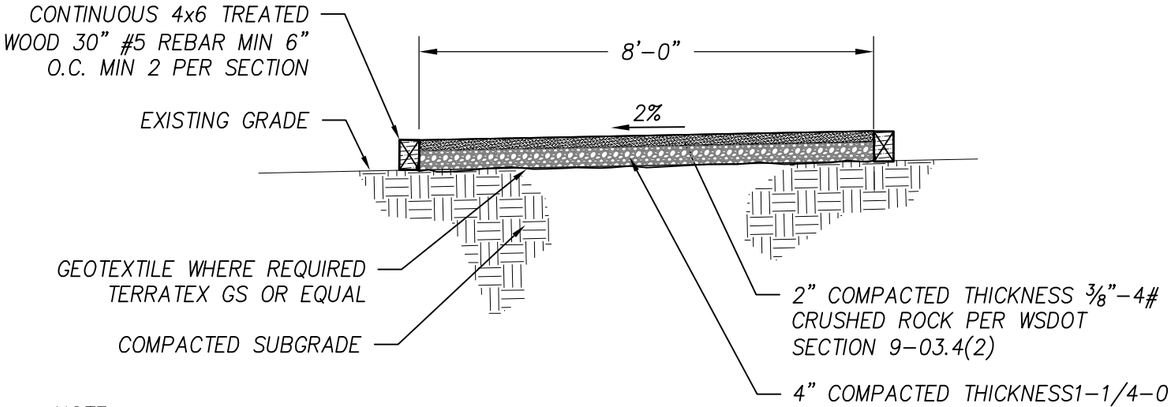
N.T.S.



NOTE:
THIS SECTION TO BE USED FOR THE MAIN TRAIL, EXCEPT FIRST 250 FEET AT NE EVERETT STREET.

CRUSHED SURFACING TRAIL EXCAVATED SECTION

N.T.S.



NOTE:
THIS SECTION TO BE USED FOR THE FIRST 250 FEET OF THE MAIN TRAIL BEGINNING AT NE EVERETT STREET.

CRUSHED SURFACING TRAIL CAUSEWAY SECTION

N.T.S.

ROBERT A. VANDERZANDEN
STATE OF WASHINGTON
23841
REGISTERED
PROFESSIONAL ENGINEER
3-8-18

DATE	NO.	DESCRIPTION

REVISIONS

DESIGNED: RAV
DRAWN: JDB
CHECKED: RAV
DATE: 3/08/2018

HHPR Harper Houf Peterson Righellis Inc.
ENGINEERS • PLANNERS
LANDSCAPE ARCHITECTS • SURVEYORS
1104 Main Street, Suite 100, Vancouver, WA 98660
phone: 360.750.1131 www.hhpr.com fax: 360.750.1141

TRAIL SECTIONS
NORTH SHORE TRAIL
CAMAS, WASHINGTON

SHEET NO. C3
JOB NO. CAM-11A

Appendix G: Mitigation Plans

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Wetland Mitigation Plan

Lacamas North Shore Trail Project
City of Camas Project: P1005

Prepared by:
Harper Houf Peterson Righellis Inc.
1104 Main Street, Suite 100
Vancouver, Washington 98660

Prepared for:
City of Camas
Parks and Recreation Department
616 NE 4th Avenue
Camas, Washington 98607

February 27, 2018

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2. Vegetation 1
3. Avoidance, Minimization, and Impacts 2
4. Mitigation 3
5. Planting Plan 5
6. General Planting Specifications 6
   - 6.1 Source of Plants 6
   - 6.2 Planting Time 6
   - 6.3 Planting Guidelines 6
7. Objectives and Performance Standards 7
   - 7.1 Objective 7
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8. Monitoring 7
9. Maintenance 8
10. Contingency Plans 8
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Appendix A: Mitigation Plan Sheet

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1. Proposed Project

The City of Camas (City) proposes to extend the existing trail system at the south end of Lacamas Lake (Figure 1). The new trails would be located within City property on the northeast side of Lacamas Lake, from the Round Lake Loop Trail east of NE Everett Street (State Route 500) to a natural area on the lakeshore. The main trail, approximately 3,300 feet in length, would traverse northwest from NE Everett Street, following the alignment of an abandoned access road. The main trail would include a 75-foot-long boardwalk, 25 feet of which would lie above a wetland. The boardwalk would be supported on 16 pin piers (8 pairs). Six pin piers would be placed in the abandoned access road where it crosses a wetland (total of 6 cubic feet of fill within the wetland).

A shorter loop trail, approximately 1,120-feet long, would connect to the main trail to create a loop in the natural area. A spur trail, approximately 180-feet long, would follow the path of an existing packed dirt trail from the south end of the loop trail to a viewpoint of Lacamas Lake. The latter two trails would have a pervious surface. The main trail would be 8-feet wide and constructed of impervious material (geotextile and a gravel cover); the loop and spur trails would be 4-feet wide and pervious (wood chips).

2. Vegetation

Vegetation in the core of the East wetland is dominated by a dense canopy of Oregon ash (*Fraxinus latifolia,* FACW), with occasional red alder, and an understory of slough sedge (*Carex obnupta*, OBL). At the northwest and southeast ends, the tree canopy thins and a shrub understory is present, composed of salmonberry (*Rubus spectabilis*, FAC), twinberry (*Lonicera involucrata*, FAC), redosier dogwood (*Cornus alba*, FACW), Douglas spirea (*Spiraea douglasii*, FACW), Pacific ninebark (*Physocarpus capitatus*, FACW), and occasional Himalayan blackberry (*Rubus armeniacus*, FAC). In these areas, Western lady fern (*Athyrium cyclosorum*, FAC), piggyback plant (*Tolmiea menziesii*, FAC), tall mannagrass (*Glyceria elata*, FACW), skunk cabbage (*Lysichiton americanus*, OBL), and reed canarygrass (*Phalaris arundinacea*, FACW) join slough sedge in herbaceous openings and understory.

Where the abandoned access road crosses the East wetland, vegetation is sparse and dominated by non-native species, primarily creeping buttercup (*Ranunculus repens*, FAC) and non-native grasses (e.g. annual blue grass [*Poa annua*, FAC]), with occasional intrusions by Himalayan blackberry.

Figure 1. Project vicinity.

3. Avoidance, Minimization, and Impacts

As a result of the avoidance and minimization efforts, only 6 square feet of herbaceous wetland, dominated by creeping buttercup and annual blue grass, would be converted to impervious surface.

The trails were realigned and redesigned multiple times (based on field reviews) to avoid and minimize impacts to wetlands and other resources. Avoidance and minimization measures included:

- Utilizing the existing abandoned access road for the main trail to the maximum extent possible;
- Reducing the width of the main trail from 12 feet (the preferred width for regional trails) to 8 feet to remain inside the footprint of the abandoned access road;
- Constructing the main trail surface with gravel rather than concrete or asphalt (the preferred surface for regional trails) to eliminate associated potential stormwater concerns;
- Crossing the East wetland on the existing fill for the abandoned access road and utilizing a low-impact boardwalk design: 6 cubic feet of excavation vs. 60 cubic feet of excavation and concrete for cylindrical footings, and eliminating presence of green concrete in wetland;

- Designing the trails for construction with low-impact manual methods to the extent practical;
- Managing stormwater for the main trail through full dispersion within 20 feet of the edge of the trail, which avoids stormwater impacts to wetlands and Lacamas Lake;
- Utilizing the existing dirt path for the loop and spur trails to the maximum extent possible;
- Utilizing level areas wherever possible for the loop and spur trails to minimize the need for filling or grading;
- Changing the loop and spur trail design from a 12-foot impervious surface to 4-foot, pervious surface;
- Re-routing the loop trail around wetlands and backwaters;
- Eliminating a viewpoint on the loop trail that would have encroached into the Lake wetland;
- Shortening the loop trail and realigning it uphill, away from the Lake wetland;
- Eliminating a segment of the loop trail that would have encroached closer to the East wetland;
- Avoiding the removal of mature trees; and
- Designing the loop and trails for construction with low-impact manual methods to the extent

4. Mitigation

The East wetland rates as a Category III wetland. The City of Camas Shoreline Master Program (SMP) requires mitigation of Category III wetlands at a 4:1 ratio for wetland rehabilitation. Thus, 24 square feet of wetland rehabilitation is required to mitigate for 6 square feet of boardwalk impacts.

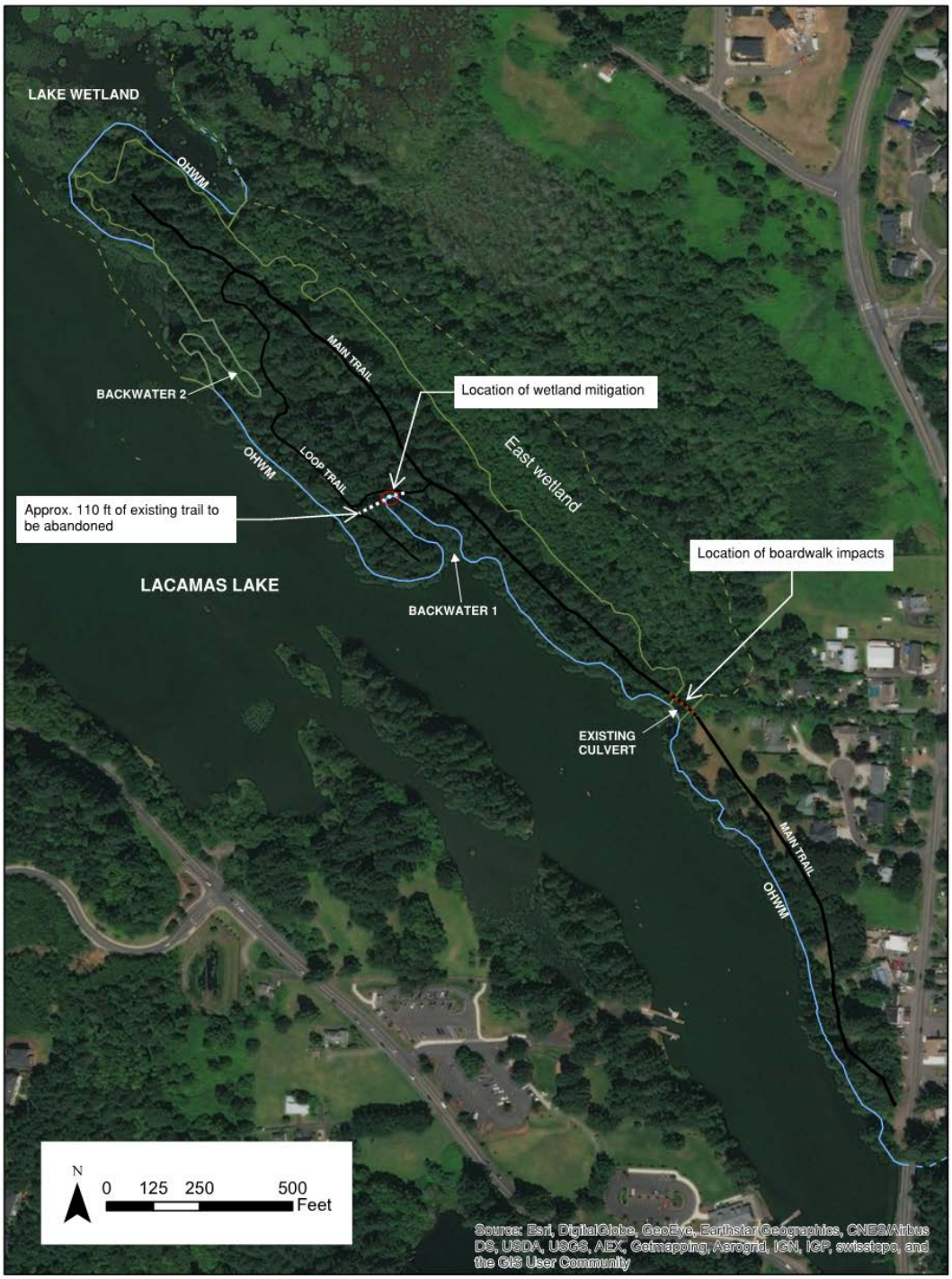

Figure 2. Location of boardwalk impacts and wetland mitigation site.

The proposed mitigation site (Figure 2) is located approximately 950 feet northwest of the impact location, where an existing packed dirt trail crosses the end of a narrow backwater (backwater 1) of Lacamas Lake. Approximately 10 linear feet of the trail (6 feet wide) are below the ordinary high water mark of the lake. The site is sheltered and shallowly inundated or exposed mud, depending on the level of the lake. Trees in the surrounding upland shade the backwater. The trail itself is bare, but remnants of wetland vegetation, including skunk cabbage and Western lady fern, can be seen along the margins of

the backwater on either side of the trail. Elsewhere around Lacamas Lake, wetlands are common in backwater and lake fringe areas.

The goal of the proposed mitigation is to rehabilitate backwater wetland in a 60 square foot area of compacted dirt trail at and below the ordinary high water mark in backwater 1. The proposed trail would be rerouted around the backwater and the existing trail would be decommissioned at this location. Decommissioning will involve: excavating approximately 4 inches of trail fill to match the natural contour of the backwater and reach the buried soil surface; loosening the buried soil; and planting the area with shade-tolerant native wetland species. Excavated fill will be thinly spread on adjacent upland trail. This achieves the 4:1 mitigation ratio required by City of Camas SMP by providing 24 square feet of mitigation for boardwalk impacts, as well as an additional 36 square feet of supplemental mitigation (Table 1).

Table 1. Summary of impacts and mitigation.

Impact Location	Impact	Mitigation Plan	Mitigation Area	Mitigation Location
Compensatory Mitigation for Permanent Removal of Native Vegetation				
Boardwalk	Permanent impact to 6 SF of wetland (in abandoned access road) for installation of 6 pin piers.	Decommission compacted dirt trail (fill) through backwater 1 and plant with native species (Table 2).	24 square feet	Trail within OHWM at backwater 1.
None	None	Extend trail decommissioning and planting to remaining area.	36 square feet	Same as above.

5. Planting Plan

Plantings will utilize salmonberry at the ordinary high water mark and herbaceous vegetation below, similar to other backwater and fringe wetlands in the area (Table 2). A total of 60 plants are to be installed.

Table 2. Planting plan. Refer to Appendix A for further details.

Species	Form, Spacing, Quantity
salmonberry (*Rubus spectabilis*)	bare root, 3 feet on center, 10 plants
Dewey's sedge (*Carex deweyana*)	bare root, 1 foot on center, 15 plants
slough sedge *(Carex obnupta)*	bare root, 1 foot on center, 20 plants
Western lady fern (*Athyrium cyclosorum*)	bare root, 1 foot on center, 10 plants
skunk cabbage (*Lysichiton americanus*)	bare root, 1 foot on center, 5 plants

6. General Planting Specifications

6.1 Source of Plants

Plants will be procured from a reputable nursery(s) having a similar climate as the Camas area and specializing in plants native to the Pacific Northwest. Provide bare root stock, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1, *American Standard for Nursery Stock*.

6.2 Planting Time

Planting should occur between October 15 and March 15.

6.3 Planting Guidelines

Trail fill will be excavated in order to match the contours in the surrounding backwater. This will involve removing a 4-inch thickness of fill from the mitigation area to reach the buried soil surface. Excavated material will be thinly spread on the adjacent upland path prior to placement of the wood chip surface. Excavated fill will NOT be placed in wetland.

The upper 6 to 12 inches of the buried soil will be loosened using hand tools or a tiller prior to planting.

Salmonberry and Dewey's sedge should be planted along the upper edges of the site, at the ordinary high water mark. Slough sedge, Western lady fern, and skunk cabbage should be planted in the low-lying potions of the site.

Holes should be deep and wide enough to accommodate the plant's roots without resulting in J-rooting. Tamp soil firmly to make good contact with roots.

If the soil is not saturated at the time of planting, then each plant will be watered when planted.

7. Objectives and Performance Standards

Objectives describe the ecological goals or outcomes planned for the site and how those are to be achieved. Performance standards and associated measurements evaluate if the objectives are attained as planned.

7.1 Objective

Rehabilitate 60 square feet of bare, compacted, trail to native wetland vegetation.

7.2 Performance Standards

Performance standards will be evaluated at three different times after installation of plants:

- 1st Year—After at least 12 months and at least one growing season the mitigation area will achieve: 1) at least 80 percent survival of all plants installed, and 2) less than 15% cumulative aerial cover of shrub or tree noxious weed species and Class A or B herbaceous noxious weed species in the most current Clark County noxious weed list. Voluntary recruitment of native species will be counted toward the performance standard.

- 5th Year—Four growing seasons after the 1st year measurement is taken, the mitigation area will achieve: 1) at least 50 percent average aerial coverage of native species during late spring-early summer,[1] and 2) less than 15% cumulative aerial cover of shrub or tree noxious weed species and Class A or B herbaceous noxious weed species in the most current Clark County noxious weed list. Voluntary recruitment of native species will be counted toward the performance standard.

- 10th Year—Nine growing seasons after the 1st year measurement is taken, the area will achieve: 1) at least 50 percent average aerial coverage of native species during late spring-early summer, and 2) less than 15% cumulative aerial cover of shrub or tree noxious weed species and Class A or B herbaceous noxious weed species in the most current Clark County noxious weed list. Voluntary recruitment of native species will be counted toward the performance standard.

8. Monitoring

The following actions will be implemented as part of the vegetation monitoring:

- A qualified professional will supervise initial planting and prepare an as-built report that will include:
    - Plant sources and day of planting

[1] This percentage was selected to match the current low coverage at the site because of the heavy shade from tree canopy.

- Final site map with the mitigation site boundaries identified
- Photographs of the mitigation area
- Final species, sizes, and numbers of plants installed
- An analysis of any changes to the mitigation plan that occurred during construction
- Other relevant observations of the professional present during construction and installation

- Monitoring activities will take place during the late spring or summer with the goal of monitoring within the same 3-week window each year. Monitoring of the 1st, 2nd, 3rd, 5th, 7th, and 10th year will be conducted, and a report documenting monitoring results will be submitted to the City. These reports will identify deficiencies in the mitigation and any contingency measures that will be taken to correct those deficiencies.

9. Maintenance

Maintenance will occur annually, at a minimum, during years 1-3, or as necessary to achieve performance standards. Maintenance during years 4-10 will be based on monitoring report recommendations, as necessary to achieve performance standards.

Maintenance for this project will include:

- Additional weed control during the first two years to reduce competition to young plants.
- If necessary to achieve performance standards, replacement (species for species, unless contingency measures are applied) of any dead plants in the mitigation area.

10. Contingency Plans

Contingency measures for post-construction activities are:

Non-native species control – If monitoring reveals that invasive vegetation is retarding the establishment of native species, the invasive species will be controlled through the best available method.

Planting Plan Modifications—If changes such as plant species, densities, and location, although not anticipated, are recommended to address an unanticipated problem (e.g., plant disease or mismatched miscrosite and plant species), then such recommendations will be documented via monitoring reports.

Vandalism—If vandalism occurs, it will be addressed as soon as noticed and practical.

Trampling—If trampling from people or pets using the adjacent trail jeopardizes plant survival or mitigation goals, temporary or permanent exclusion fencing should be installed.

11. Implementation Schedule

Construction is proposed to start summer or early fall of 2018 and is anticipated to take approximately 12 weeks. Construction sequencing is anticipated to begin with installing erosion control elements, then follow with trail construction from north to south, and finishing with construction of the boardwalk.

Planting will immediately follow completion of the construction work. Planting will occur between October 15, 2018 and March 15, 2019 to maximize plant survival.

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APPENDIX A – MITIGATION PLAN SHEET

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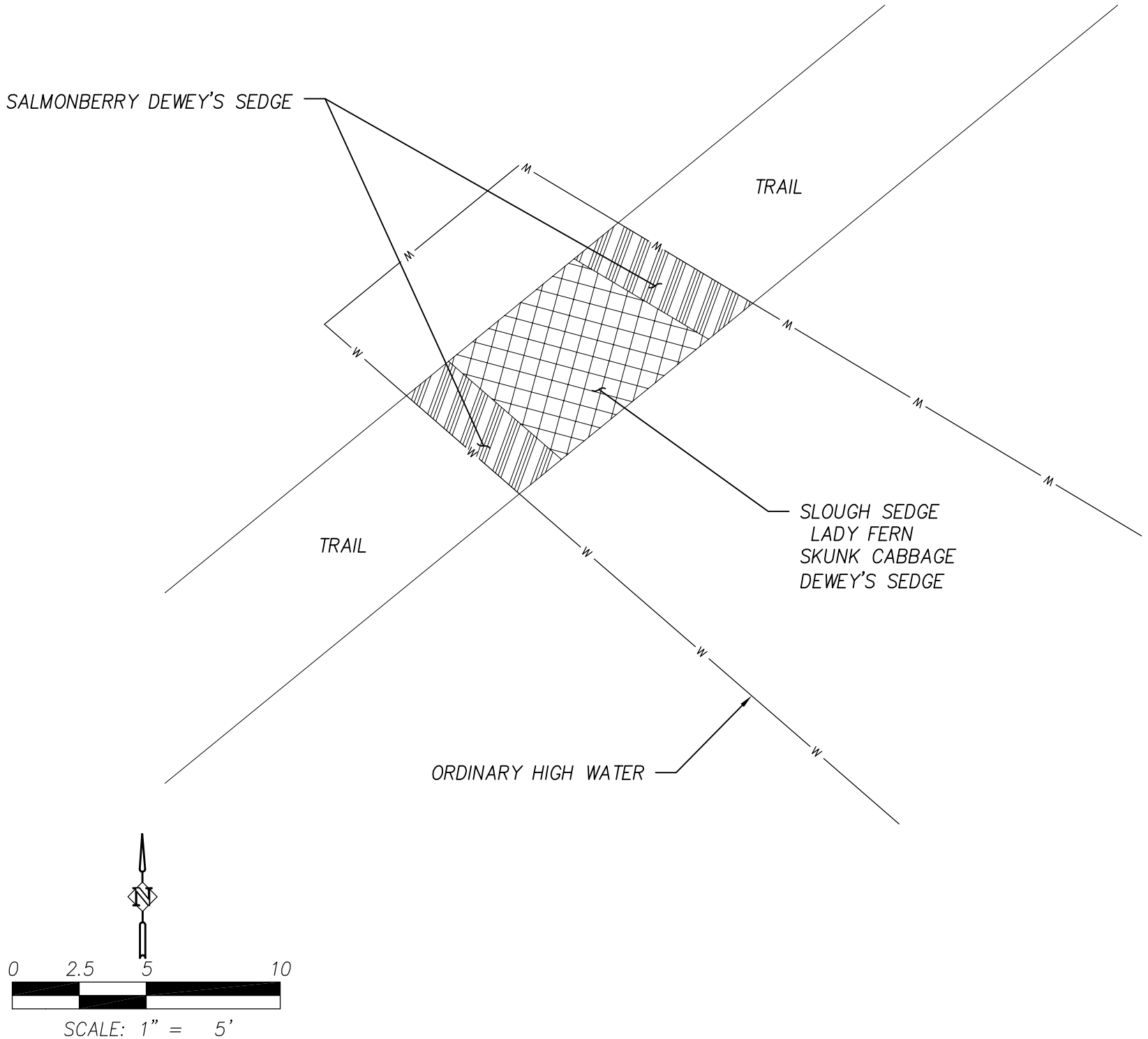

DATE	NO.	DESCRIPTION

REVISIONS

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LACAMAS NORTH SHORE

WETLAND MITIGATION PLAN

CAMAS, WASHINGTON

SHEET NO. A1

JOB NO. CAM-11A

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Vegetation Mitigation Plan

Lacamas North Shore Trail Project
City of Camas Project P1005

Prepared by:
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Prepared for:
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February 27, 2018

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1. Proposed Project

The City of Camas (City) proposes to extend the existing trail system at the south end of Lacamas Lake (Figure 1). The new trails would be located within City property on the northeast side of Lacamas Lake, from the Round Lake Loop Trail east of NE Everett Street (State Route 500) to a natural area on the lakeshore. The main trail, approximately 3,300 feet in length, would traverse northwest from NE Everett Street, following the alignment of an abandoned access road. The main trail would include a 75-foot-long boardwalk, 25 feet of which would lie above a wetland. The boardwalk would be supported on 16 pin piers placed in the abandoned access road where it crosses a wetland.

A shorter loop trail, approximately 1,120-feet long, would connect to the main trail to create a loop in the natural area. A spur trail, approximately 180-feet long, would follow the path of an existing packed dirt trail from the south end of the loop trail to a viewpoint of Lacamas Lake. The latter two trails would have a pervious surface. The main trail would be 8-feet wide and constructed of impervious material (geotextile and a gravel cover); the loop and spur trails would be 4-feet wide and pervious (wood chips).

All segments of the trail would be within the jurisdictional shoreline of Lacamas Lake. Impacts to shoreline vegetation must be mitigated, in accordance with the City of Camas Master Shoreline Program (SMP) chapter 5.8, Vegetation Conservation.

Construction of the trails (including boardwalk) is scheduled for summer or fall of 2018.

2. Vegetation

The proposed trail would be located on an upland ridge at the edge of Lacamas Lake. Tree canopy in the upland forest is dominated by Douglas fir (*Pseudotsuga menziesii*) and bigleaf maple (*Acer macrophyllum*), interspersed with occasional western hemlock (*Tsuga heterophylla*). Cascara (*Frangula purshiana*) and cherry (*Prunus* sp.) are common understory trees. There is a diverse shrub layer—including vine maple (*Acer circinatum*), beaked hazelnut (*Corylus cornuta*), Pacific ninebark (*Physocarpus capitatus*), salmonberry (*Rubus spectabilis*), common snowberry (*Symphoricarpos albus*), salal (*Gaultheria shallon*), and mock orange (*Philadelphus lewisii*)—with sword fern (*Polystichum munitum*), dull Oregon grape (*Mahonia nervosa*), fringe cup (*Tellima grandiflora*), threeleaf foamflower (*Tiarella trifoliata*), and other herbs in the understory. Invasive upland species, including English holly (*Ilex aquifolium*), ivy (*Hedera* spp.), periwinkle (*Vinca* spp.), scotch broom (*Cytisus scoparius*) and shiny geranium (*Geranium lucidum*), are well established in some locations, but generally not dominant. Southeast of this upland forest, on a strip of City property between Lacamas Lake and private homes, is an area dominated by open grass (a mix of non-native pasture and lawn species) with scattered trees, primarily Douglas fir, bigleaf maple, and Oregon white oak (*Quercus garryana*).

Figure 1. Project vicinity.

3. Avoidance, Minimization, and Impacts

Only 4,200 square feet of upland, understory vegetation (no mature trees) would be removed within the shoreline. This impact would occur along the loop trail. The understory in this area is open (approximately 60 percent cover by understory plants), with occasional shrubs (e.g. vine maple, beaked hazelnut, mock orange, snowberry, and dull Oregon grape) and Western sword fern dominating the herb layer.

The trails were realigned and redesigned multiple times (based on field reviews) to avoid and minimize impacts to wetlands and other resources. Avoidance and minimization measures included:

- Utilizing the existing abandoned access road for the main trail to the maximum extent possible;
- Reducing the width of the main trail from 12 feet (the preferred width for regional trails) to 8 feet to remain inside the footprint of the abandoned access road;

- Constructing the main trail surface with gravel rather than concrete or asphalt (the preferred surface for regional trails) to eliminate associated potential stormwater concerns;
- Crossing the East wetland on the existing fill for the abandoned access road and utilizing a low-impact boardwalk design: 6 cubic feet of excavation vs. 60 cubic feet of excavation and concrete for cylindrical footings, and eliminating presence of green concrete in wetland;
- Designing the trails for construction with low-impact manual methods to the extent practical.
- Managing stormwater for the main trail through full dispersion within 20 feet of the edge of the trail, which avoids stormwater impacts to wetlands and Lacamas Lake.
- Utilizing the existing dirt path for the loop and spur trails to the maximum extent possible;
- Utilizing level areas wherever possible for the loop and spur trails to minimize the need for filling or grading;
- Changing the loop and spur trail design from a 12-foot impervious surface to 4-foot, pervious surface;
- Re-routing the loop trail around wetlands and backwaters;
- Eliminating a viewpoint on the loop trail that would have encroached into the Lake wetland;
- Shortening the loop trail and realigning it uphill, away from the Lake wetland;
- Eliminating a segment of the loop trail that would have encroached closer to the East wetland;
- Avoiding the removal of mature trees; and
- Designing the trails for construction with low-impact manual methods to the extent practical.

4. Mitigation

Mitigation will occur at two sites (Figure 2). At the south end of the proposed loop trail, an existing packed dirt trail crosses the end of a narrow backwater in Lacamas Lake (backwater 1). The proposed trail would be rerouted around backwater 1 and a segment of the existing trail, approximately 110 linear feet, would be decommissioned and replanted. This will result in 600 square feet of upland vegetation mitigation.

The second mitigation site, 3,600 square feet in size, will be located adjacent to NE Everett Street where the main trail will begin (Figure 2). Vegetation here is a Douglas fir stand with a degraded understory dominated by non-native grasses and invasive species (ivy, Himalayan blackberry, and scotch broom). The mitigation site will begin at the south end of the fence between the forest and the road and extend for approximately 185 feet to north and 20 feet to the west. Invasive species will be removed and the understory will be replanted with native species on both sides of the new trail.

This will provide mitigation for removal of shoreline vegetation at a 1:1 ratio by area, resulting in a total of 4,200 square feet of replacement shoreline vegetation. This mitigation will replace functions and values provided by understory removed during trail construction; primarily food and cover for wildlife and soil stability.

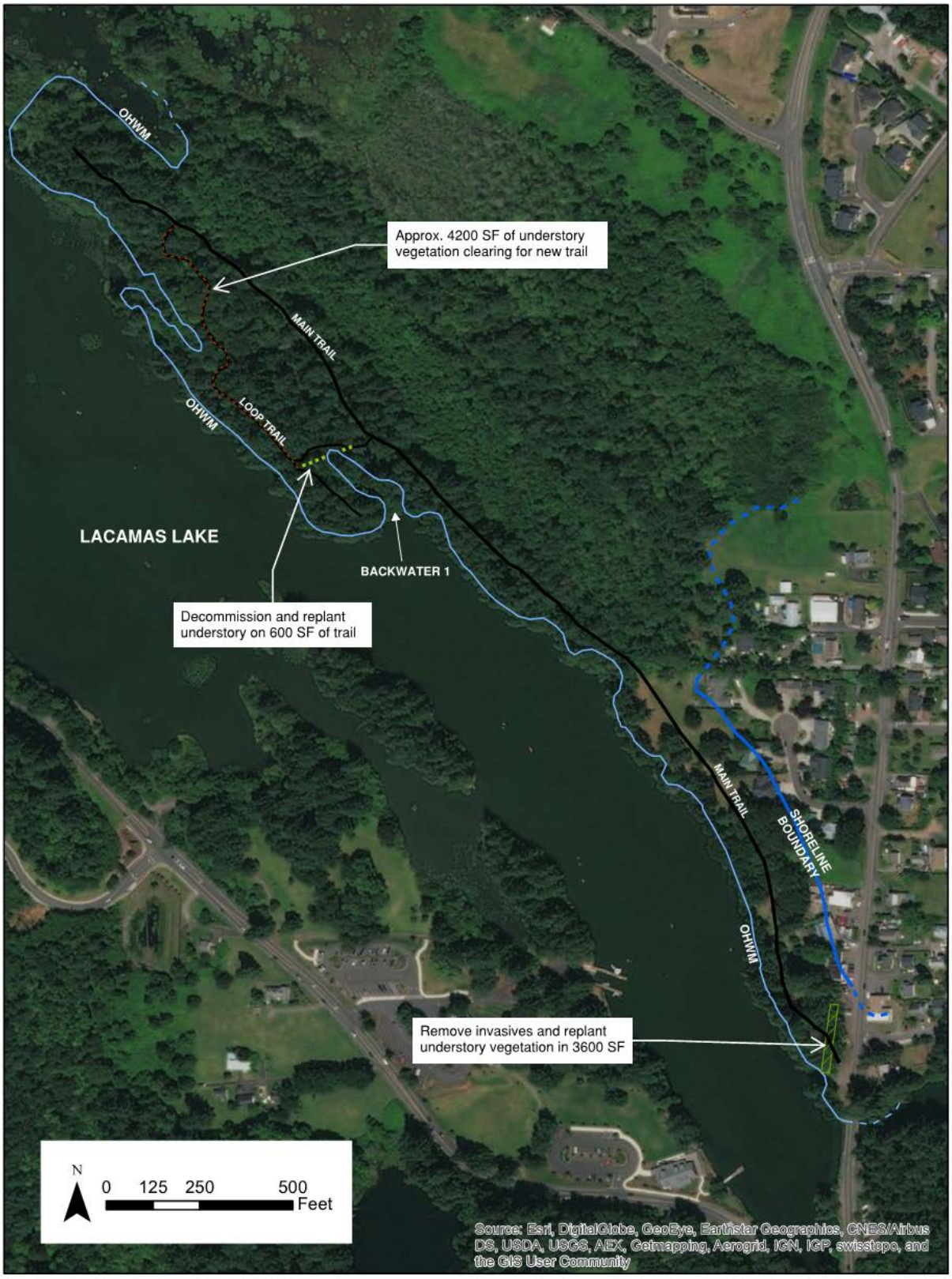

Figure 2. Mitigation sites.

The mitigation sites pose multiple maintenance challenges, including the likelihood of damage via trampling or vandalism and the difficulty of delivering irrigation water during the dry season. In order to address these challenges upfront, mitigation areas will be overplanted, with plants spaced 2 feet on-center. This allows for plant mortality of up to 40 percent, while continuing to achieve understory plant cover similar to that of surrounding native forest.

Table 1. Summary of impacts and mitigation.

Location	Size	Action
Permanent Removal of Native Shoreline Vegetation		
Loop Trail	4200 square feet	Clear understory vegetation, 4 feet wide, to construct pervious trail
Compensatory Vegetation Mitigation (1:1)		
Backwater 1 trail (above OHWM)	600 square feet	Decommission unused portion of existing trail and plant with native species (Table 2)
Forest adjacent to NE Everett Street	3600 square feet	Remove invasive species and plant with native understory species (Table 3)

5. Planting Plan

Backwater 1 Trail (Above OHWM)

Plantings will utilize native trees, shrubs, ferns, and herbs similar to those removed by trail construction and those present in the surrounding forest.

Table 2. Planting plan for backwater 1 trail (above OHWM).

Species	Habit	Form, Spacing (minimum), Quantity
vine maple (*Acer circinatum*)	shrub	bare root, 4 feet o.c., 5 plants
beaked hazelnut (*Corylus cornuta*)	shrub	bare root, 4 feet o.c., 5 plants
cascara (*Frangula purshiana*)	tree	bare root, 10 feet o.c., 2 plants
salal (*Gaultheria shallon*)	shrub	bare root, 2 feet o.c., 15 plants
Cascade Oregon grape (*Mahonia nervosa*)	shrub	bare root, 2 feet o.c., 15 plants
mock orange (*Philadelphus lewisii*)	shrub	bare root, 4 feet o.c., 15 plants
Western sword fern (*Polystichum munitum*)	fern	bare root, 2 feet o.c., 50 plants
bitter cherry (*Prunus emarginata*)	tree	bare root, 10 feet o.c., 3 plants
baldhip rose (*Rosa gymnocarpa*)	shrub	bare root, 2 feet o.c., 15 plants
common snowberry (*Symphoricarpos albus*)	shrub	bare root, 2 feet o.c., 15 plants
piggyback plant (*Tolmiea menziesii*)	herb	container, 2 feet o.c., 25 plants
Total	**165 plants**	

Forest at NE Everett Street

Prior to planting, invasive species will be removed from the mitigation area.

Plantings will utilize native shrubs, ferns, and herbs similar to those removed by trail construction and present in the surrounding forest (Table 3).

Plantings will utilize bare root stock in order to minimize soil disturbance.

Table 3. Planting plan for forest at NE Everett site.

Species	Habit	Form, Spacing (minimum), Quantity
vine maple (*Acer circinatum*)	shrub	bare root, 6 feet o.c., 25 plants
beaked hazelnut (*Corylus cornuta*)	shrub	bare root, 6 feet o.c., 25 plants
cascara (*Frangula purshiana*)	tree	bare root, 12 feet o.c., 10 plants
salal (*Gaultheria shallon*)	shrub	bare root, 2 feet o.c., 100 plants
Cascade Oregon grape (*Mahonia nervosa*)	shrub	bare root, 2 feet o.c., 100 plants
mock orange (*Philadelphus lewisii*)	shrub	bare root, 6 feet o.c., 25 plants
Western sword fern (*Polystichum munitum*)	fern	bare root, 2 feet o.c., 250 plants
bitter cherry (*Prunus emarginata*)	tree	bare root, 12 feet o.c., 10 plants
baldhip rose (*Rosa gymnocarpa*)	shrub	bare root, 2 feet o.c., 25 plants
common snowberry (*Symphoricarpos albus*)	shrub	bare root, 2 feet o.c., 350 plants
Total	**920 plants**	

6. General Planting Specifications

6.1 Source of Plants

Plants will be procured from a reputable nursery(s) having a similar climate as the Camas area and specializing in plants native to the Pacific Northwest. Provide bare root stock, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1, *American Standard for Nursery Stock*.

6.2 Planting Time

Planting should occur between October 15 and March 15.

6.3 Planting Guidelines

Backwater 1 Trail (above OHWM)

Prior to planting, loosen the top 6 to 12 inches of trail surface to eliminate compaction, using hand tools or a tiller, and amend with organic matter.

Make holes deep and wide enough to accommodate the plants' roots without resulting in J-rooting. Tamp down soil firmly around plants to make good contact with roots. If soil is not saturated at the time of planting, water each plant after planting.

Mulch the planting area with wood chips or bark to suppress weeds and retain moisture.

NE Everett Street

Prior to planting, remove invasive species (including ivy, scotch broom, and Himalayan blackberry) from the mitigation area.

Utilize the wedge method for planting bare root stock in order to minimize soil disturbance. No soil should be removed from holes.

Make holes deep and wide enough to accommodate the plants' roots without resulting in J-rooting. Tamp down soil firmly around plants to make good contact with roots. If soil is not saturated at the time of planting, water each plant after planting.

Mulch the planting area with wood chips or bark to suppress weeds and retain moisture.

7. Objectives and Performance Standards

Objectives describe the ecological goals or outcomes planned for the site and how those are to be achieved. Performance standards and associated measurements evaluate if the objectives are attained as planned.

7.1 Objective 1 — Backwater 1 Trail (above OHWM)

To replace bare, compacted dirt with native understory vegetation that provides cover and food for wildlife, in accordance with SMP 5.8.2.

7.2 Objective 2 — NE Everett Street

To replace invasive species with native understory vegetation that provides cover and food for wildlife within the shoreline, in accordance with Camas SMP 5.8.2.

7.3 Performance Standards

Performance standards will be evaluated at three different times after installation of plants:

- 1st Year—After at least 12 months and at least one growing season the mitigation area will achieve: 1) at least 60% survival of all plants installed, and 2) less than 5% cumulative aerial cover of shrub or tree noxious weed species and Class A or B herbaceous noxious weed species in the most current Clark County noxious weed list. Voluntary recruitment of native species into the understory will be counted toward the performance standard.

- 5th Year—Four growing seasons after the 1st year measurement is taken, the mitigation area will achieve: 1) at least 60% average aerial coverage of native understory species, and 2) less than 5% cumulative aerial cover of shrub or tree noxious weed species and Class A or B herbaceous noxious weed species in the most current Clark County noxious weed list. Voluntary recruitment of native species into the understory will be counted toward the performance standard.

- 10th Year—Nine growing seasons after the 1st year measurement is taken, the area will achieve: 1) at least 60% average aerial coverage of native understory species, and 2) less than 5% cumulative aerial cover of shrub or tree noxious weed species and Class A or B herbaceous noxious weed species in the most current Clark County noxious weed list. Voluntary recruitment of native understory species will be counted toward the performance standard.

8. Monitoring

The following actions will be implemented as part of the vegetation monitoring:

- A qualified professional will supervise initial planting and prepare an as-built report that will include:
    - Plant sources and day of planting
    - Final site map with the mitigation site boundaries identified
    - Photographs of the mitigation area
    - Final species, sizes, and numbers of plants installed

- An analysis of any changes to the mitigation plan that occurred during construction
- Other relevant observations of the professional present during construction and installation

- Monitoring activities will take place during the late spring or summer with the goal of monitoring within the same 3-week window each year. Monitoring of the 1st, 2nd, 3rd, 5th, 7th, and 10th year will be conducted, and a report documenting monitoring results will be submitted to the City. These reports will identify deficiencies in the mitigation and any contingency measures that will be taken to correct those deficiencies.

9. Maintenance

Maintenance will occur annually, at a minimum, during years 1-3, or as necessary to achieve performance standards. Maintenance during years 4-10 will be based on monitoring report recommendations, as necessary to achieve performance standards.

Maintenance for this project will include:

- Additional weed control during the first two years to reduce competition to young plants.
- Removal of invasive species, such as Himalayan blackberry, ivy, and scotch broom, within the mitigation area.
- If necessary to achieve performance standards, replacement (species for species, unless contingency measures are applied) of any dead plants in the mitigation area.

10. Contingency Plans

Contingency measures for post-construction activities are:

Non-native species control – If monitoring reveals that invasive vegetation is retarding the establishment of native species, the invasive species will be controlled through the best available method.

Planting Plan Modifications—If changes such as plant species, densities, and location, although not anticipated, are recommended to address an unanticipated problem (e.g., plant disease or mismatched microsite and plant species) then such recommendations will be documented via monitoring reports.

Vandalism—If vandalism occurs, it will be addressed as soon as noticed and practical.

Trampling—If trampling from people or pets using the adjacent trail jeopardizes plant survival or mitigation goals, temporary or permanent exclusion fencing should be installed.

11. Implementation Schedule

Construction is proposed to start summer or early fall 2018 and is anticipated to take approximately 12 weeks. Construction sequencing is anticipated to begin with installing erosion control elements, then follow with trail construction from north to south, and finishing with construction of the boardwalk.

Planting will immediately follow completion of the construction work. Planting will occur between October 15, 2018 and March 15, 2019 to maximize plant survival.

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