# Appendix A:  Figures

# Figure 1: Camp Lacamas Vicinity Map



## Legend

- Highway
  - Interstate
  - State
- Arterial
- Collector
  - Public Road
  - DNR
  - DNR Private
- Other
  - Private
  - Alley
  - Driveway
  - Proposed
  - Unknown
- Cities Boundaries
- Urban Growth Boundaries

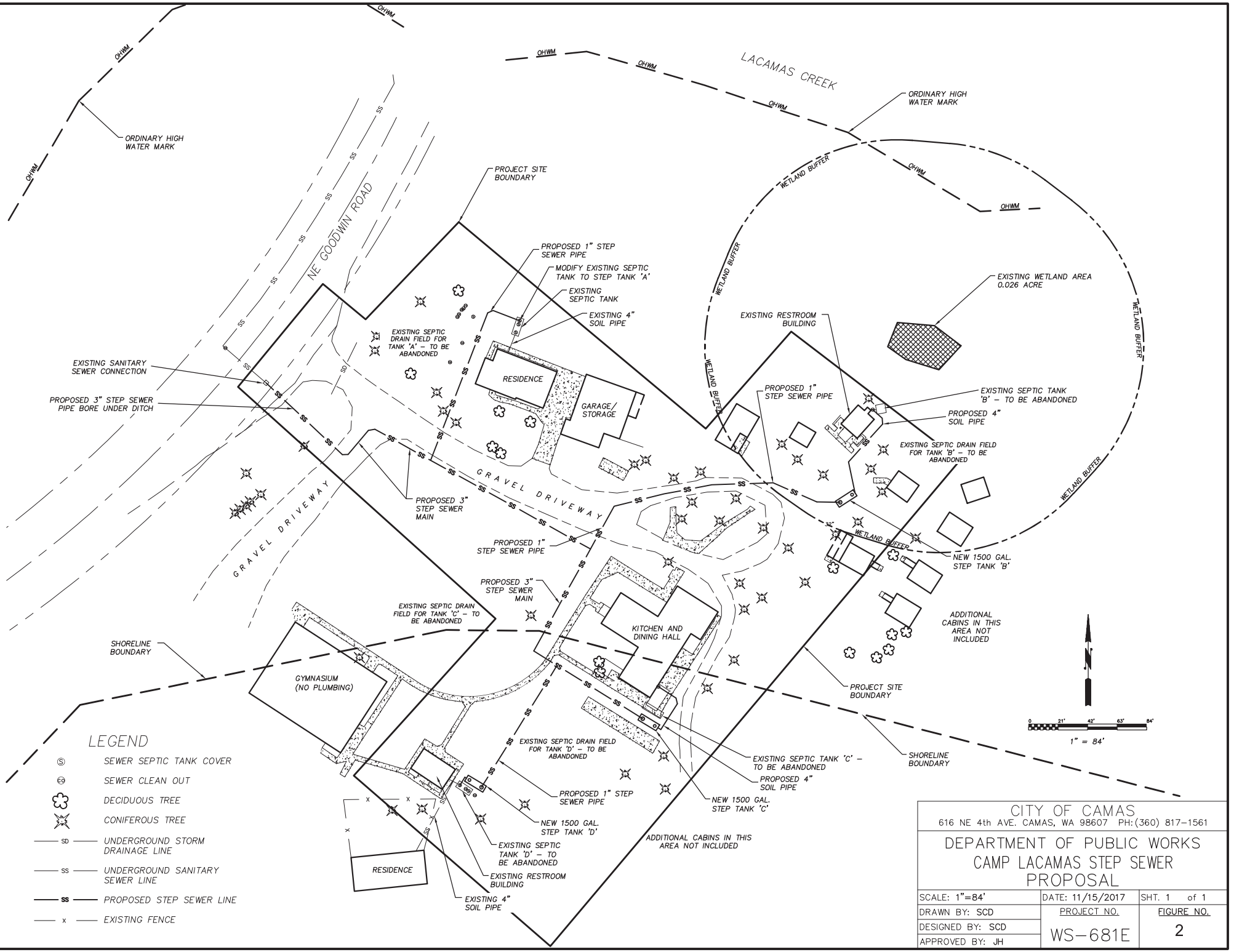
## Notes:

1: 18,000

3,000.0 0 1,500.00 3,000.0 Feet

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

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.

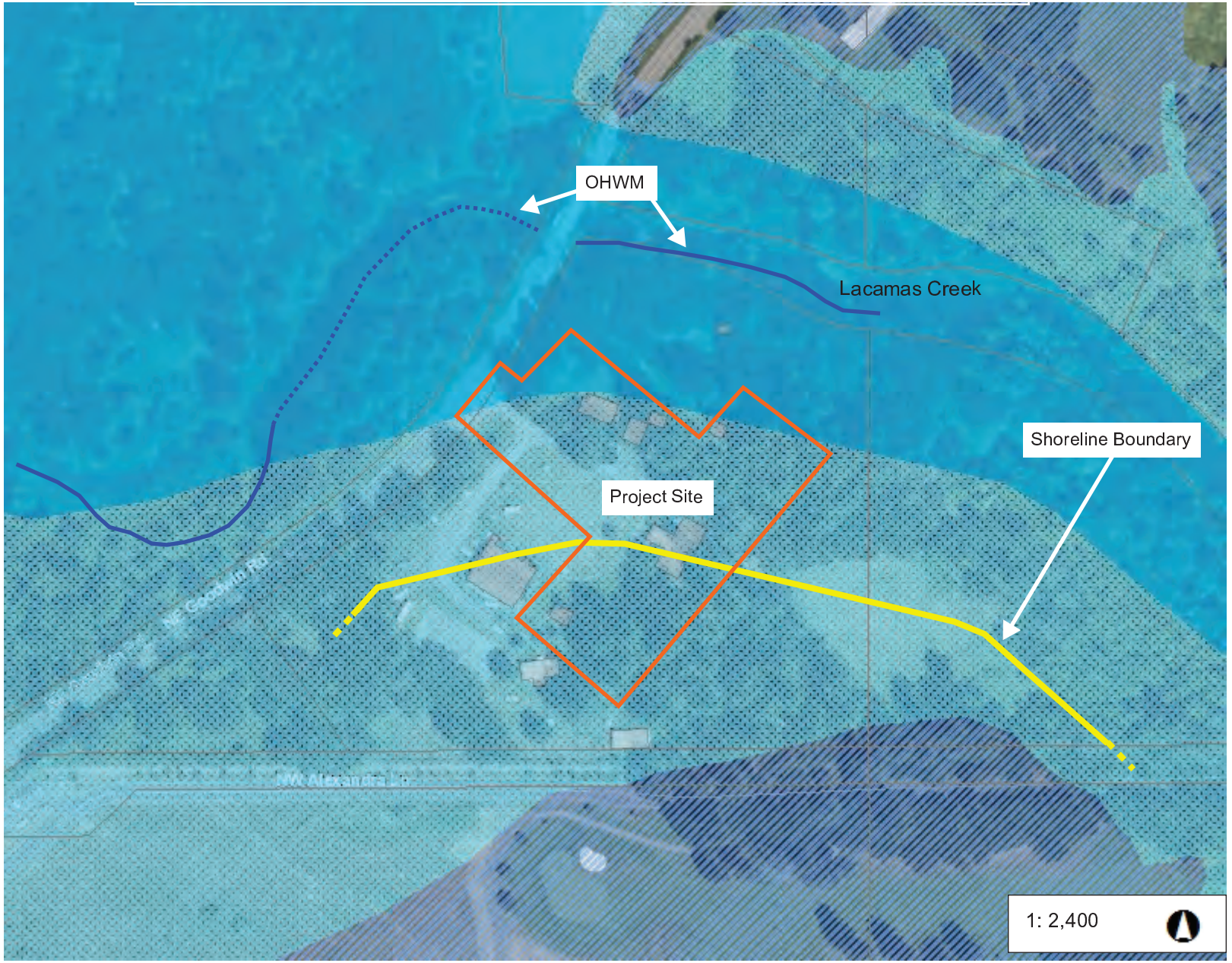



CITY OF CAMAS
616 NE 4th AVE. CAMAS, WA 98607 PH:(360) 817-1561

# DEPARTMENT OF PUBLIC WORKS
# CAMP LACAMAS STEP SEWER PROPOSAL

| | | |
|---|---|---|
| SCALE: 1"=84' | DATE: 11/15/2017 | SHT. 1 of 1 |
| DRAWN BY: SCD | PROJECT NO. | FIGURE NO. |
| DESIGNED BY: SCD | WS-681E | 2 |
| APPROVED BY: JH | | |

# Figure 3: Camp Lacamas Floodplain and Shoreline Boundary





## Legend

- Building Footprints
- Taxlots
- Flood Zone Designation
  - Floodway
  - Floodway Fringe
  - 500 Year Flood Area
  - Area Not Studied
- Roads

## Notes:

400.0 0 200.00 400.0 Feet

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

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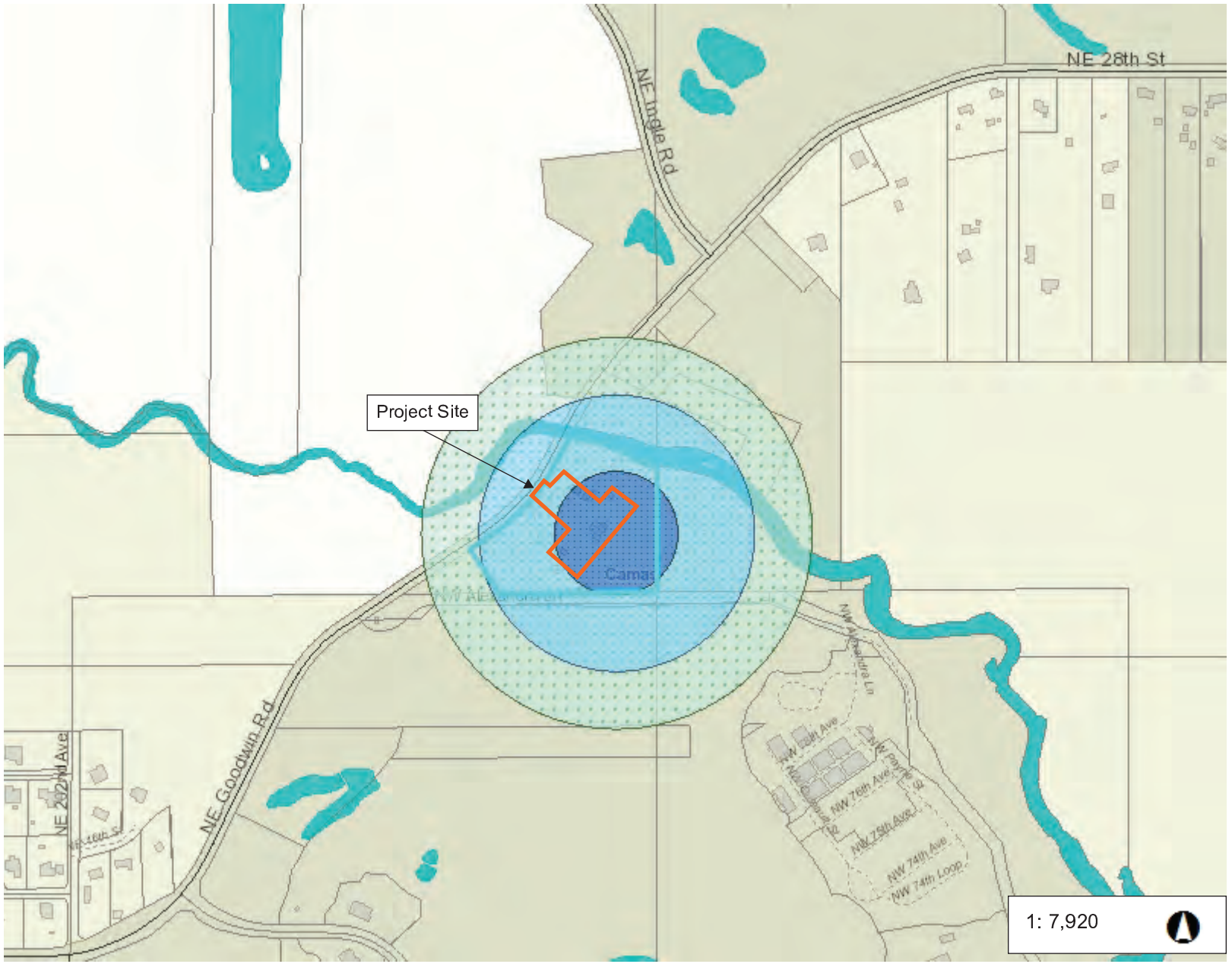
# Figure 4: Camp Lacamas Critical Aquifer Recharge Areas




## Legend

- Public Wellhead Zones
  - 1
  - 5
  - 10
- Private Wellhead Zones
  - 1
  - 5
  - 10
- Wellhead Protection Areas
  - 0
  - 1 Year
  - 5 Years
  - 10 Years
- Building Footprints
- Taxlots
- Cities Boundaries
- Urban Growth Boundaries

## Notes:

1,320.0 0 660.00 1,320.0 Feet

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

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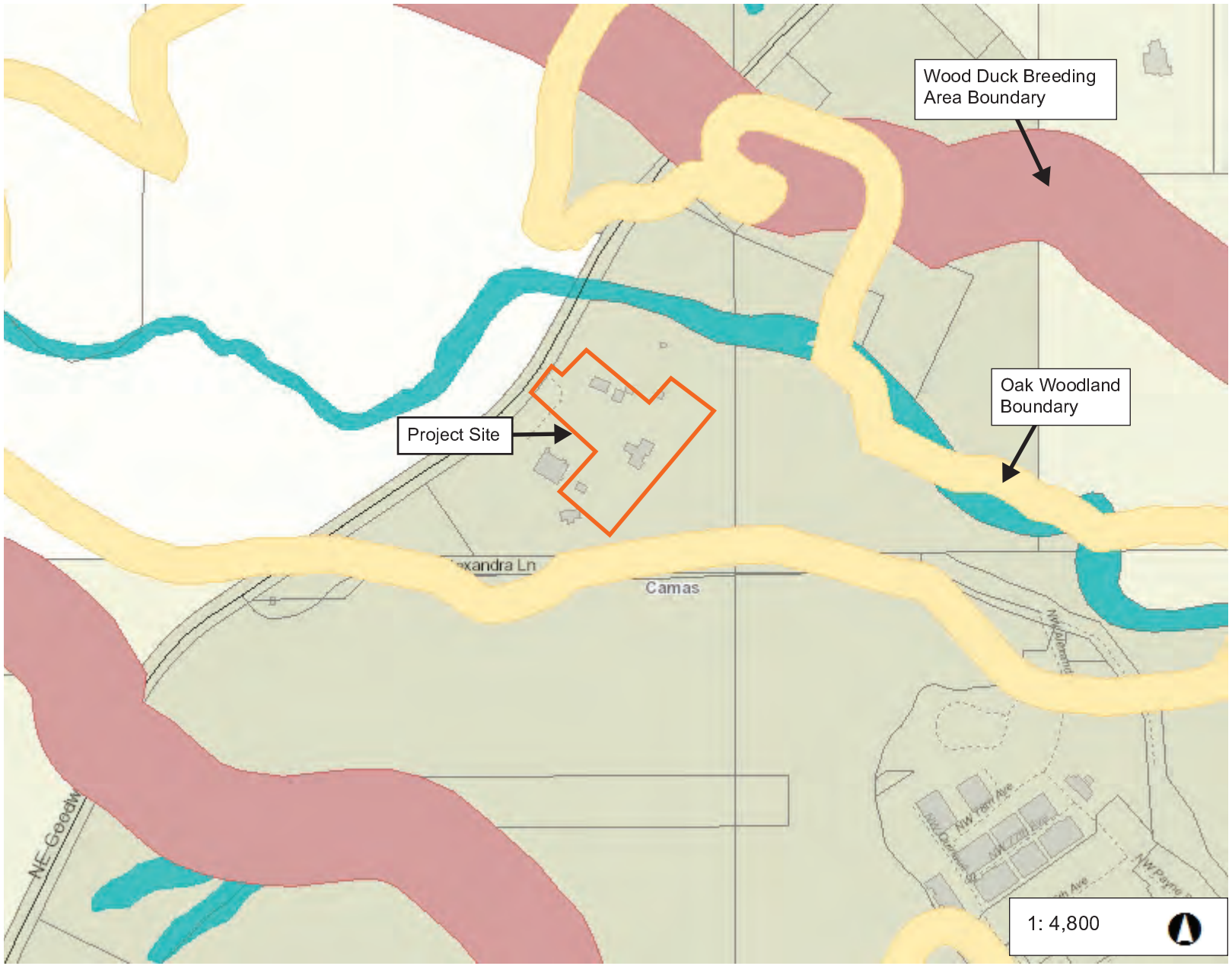
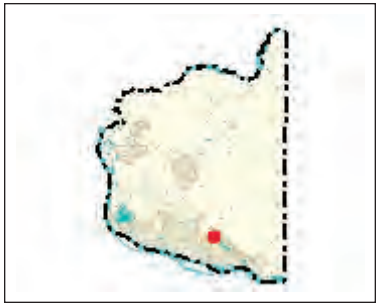
# Figure 5: Camp Lacamas Priority Species and Habitat



Legend

- Priority Habitat Buffer
- Priority Species Buffer
- Building Footprints
- Taxlots
- Cities Boundaries
- Urban Growth Boundaries

Notes:

800.0 0 400.00 800.0 Feet

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

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.

# Appendix B:  Photographs

**Photograph 1:** View northwest across camp lawn toward NE Goodwin Road. Proposed sewer alignment to be located in gravel road on right and connection to sewer main in NE Goodwin Road near the sign board. Photograph taken July 28, 2017.

**Photograph 2:** View of camper residential cabins and restroom (the building on left in background). Proposed sewer alignment to pass between various Douglas fir trees. Photograph taken July 28, 2017.

**Photograph 3:** View looking east, showing Wetland K-1. Emergent area, dominated by water parsley in foreground and center. Photograph taken July 28, 2017.

**Photograph 4:** View looking southwest across camp lawn. Proposed sewer alignment to be right and parallel to the sidewalk and extend to the restroom (green building at back, center). The area beyond the blue spruce (*Picea pungens*) in the foreground is outside of Shoreline jurisdiction. Photograph taken July 28, 2017.

**Photograph 5:** View along the west side of the caretaker's house. Proposed sewer alignment to pass close to the building in the lawn beneath the Oregon white oaks (*Quercus garryana*). The septic tank to be modified is buried at the corner of the building. Photograph taken July 28, 2017.

**Photograph 6:** View looking east along the south bank of Lacamas Creek, approximately 160 feet north of the project, adjacent to the parcel. Photograph taken July 28, 2017.

# Appendix C:  Tree Survey

# Table C-1. Tree Survey

Species and diameter of trees larger than 4 inches DBH (diameter breast height) in project area.

| DBH (in) | Douglas Fir | Oregon White Oak | Blue Spruce (*Picea pungens*) | Elm (*Ulmus sp.*) | Yew (*Taxus sp.*) |
|---|---|---|---|---|---|
| 4 | | | 1* | | |
| 7 | | | 1* | | |
| 8 | | | 1 | | |
| 9 | | | 1 | | |
| 12 | | | 1* | | |
| 13 | | | 1* | | |
| 14 | | | | | 1 |
| 19 | 1 | 1 | 1† | | |
| 20 | | 1 | | 1* | |
| 22 | | | | 1* | |
| 25 | | 1 | | | |
| 26 | 1 | | | | |
| 27 | | | | 1 | |
| 29 | 1 | | | | |
| 30 | 1 | | | | |
| 33 | 1 | | | | |
| 34 | 1 | | | | |
| 38 | 2 | | | | |
| 40 | 1 | | | | |
| 46 | 2 | | | | |
| Total | 11 | 3 | 7 | 3 | 1 |
| % of Total | 44 | 12 | 28 | 12 | 4 |

**Stem of multi-stemmed tree*

† *Collar measurement*

# Appendix D: Other Technical Reports

# WETLAND REPORT

## Camp Lacamas Step Sewer Project
## City of Camas Project WS-681E

**Prepared for:**
City of Camas
Public Works Department
616 NE 4th Avenue
Camas, Washington 98607

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

**December 19, 2017**

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

## TABLE OF CONTENTS

# 1. INTRODUCTION

The City of Camas (City) plans to install a STEP (Septic Tank Effluent Pumping) system to serve Camp Lacamas at 2025 NE Goodwin Road (parcel number 172543000), replacing the existing on-site septic system. This new system will connect to the existing public sewer via an existing stub that lies at the eastern edge of NE Goodwin Road. A new line will be extended from the existing stub to the parcel, by boring under the ditch along the roadway. The proposed STEP system consists of approximately 900 feet of sewer line and four underground septic tanks (three new STEP tanks and one existing septic tank to be modified), hereafter referred to as STEP tanks, to service two residences, the kitchen/dining hall, and two restrooms. Electric pumps are integrated into each STEP tank. One small electrical service panel (to provide power for the system) will be installed aboveground. Three existing septic tanks will be decommissioned in-place (pumped out and filled with sand). Excavations will be either in the existing roadway, adjacent lawn, or areas regularly traversed by pedestrians. No new impervious surface will be created.

# 2. GENERAL SITE DESCRIPTION

## 2.1 Land Use and Landscape Setting

The field study area for this wetland delineation is a portion of parcel 172543000, located within the southeast ¼ of Section 20, of Township 2 North, Range 3 East, Willamette Meridian, City of Camas, Clark County, Washington (Figure 1, Appendix A). Lacamas Creek lies to the northeast of the study area and NE Goodwin Road lies to the northwest. The project is located on a terrace of Lacamas Creek. The terrace is developed with camp buildings, access roads, and mowed fields (Photographs 1 and 2, Appendix B). The parcel is zoned Light Industrial/Business Park (Clark County GIS 2017). Surrounding parcels are a mixture of parks, open space, and agriculture.

## 2.2 Soils

The Clark County soil survey (Soil Survey Staff, accessed November 6, 2017) identifies two map units in the study area (Figure 2): 1) Lauren gravelly loam (0-8% slopes), a deep soil formed in old alluvium and excessively well drained; and, 2) Lauren gravelly loam, cemented substratum (3-15% slopes), which is moderately well drained. Lauren soils are non-hydric.

## 2.3 Streams

At the nearest point, the project alignment is approximately 160 feet from the ordinary high water mark (OHWM) of Lacamas Creek, a perennial stream. Thus, the project is within Water Resource Inventory Area (WRIA) 28 and the 6th field Hydrologic Unit Code (HUC) Lower Columbia/Sandy 170800010606. The entire project is within the 100-year floodplain of Lacamas Creek (FEMA 2012). Lacamas Creek flows east and south, entering Lacamas Lake approximately 1 mile downstream of the parcel. Lacamas Creek is listed as habitat for resident fish (WDFW 2017). Anadromous fish are prevented from entering Lacamas Lake, and thus Lacamas Creek, by Lacamas Lake and Round Lake dams (WDFW 2017).

Lacamas Creek is regulated as a shoreline (Type S stream) under the City of Camas Shoreline Master Program (SMP). The parcel is within the Urban Conservancy shoreline designation (Clark County GIS 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 and site specific topography by KC Development (March 28, 2017);
- 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 map does not identify wetlands on the parcel. Likewise, the National Wetland Inventory (NWI) data (Clark County GIS 2017) does not map wetland on the parcel, only on the north side of Lacamas Creek, which is approximately 200 feet at the closest point to the project (Figure 3). Clark County's modeled wetland data (Clark County GIS 2017) identifies potential wetland adjacent to Lacamas Creek and part of the roadside ditch along the south side of NE Goodwin Road.

No hydric soils are mapped in the study area (section 2.2).

Rainfall was evaluated for the three months preceding the wetland field visit as measured at the Portland International Airport weather station (NOAA NWS 2017). While July at the time of the delineation was drier than the normal range, precipitation in May and June fell within the normal range, and precipitation in April was well above normal. The precipitation for the 3 months plus July was slightly above average for that time period. Based on this analysis, climatic and hydrologic conditions at the time of the delineation are considered normal.

**Table 1. Summary of Precipitation at Portland International Airport Weather Station (NOAA NWS 2017).**

| Month | Total Precipitation (inches) | Normal Range WETS (inches) | Within Normal Range | Average (inches) |
|---|---|---|---|---|
| **April** | 4.51 | 1.89 – 3.12 | Wetter | 2.64 |
| **May** | 1.92 | 1.39 – 2.89 | Yes | 2.38 |
| **June** | 1.08 | 0.91 – 1.94 | Yes | 1.59 |
| **July (1-27)** | T | 0.30 – 1.12 | Drier | 0.72 |
| **Overall for April-July** | 7.51 | N/A | Yes | 7.33 |

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 or wire flags, and locations recorded using a handheld GPS unit to produce a sketch map. All data plot and flag locations were then recorded by KC Development (the land surveying firm contracted by the City).

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 Ordinary High Water Mark (OHWM) of Lacamas Creek 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 Creek 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 Ivy Watson), conducted field visits on June 20, 2017 and July 28, 2017 and identified one wetland (Wetland K-1) and wetland buffer in the study area. Delineated boundaries for Wetland K-1 are shown in Figure 4. Table 2 provides a summary of the wetland character.

**Table 2. Summary of the Wetland K-1 on the Camp Lacamas STEP site.**

| Wetland | Size (acres) | HGM Classification | Cowardin Class |
|---|---|---|---|
| **K-1** | 0.026 | Depressional | Palustrine Scrub-shrub/ Emergent |

## 4.1 Location and General Description

A very small (0.026 acre or 1,112 square feet) palustrine scrub-shrub/emergent (PSS/PEM) depressional wetland with a forested fringe (Wetland K-1; Photographs 3 and 4) is present approximately 40 feet northeast of the project alignment, at the closest point. This wetland is located in a depression at the toe of a steep slope (approximately 30%) that separates the developed camp area on the upper terrace from the forested and relatively undisturbed lower terrace along Lacamas Creek. This wetland could be occupying the bottom of an old, abandoned gravel pit, but this is uncertain.

The boundary of Wetland K-1 lies at the base of a distinct and abrupt break in topography and changes in associated parameters: change in dominant vegetation (from hydrophytic to upland), soils (hydric to non-hydric), and lack of hydrology. The surrounding upland terrace is densely forested (canopy cover approximately 80%), with a mix of Oregon white oak (*Quercus garryana*), Douglas fir (*Pseudotsuga menziesii*), and Oregon ash (*Fraxinus latifolia*), and an understory of native shrubs and saplings.

One roadside ditch (Photographs 7 and 8) was identified in the study area, along NE Goodwin Road. In the vicinity of the project, this ditch is excavated in upland based on USDA NRCS soil mapping (non-hydric soils); corroboration of the same based on the site review, and non-hydrophytic vegetation. Ditches excavated in upland are exempt from City wetland regulations (SMP 16.53.010.C.2); therefore, the ditch was not delineated and no buffer is required. The ditch likely carries seasonal stormwater drainage. The project will not impact this ditch; the sewer line will be bored underneath it and construction will implement relevant Best Management Practices (silt fencing, equipment storage, etc.).

## 4.2 Vegetation

Vegetation in the wetland consists of a mosaic of emergent and scrub-shrub communities, with a forested fringe. The emergent plant community is dominated by water parsley (*Oenanthe sarmentosa*), intermixed with native forbs (e.g. marsh bedstraw [*Galium palustre*], water smartweed [*Persicaria sp.*], mad dog skullcap [*Scutellaria lateriflora*], and small-fruited bulrush [*Scirpus microcarpus*]), and invasive species (e.g. reed canarygrass [*Phalaris arundinacea*], spotted touch-me-not [*Impatiens capensis*], and climbing nightshade [*Solanum dulcamara*]). The invasive species have not proliferated in the wetland, probably because mature trees in the forested fringe and adjacent upland shade the wetland from all sides. The scrub-shrub plant community is dominated by thickets of red osier dogwood (*Cornus alba*). The forested fringe is dominated by Oregon ash (*Fraxinus latifolia*), with an understory of emergent species, such as those described above. The dominant species in the data plot (Data Form K-1 Plot 2, Appendix C) satisfy the Rapid Test for hydrophytic vegetation.

## 4.3 Soils

Soils observed in Wetland K-1 have a very dark gray (2.5Y3/1) gravelly loam surface horizon (0-12 inches) with 2 percent dark yellowish brown (10YR4/6) and 2 percent brown (10YR4/3) concentrations in the matrix (Data Form K-1 Plot 2, Appendix C). From 12 to 14 inches, the limit of the soil pit, was weather bedrock (Troutdale Formation) that was very difficult to excavate. The texture was extremely gravelly sandy loam with a brown to strong brown

(7.5YR4/4-6) matrix and yellowish brown (10YR5/6) concentrations in the matrix. The surface (0-12 inches) horizon meets the criteria for redox dark surface (hydric soil indicator F6).

## 4.4 Hydrology

Hydrology for Wetland K-1 appears to be driven by a high water table associated with Lacamas Creek and having restricted drainage because of the shallow bedrock. Areas of surface water ponding and saturated soils were observed during the June 20, 2017 site visit (Photograph 3). Soil was moist, but not saturated, during the July 28 delineation. Secondary indicators, including water-stained leaves (B9), geomorphic position (D2), and FAC-neutral vegetation (D5) were observed during the July visit. The presence of these primary and secondary indicators of wetland hydrology meets the wetland hydrology criteria.

## 4.5 Wetland Rating

Wetland K-1 is a very small wetland (0.026 acres). Consequently, the habitat functions and ratings are difficult to assess accurately using the *Washington State Wetland Rating System for Western Washington – 2014 Update*, which Hruby (2014, p. 26) notes:

> *At present, the accuracy of the scoring has not been tested for wetlands smaller than 1/10 ac, but the method may be applicable to even smaller wetlands because the scoring of water quality and hydrologic functions is not dependent on the size or the habitat niches in the wetland. …The field testing, however, indicates that the method will not work well for scoring habitat functions in wetlands smaller than 1/10 ac (4000 $ft^2$).*

With this understanding, Wetland K-1 was rated using Hruby (2014). The resulting scores indicated moderate to high water quality function (score of 7), with moderate hydrologic function (score of 6), and high habitat function (score of 8). Overall, these scores result in a 21 point Category II rating (Appendix D).

Wetland buffer widths required for water quality functions protection (SMP Table 16.53.040-1) and habitat functions protection (SMP Table 16.53.040-2) are determined based on the intensity of the proposed land use (SMP Table 16.53.040-4 Land Use Intensity Matrix), the wetland rating, and the habitat score for each wetland. Underground utility lines are a low intensity land use according to the Land Use Intensity Matrix. Thus, the buffers designated by the City are 50 feet for water quality and 130 feet for habitat functions. The following discussion will only reference the buffer for habitat functions, as it is the larger of the two and therefore determines the outer boundary of the regulated buffer area.

**Table 3. Summary of the Wetland K-1 Rating and Buffer Width.**

| Wetland | Size* (acres) | Wetland Rating** | Max. Buffer Width*** |
|---|---|---|---|
| **K-1** | 0.026 | II | Habitat Functions: 130 feet |

* Based on survey of delineation by City of Camas.
** Hruby, 2014.
*** SMP Table 16.53.040-2, applying low intensity use per SMP Table 16.53.040-4.

The wetland buffer to the southwest of the wetland (toward the project alignment) extends up a steep slope and into the developed area of the camp. Here, the buffer is characterized by mature Douglas fir trees (*Pseudotsuga menziesii*, 24 to 55 inches diameter breast height [DBH]) that provide approximately 80 percent canopy cover throughout most of the buffer area. On the slope, the understory is dominated by a carpet of ivy (*Hedera helix*) with occasional shrubs (e.g. Western serviceberry [*Amelanchier alnifolia*], beaked hazelnut [*Corylus cornuta*], and common snowberry [*Symphoricarpos albus*]). In the camp area, the understory is sparse and crisscrossed by footpaths. Where present, understory vegetation is dominated by non-native grasses and forbs (e.g. orchard grass [*Dactylis glomerata*], shiny geranium [*Geranium lucidum*], and common dandelion [*Taraxacum officinale*]), with occasional native forbs (e.g. fringecup [*Tellima grandiflora*] and Siberian springbeauty [*Claytonia siberica*]). The buffer in the camp area contains preexisting buildings, including a restroom, "snack shack", and four cabins. These are functionally separate from the wetland and do not protect it from adverse impacts, and are therefore excluded from the buffer per SMP 16.53.040.B.4.b.i.

The restroom lies at the top of the slope, above the wetland. Though the building is excluded from the wetland buffer, it is served by a septic tank and leach field located within the buffer, also at the top of the slope. The proposed project would empty and abandon all existing septic systems and connect Camp Lacamas to the City's sanitary sewer system. The STEP system would include built-in alarm systems that require immediate investigation by City maintenance staff when a problem is detected, in contrast to the 10-year inspection interval required for septic systems (Jim Hodges, City of Camas, pers. comm., 2017). This is considered an ecological benefit because of the potential for water quality impacts posed by old septic systems, especially given the presence of an impermeable layer (the Troutdale Formation) 2 to 3 feet below the ground surface, dipping towards the wetland and Lacamas Creek.

Project impacts within the buffer would be limited to temporary disturbance to soil and non-native annual vegetation.

### 4.6 Streams

Lacamas Creek, nearest the project alignment (from the NE Goodwin Road bridge to approximately 450 feet downstream), was reviewed on July 28, 2017. The OHWM in this location was identified based on a change of vegetation from facultative herbaceous species dominated by reed canarygrass, to trees and shrubs dominated by upland species (e.g. Oregon white oak, cascara [*Frangula purshiana*], and common snowberry) and, typically, a recognizable slope break. At the downstream end of this area, the OHWM is located at the outer edge of an old backwater channel. Here the OHWM was determined by a distinct and abrupt rise in topography and a shift in vegetation from obligate wetland species (slough sedge [*Carex obnupta*]) to the upland forest described above.

Upstream of the NE Goodwin Road bridge for approximately 1000 feet, the OHWM is typically at the back of the first stream terrace above the active channel (reviewed by Kent Snyder August 20, 2015 and March 2, 2017). Here the OHWM is readily defined by a distinct and abrupt rise in topography (typically 1 to 3 feet high), and vegetation changes from a facultative shrub or herbaceous (e.g., reed canarygrass) community to upland forest community (e.g., snowberry,

sword fern, bigleaf maple, and Douglas fir). Movement of sediment is evident on the terrace below; no such sediment was observed above the OHWM. There were wrack lines in vegetation on active channel, but not above slope break. The uppermost segment of the OHWM follows the edge of an old stream meander. Here the boundary is defined by a lower (typically 1-foot) topographic break along a shallow channel. Either open water or scrub-shrub vegetation (typically red osier dogwood) lies on the stream side and an open ash forest is present on the other. Wrack and sediment from Lacamas Creek are present along the boundary.

## 5. CONCLUSIONS

One very small (0.026 acre or 1,112 square feet) palustrine scrub-shrub/emergent depressional wetland (Wetland K-1), possibly an old borrow pit, was identified in the study area. This wetland rated as a Category II with a habitat score of 8, according to the 2014 Ecology rating system (Hruby 2014) and City requirements (SMP 16.53). The City requires a buffer of 130 feet to protect habitat function when a project proposes low intensity land uses adjacent to a wetland with this rating (SMP 16.53.040). The project area is within 200 feet of the floodway of Lacamas Creek, and therefore within the regulated Shoreline (SMP 2015).

The proposed project would protect the wetland by discontinuing on-site septic system located inside the 130-foot buffer. Only temporary impacts to the buffer would result from the project in a previously developed area. Implementation of a Temporary Sediment and Erosion Control Plan would protect the wetland from discharges during construction.

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## Appendix A – Figures

# Figure 1: Wetland Delineation Study Area


Legend

- Building Footprints
- Taxlots
- Roads

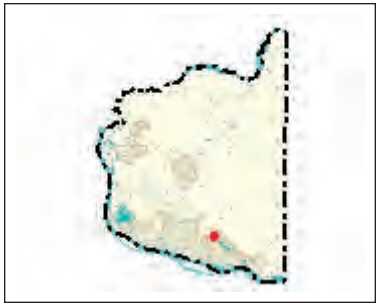
Notes:

400.0 0 200.00 400.0Feet

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

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.

# Figure 2. USDA NRCS soil map

## Legend

- Taxlots
- Soil Type

LgB - Lauren gravelly loam (0-8% slopes)

LrC - Lauren gravelly loam, cemented substratum (3-15% slopes)

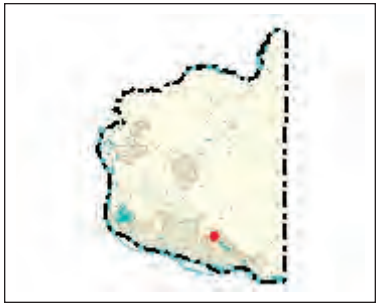
## Notes:

200.0 0 100.00 200.0 Feet

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

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.

# Figure 3. NWI and Clark County modeled wetland

Legend

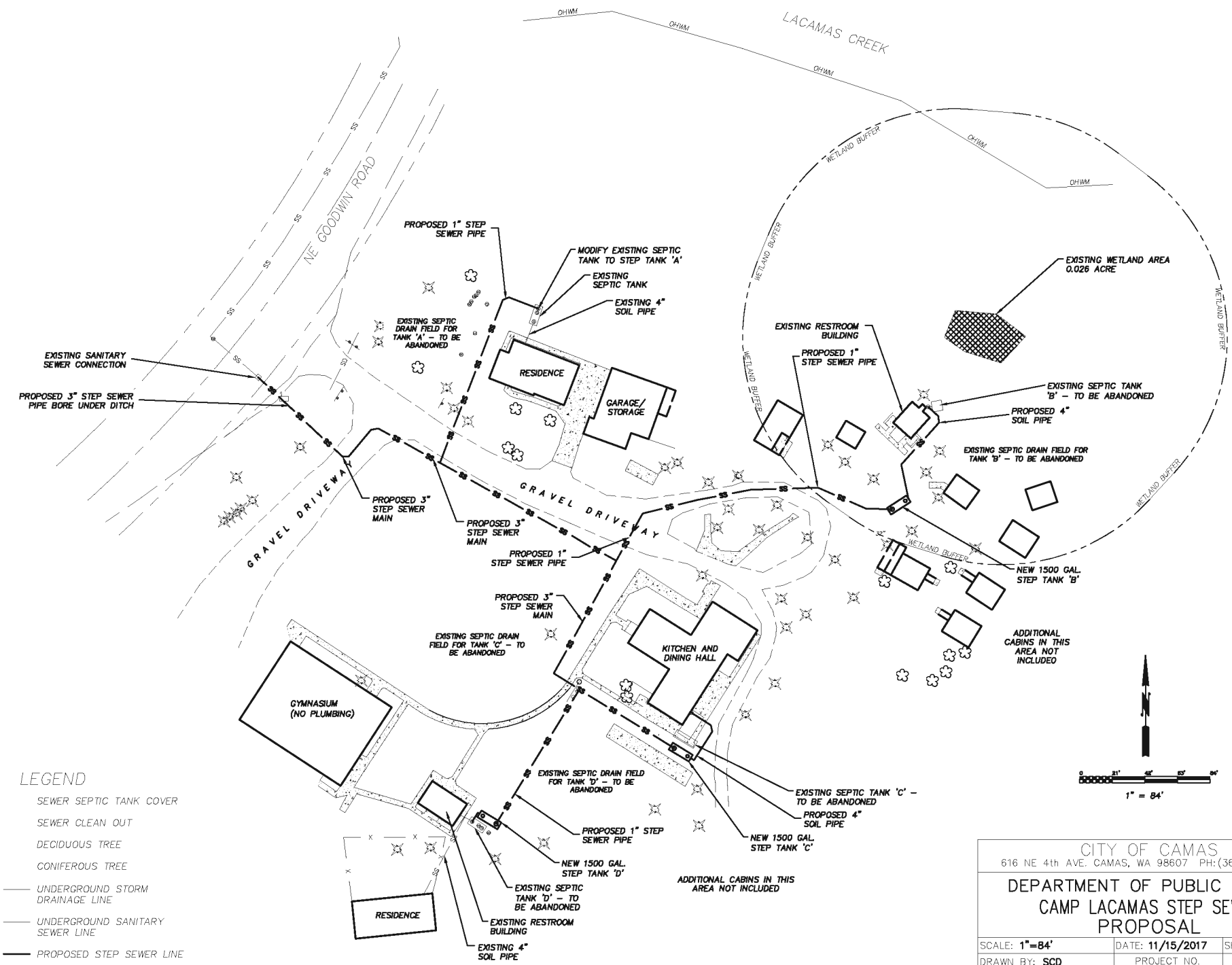
- Taxlots
- NWI Wetland
- Modeled Wetland

Notes:

200.0 0 100.00 200.0 Feet

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

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.




CITY OF CAMAS
616 NE 4th AVE. CAMAS, WA 98607 PH:(360) 817-1561

# DEPARTMENT OF PUBLIC WORKS
# CAMP LACAMAS STEP SEWER PROPOSAL

| | | |
|---|---|---|
| SCALE: 1"=84' | DATE: 11/15/2017 | SHT. 1 of 1 |
| DRAWN BY: SCD | PROJECT NO. | FIGURE NO. |
| DESIGNED BY: SCD | WS-681E | 4 |
| APPROVED BY: JH | | |

## Appendix B – Photographs

**Photograph 1:** View northwest across camp toward NE Goodwin Road. Photograph taken July 28, 2017.

**Photograph 2:** View of camper residential cabins and restroom (the building on left in background). Photograph taken July 28, 2017.

**Photograph 3:** View looking east, showing Wetland K-1. Emergent area, dominated by water parsley in foreground and center. Photograph taken July 28, 2017.

**Photograph 4:** View looking northwest from the southeast corner of Wetland K-1 showing emergent wetland vegetation (foreground), scrub-shrub vegetation dominated by red osier dogwood (left), and Oregon ash in the forest fringe (right). A windthrow tip-up can be seen in the center. Photograph taken July 28, 2017.

**Photograph 5:** Wetland plot (Plot 2) in Wetland K-1, showing sample pit and emergent wetland vegetation. Photograph taken July 28, 2017.

**Photograph 6:** View looking east into the wetland from the top of the steep slope behind the restroom. Upland vegetation dominated by English ivy, common snowberry, and highbush cranberry can be seen in the foreground. Photograph taken July 28, 2017.

**Photograph 7:** View of ditch along south side of NE Goodwin Road in vicinity of where sewer line is planned to bored under ditch. Photograph taken June 20, 2017.

**Photograph 8:** Vegetation in ditch along south side of NE Goodwin Road in vicinity of where sewer line is planned to bored under ditch.. Photograph taken July 28, 2017.

## Appendix C – Wetland Data Forms

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

Project/Site: Camp Lacamas K-1 City/County: Camas Sampling Date: 7/28/17
Applicant/Owner: City of Camas State: WA Sampling Point: Plot 1
Investigator(s): Kent Snyder, Ivy Watson Section, Township, Range: Sec. 20, T2N, R3E, WM
Landform (hillslope, terrace, etc.): River terrace Local relief (concave, convex, none): slope Slope (%): 30-35%
Subregion (LRR): NW Forests and Coasts Lat: 45°38'17.20" Long: 122°27'19.59" Datum: WGS84
Soil Map Unit Name: Lauren gravelly loam, cemented substratum, 3 to 15% (LrC) NWI classification: upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___ , Soil ___ , or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___ , Soil ___ , or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. *Frangula purshiana* | 1 | N | FAC |
| 2. *Pseudotsuga menziesii* | 80 | Y | FACU |
| 3. | | | |
| 4. | | | |
| | 81 | = Total Cover | |

| Sapling/Shrub Stratum (Plot size: 30 ) | | | |
|---|---|---|---|
| 1. *Amelanchier alnifolia* | 10 | N | FACU |
| 2. *Corylus cornuta* | 25 | Y | FACU |
| 3. *Oemleria cerasiformis* | 2 | N | FACU |
| 4. *Symphoricarpos albus* | 5 | N | FACU |
| 5. *Viburnum ellipticum* | 5 | N | UPL |
| | 47 | = Total Cover | |

| Herb Stratum (Plot size: 5 ) | | | |
|---|---|---|---|
| 1. *Hedera helix* | 100 | Y | FACU |
| 2. *Athyrium filix-femina* | 2 | N | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 102 | = Total Cover | |

| Woody Vine Stratum (Plot size: ) | | | |
|---|---|---|---|
| 1. | | | |
| 2. | | | |
| | | = Total Cover | |

% Bare Ground in Herb Stratum 0

**Dominance Test worksheet:**

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

**Prevalence Index worksheet:**

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

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

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

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

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

Remarks:

Total precipitation for April-July 27 was 7.51 inches, compared to an average of 7.33 inches for April-July per NRCS WETS table for Portland International Airport. Precipitation in early spring (March and April) exceeded the normal range for those months. Thus climatic/hydrologic conditions in July are considered typical to somewhat wet.

## SOIL

Sampling Point: Plot 1

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

| Depth (inches) | Matrix Color (moist) | Matrix % | Redox Features Color (moist) | Redox Features % | Redox Features Type[1] | Redox Features Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-7 | 10YR4/3 | | | | | | gr sl | |
| 7-17 | 7.5YR3/3 | | | | | | vgr sl | |
| | 10YR7-4/6-8 | | | | | | | Cemented sand grains in matrix |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

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

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

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

**Indicators for Problematic Hydric Soils[3]:**

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

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

**Restrictive Layer (if present):**

Type: _____

Depth (inches): _____

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

Remarks: The 7-17 inch horizon (Cr) is weathered Troutdale Formation. Plot appears to be on the side of an old borrow pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

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

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

Secondary Indicators (2 or more required)

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

**Field Observations:**

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

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

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

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

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

Remarks:

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

Project/Site: Camp Lacamas K-1 City/County: Camas Sampling Date: 7/28/17
Applicant/Owner: City of Camas State: WA Sampling Point: Plot 2
Investigator(s): Kent Snyder, Ivy Watson Section, Township, Range: Sec. 20, T2N, R3E, WM
Landform (hillslope, terrace, etc.): River terrace Local relief (concave, convex, none): Concave Slope (%): <1
Subregion (LRR): NW Forests and Coasts Lat: 45°38'17.20" Long: 122°27'19.59" Datum: WGS84
Soil Map Unit Name: Lauren gravelly loam, cemented substratum, 3 to 15% (LrC) NWI classification: upland
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes x No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

| | | | | |
|---|---|---|---|---|
| Hydrophytic Vegetation Present? | Yes | x | No | |
| Hydric Soil Present? | Yes | x | No | |
| Wetland Hydrology Present? | Yes | x | No | |

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

Remarks:

## VEGETATION – Use scientific names of plants.

| Tree Stratum (Plot size: 30 ) | Absolute % Cover | Dominant Species? | Indicator Status |
|---|---|---|---|
| 1. *Fraxinus latifolia* | 50 | Y | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| | 50 | = Total Cover | |
| **Sapling/Shrub Stratum** (Plot size: 30 ) | | | |
| 1. *Cornus alba* | 30 | Y | FACW |
| 2. | | | |
| 3. | | | |
| 4. | | | |
| 5. | | | |
| | 30 | = Total Cover | |
| **Herb Stratum** (Plot size: 5 ) | | | |
| 1. *Galium palustre* | 2 | N | OBL |
| 2. *Impatiens capensis* | 5 | N | FACW |
| 3. *Oenanthe sarmentosa* | 65 | Y | OBL |
| 4. *Solanum dulcamara* | 5 | N | FAC |
| 5. | | | |
| 6. | | | |
| 7. | | | |
| 8. | | | |
| 9. | | | |
| 10. | | | |
| 11. | | | |
| | 77 | = Total Cover | |
| **Woody Vine Stratum** (Plot size: ) | | | |
| 1. | | | |
| 2. | | | |
| | | = Total Cover | |

% Bare Ground in Herb Stratum 30

**Dominance Test worksheet:**

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

**Prevalence Index worksheet:**

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

Prevalence Index = B/A =

**Hydrophytic Vegetation Indicators:**

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

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

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

Remarks:

Total precipitation for April-July 27 was 7.51 inches, compared to an average of 7.33 inches for April-July per NRCS WETS table for Portland International Airport. Precipitation in early spring (March and April) exceeded the normal range for those months. Thus climatic/hydrologic conditions in July are considered typical to somewhat wet.

## SOIL

Sampling Point: Plot 2

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

| Depth (inches) | Matrix Color (moist) | % | Redox Features Color (moist) | % | Type[1] | Loc[2] | Texture | Remarks |
|---|---|---|---|---|---|---|---|---|
| 0-12 | 2.5Y3/1 | | 10YR4/6 | 2 | C | M | gr l | |
| | | | 10YR4/3 | 2 | C | M | | |
| 12-14 | 7.5YR4/4-6 | | 10YR5/6 | 5 | C | M | exgr sl | Weathered bedrock (Cr) |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

[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: Paralithic contact

Depth (inches): 12 inches

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

Remarks: The 12-14 inch horizon (Cr) is weathered Troutdale Formation. Plot appears to be in the bottom of an old borrow pit.

## HYDROLOGY

**Wetland Hydrology Indicators:**

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

- x 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)

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

**Field Observations:**

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

Water Table Present? Yes ___ 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: Soil is moist. Saturated soil with areas of ponding was observed during June 20, 2017 visit by K.Snyder.

## Appendix D – Wetland Rating Form

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Wetland name or number K-1

# RATING SUMMARY – Western Washington

Name of wetland (or ID #): Camp Lacamas K-1 Date of site visit: 07/28/17

Rated by Ivy Watson Trained by Ecology? x Yes ___No Date of training 11/8-9/16

**HGM Class used for rating** Depressional 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** | 7 | 6 | 8 | 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 K-1

# 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 K-1

# 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?
   _x_ 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 K-1

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 |
| 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 K-1

## 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:<br>Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3<br>Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2<br>Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1<br>Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1 | 3 |
| 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):<br>Wetland has persistent, ungrazed, plants > 95% of area points = 5<br>Wetland has persistent, ungrazed, plants > ½ of area points = 3<br>Wetland has persistent, ungrazed plants > $^1/_{10}$ of area points = 1<br>Wetland has persistent, ungrazed plants < $^1/_{10}$ of area points = 0 | 5 |
| D 1.4. Characteristics of seasonal ponding or inundation:<br>*This is the area that is ponded for at least 2 months. See description in manual.*<br>Area seasonally ponded is > ½ total area of wetland points = 4<br>Area seasonally ponded is > ¼ total area of wetland points = 2<br>Area seasonally ponded is < ¼ total area of wetland points = 0 | 4 |
| Total for D 1 Add the points in the boxes above | 12 |

**Rating of Site Potential** If score is: X **12-16 = H** ___ **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?<br>Source_____ Yes = 1 No = 0 | 0 |
| Total for D 2 Add the points in the boxes above | 0 |

**Rating of Landscape Potential** If score is: ___ **3 or 4 = H** ___ **1 or 2 = M** X **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 | 1 |
| Total for D 3 Add the points in the boxes above | 3 |

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

*Septic systems are being removed by the STEP project.

Wetland name or number K-1

## 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:<br>Wetland is a depression or flat depression with no surface water leaving it (no outlet) points = 4<br>Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2<br>Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1<br>Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 0 | 4 |
| 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.*<br>Marks of ponding are 3 ft or more above the surface or bottom of outlet points = 7<br>Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5<br>Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3<br>The wetland is a "headwater" wetland points = 3<br>Wetland is flat but has small depressions on the surface that trap water points = 1<br>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.*<br>The area of the basin is less than 10 times the area of the unit points = 5<br>The area of the basin is 10 to 100 times the area of the unit points = 3<br>The area of the basin is more than 100 times the area of the unit points = 0<br>Entire wetland is in the Flats class points = 5 | 0 |
| Total for D 4 Add the points in the boxes above | 7 |

**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 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.*<br>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):<br>• Flooding occurs in a sub-basin that is immediately down-gradient of unit. points = 2<br>• Surface flooding problems are in a sub-basin farther down-gradient. points = 1<br>Flooding from groundwater is an issue in the sub-basin. points = 1<br>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<br>There are no problems with flooding downstream of the wetland. points = 0 | 1 |
| 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 | 1 |

**Rating of Value** If score is: ___ **2-4 = H** _X_ **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 |
| _x_____Emergent | 3 structures: points = 2 |
| _x_____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:*

____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 |
| _x_____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 |
| _x_____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***

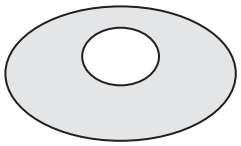
| | |
|---|---|
| If you counted: > 19 species | points = 2 |
| 5 - 19 species | points = 1 |
| < 5 species | points = 0 |

**1**

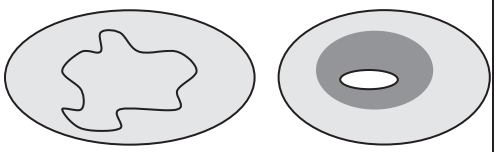
H 1.4. Interspersion of habitats

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

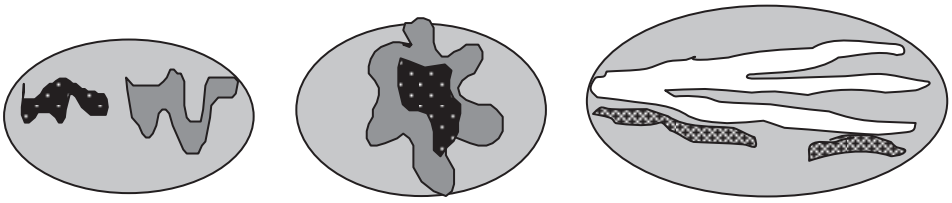


**Low** = 1 point



**Moderate** = 2 points

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



**3**

Wetland name or number K-1

| | |
|---|---|
| H 1.5. Special habitat features:<br>Check the habitat features that are present in the wetland. *The number of checks is the number of points.*<br>x ____Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long).<br>____Standing snags (dbh > 4 in) within the wetland<br>____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)<br>____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)*<br>____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)*<br>x ____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 | 9 |

**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*).<br>*Calculate:* % undisturbed habitat 19 + [(% moderate and low intensity land uses)/2] 5 = 24 %<br>If total accessible habitat is:<br>> 1/3 (33.3%) of 1 km Polygon points = 3<br>20-33% of 1 km Polygon points = 2<br>10-19% of 1 km Polygon points = 1<br>< 10% of 1 km Polygon points = 0 | 2 |
| H 2.2. Undisturbed habitat in 1 km Polygon around the wetland.<br>*Calculate:* % undisturbed habitat 28 + [(% moderate and low intensity land uses)/2] 18 = 66 %<br>Undisturbed habitat > 50% of Polygon points = 3<br>Undisturbed habitat 10-50% and in 1-3 patches points = 2<br>Undisturbed habitat 10-50% and > 3 patches points = 1<br>Undisturbed habitat < 10% of 1 km Polygon points = 0 | 3 |
| H 2.3. Land use intensity in 1 km Polygon: If<br>> 50% of 1 km Polygon is high intensity land use points = (- 2)<br>≤ 50% of 1 km Polygon is high intensity points = 0 | 0 |
| Total for H 2 Add the points in the boxes above | 5 |

**Rating of Landscape Potential** If score is: X **4-6 = H** ___**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.*<br>Site meets ANY of the following criteria: points = 2<br>X It has 3 or more priority habitats within 100 m (see next page)<br>— It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists)<br>— It is mapped as a location for an individual WDFW priority species<br>— It is a Wetland of High Conservation Value as determined by the Department of Natural Resources<br>— 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<br>Site has 1 or 2 priority habitats (listed on next page) within 100 m points = 1<br>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 K-1

# 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.

X **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*).

X **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*).

X **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.

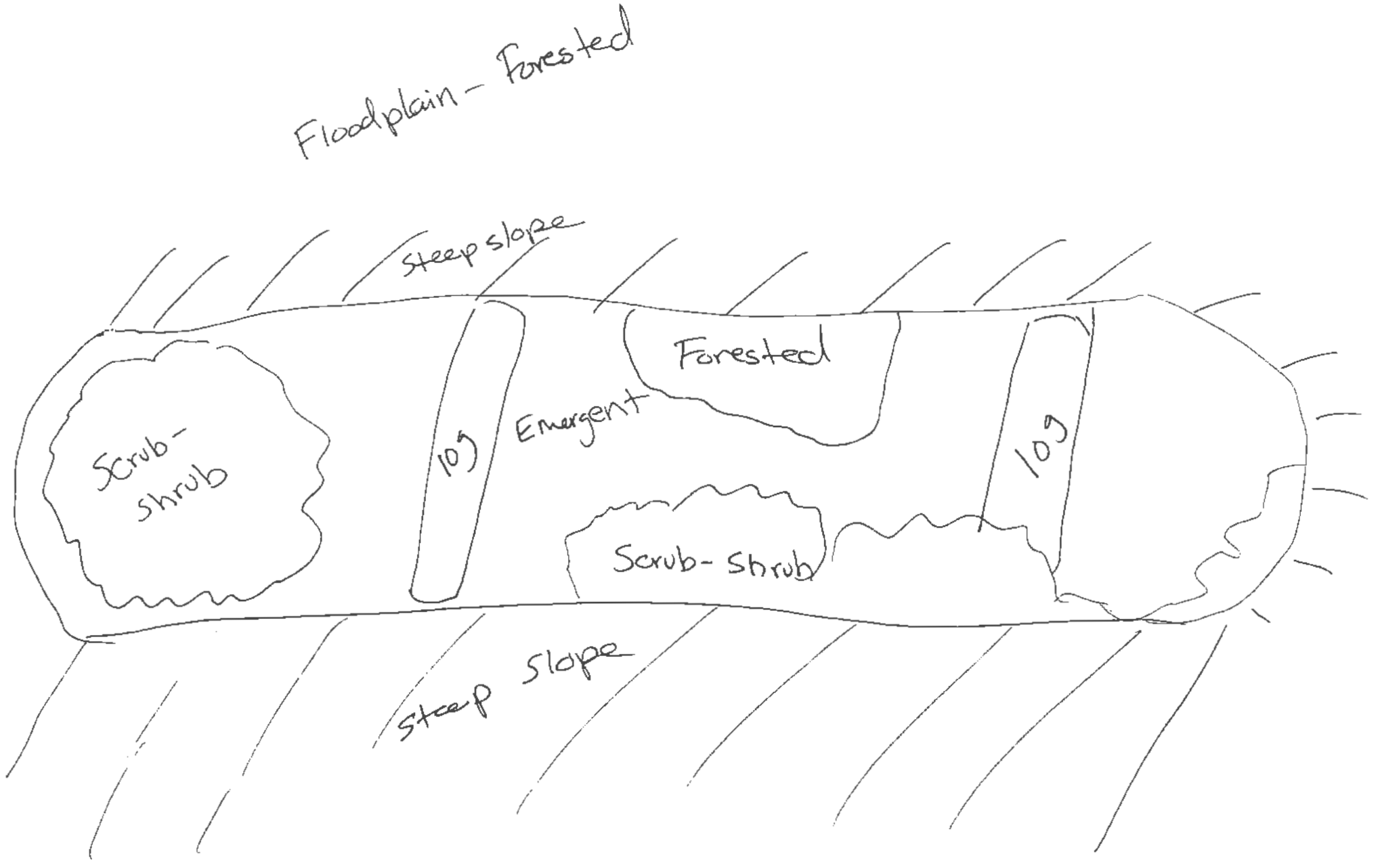
— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **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.

Camp Lacamas Wetland K-1 Cowardin Classes & habitat



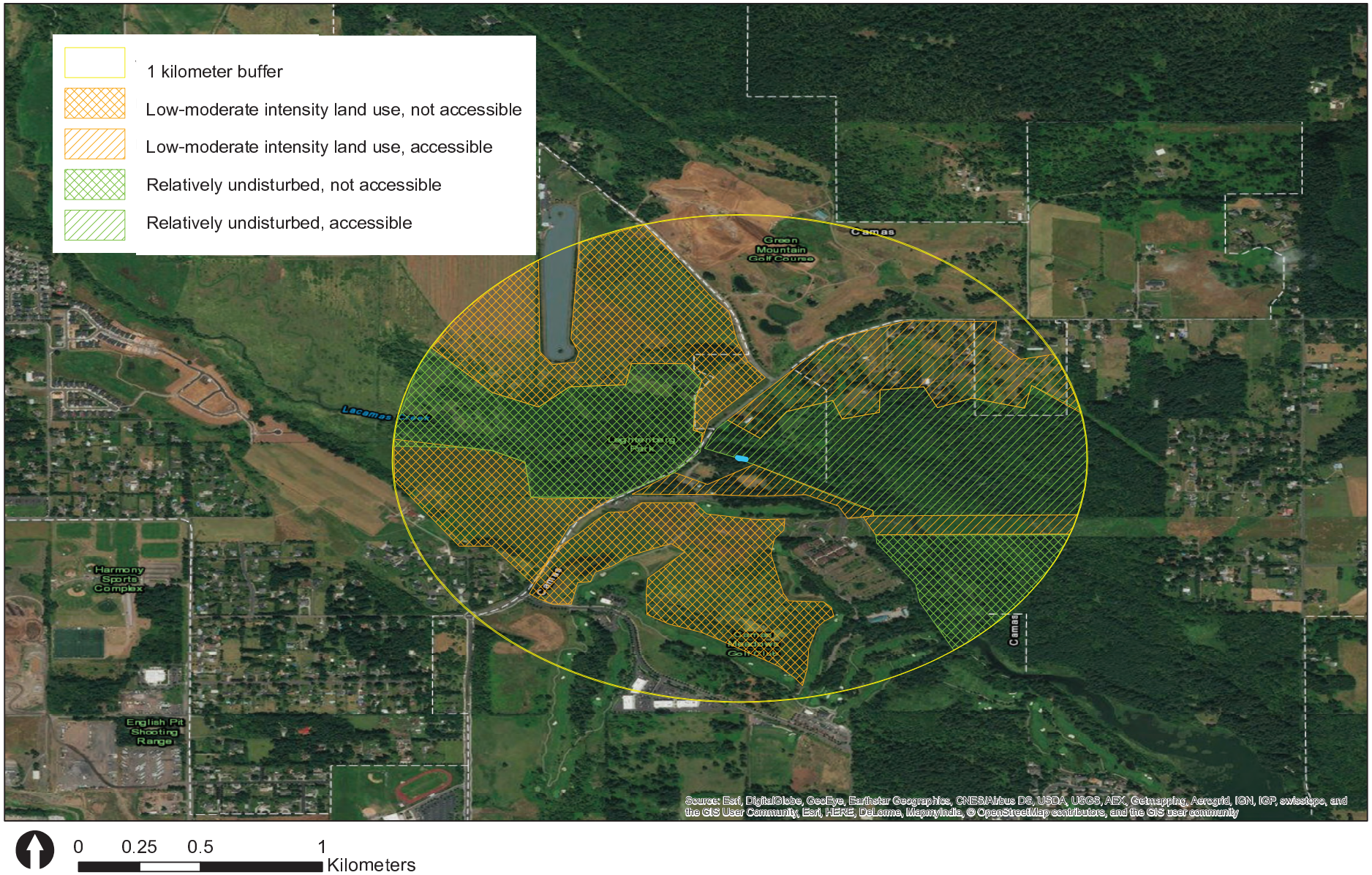

150 foot buffer
Wetland Area
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
0
50
100
200
Feet

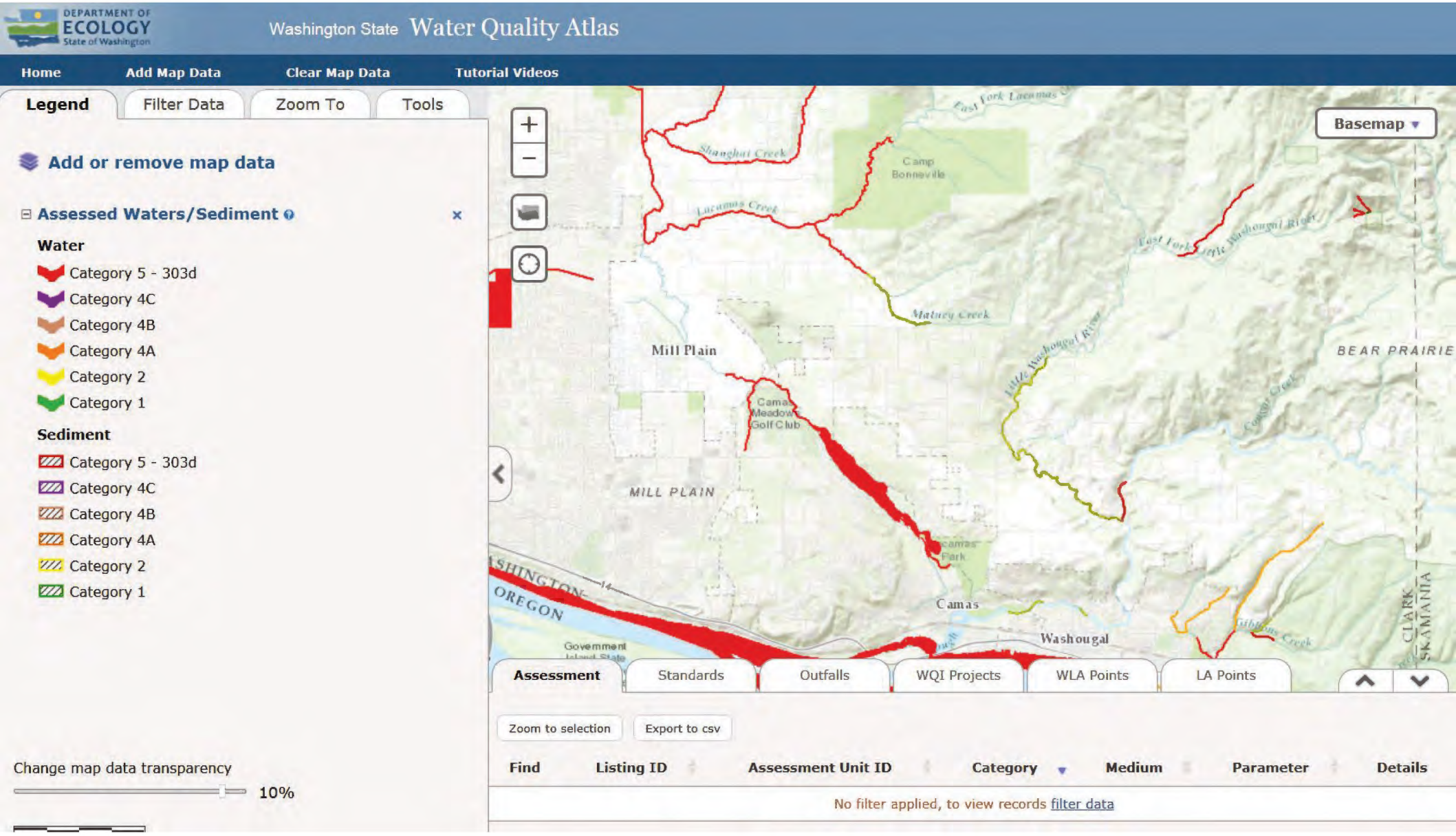
# StreamStats Report

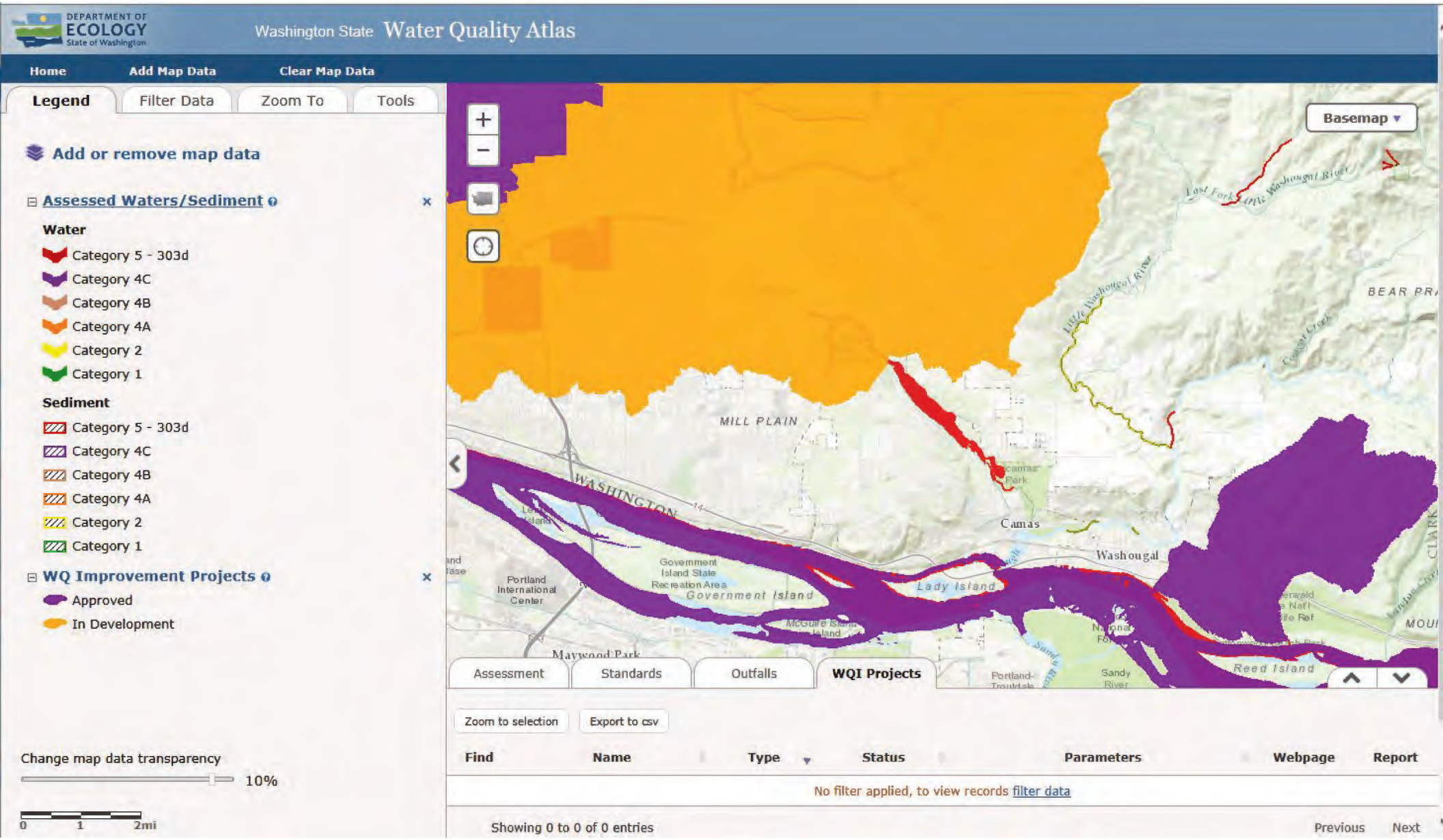
**Region ID:** WA
**Workspace ID:** WA20170817171944528000
**Clicked Point (Latitude, Longitude):** 45.63817, -122.45539
**Time:** 2017-08-17 14:21:35 -0700


## Basin Characteristics

| Parameter Code | Parameter Description | Value | Unit |
|---|---|---|---|
| DRNAREA | Area that drains to a point on a stream | 51.55 | square miles |


1 kilometer buffer
Low-moderate intensity land use, not accessible
Low-moderate intensity land use, accessible
Relatively undisturbed, not accessible
Relatively undisturbed, accessible
Green Mountain Golf Course
Camas
Lacamas Creek
Lacamas Lake Park
Harmony Sports Complex
English Pit Shooting Range
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
0
0.25
0.5
1
Kilometers


DEPARTMENT OF ECOLOGY
State of Washington
Washington State Water Quality Atlas
Home
Add Map Data
Clear Map Data
Tutorial Videos
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
10%
Basemap
Shanghai Creek
Lacamas Creek
Camp Bonneville
East Fork Lacamas
East Fork Little Washougal River
Matney Creek
Mill Plain
Little Washougal River
BEAR PRAIRIE
Camas Meadows Golf Club
MILL PLAIN
Camas
Washougal
OREGON
Government Island State
CLARK
SKAMANIA
Assessment
Standards
Outfalls
WQI Projects
WLA Points
LA Points
Zoom to selection
Export to csv
Find
Listing ID
Assessment Unit ID
Category
Medium
Parameter
Details
No filter applied, to view records filter data


DEPARTMENT OF ECOLOGY State of Washington
Washington State Water Quality Atlas
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Water
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Camas
Washougal
Government Island
Lady Island
Portland International Center
Maywood Park
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Harper Houf Peterson Righellis Inc.
ENGINEERS ◆ PLANNERS
LANDSCAPE ARCHITECTS ◆ SURVEYORS

# TECHNICAL MEMORANDUM

**DATE:** December 19, 2017

**TO:** City of Camas
Community Development Department
616 NE Fourth Avenue
Camas, Washington 98607

**FROM:** Kent E. Snyder, PhD

**RE:** Camp Lacamas STEP Sewer Project

---



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## 1.0 INTRODUCTION

### Project Description

The City of Camas (City) plans to install a STEP (Septic Tank Effluent Pumping) system to serve Camp Lacamas, replacing the existing on-site septic system. The new system will connect to the existing public sewer via an existing stub that lies at the eastern edge of NE Goodwin Road. A new line will be extended from the existing stub to the parcel, by boring under the ditch along the roadway. The proposed STEP system consists of approximately 900 feet of sewer line and four underground septic tanks (three new STEP tanks and one existing septic tank to be modified) to service two residences, the kitchen/dining hall, and two restrooms. Electric pumps are integrated into each STEP tank. One small electrical service panel (to provide power for the system) will be installed aboveground. Three existing septic tanks will be decommissioned in-place

(pumped out and filled with sand). Excavations are planned to be either in the existing roadway, adjacent lawn, or areas regularly traversed by pedestrians. No new impervious surface will be created.

The portion of this project outside of the Camas shoreline boundary includes approximately 200 feet of the new sewer line, and two new STEP tanks. This memorandum serves addresses critical areas outside of the shoreline boundary of the proposed project; however, it also includes resource information regarding the entire project area, e.g., the Critical Aquifer Recharge Area (CARA).

**Project Location**

Camp Lacamas is 9.63 acres, located at 2025 NE Goodwin Road (parcel number 172543000) in Section 20 of Township 2 North and Range 3 East (Figure 1).

## 2.0 DATABASE AND SITE REVIEW

Information on federal threatened and endangered species and priority habitats potentially occurring in the project site was obtained from websites and databases of the Washington Department of Natural Resources (WDNR) Natural Heritage Program (WNHP), the Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS), the US Fish and Wildlife Service (USFWS) IPaC Service, and the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries). This information was used in conjunction with the Clark County GIS database to determine the known presence of protected species or habitats in the project site.

Pedestrian reviews were made by HHPR staff (Kent Snyder or Ivy Watson) on June 20, June 26, and July 28, 2017 to assess site conditions and habitats, and evaluate potential impacts of the proposed project action on natural resources.

The project site, located on a terrace above Lacamas Creek, is developed with camp buildings, gravel access roads, and mowed fields. Mowed fields near the camp entrance are charactized by non-native lawn grasses (e.g. annual bluegrass [*Poa annua*]) and weedy forbs (e.g. English plantain [*Plantago lanceolata*], common dandelion [*Taraxacum officinale*], rough cat's ear [*Hypochaeris radicata*], and white clover [*Trifolium repens*]).

Cabins and several other buildings at the east end of the camp are in the understory of a stand of mature Douglas fir trees (*Pseudotsuga menziesii*, 24 to 55 inches diameter breast height [DBH]) that provide approximately 80 percent canopy cover throughout most of this area. The understory is sparse and crisscrossed by footpaths. Where present, understory vegetation is dominated by non-native grasses and forbs (e.g. orchard grass [*Dactylis glomerata*], shiny geranium [*Geranium lucidum*], and common dandelion), with

occasional native forbs (e.g. fringecup [*Tellima grandiflora*] and Siberian springbeauty [*Claytonia siberica*]).

## 3.0 WETLANDS CMC 16.53

No wetlands or wetland buffers occur within the project site outside of the Shoreline Jurisdiction. Wetlands or buffers within shoreline jurisdiction is addressed in the shoreline application.

## 4.0 CRITICAL AQUIFER RECHARGE AREAS (CARA) CMC 16.55

The project site lies within a wellhead protection zone (Figure 4). It is within the 10-year zone of a well located on the parcel and serving Camp Lacamas (Clark County GIS 2017). The Troutdale Aquifer, designated by the US Environmental Protection Agency (EPA) as a Sole Source Aquifer, underlies the project.

**Activities Allowed (CMC 16.55.040-50)**

The proposed project is an allowed activity in the CARA (CMC 16.55.040.A. and C) and thus do not require submission of a critical area report. Furthermore, a hydrological assessment is not required because: the project is below the threshold for new impervious surface (5% or 2,500 square feet, whichever is greater); will not divert, alter, or reduce the flow of surface or ground waters, or otherwise reduce the recharging of the aquifer; will not use hazardous substances; and will not construct or use an injection well.

**Performance Standards (CMC 16.55.060-080)**

The proposed STEP system is intended to serve the existing camp and will not result in a change of use or an increase in the use of hazardous substances. The project will provide a net benefit to the wellhead protection zone and underlying aquifer by decommissioning (pumping dry and backfilling with clean sand per Clark County Public Health regulations, Clark County Code 24.17.210) the existing septic systems.

No hazardous or waste materials would enter the groundwater and no groundwater withdrawals would occur as a result of the project. Appropriate BMPs and maintenance would be used to prevent contamination of the ground and groundwater during the construction. In the event that contaminated soils are encountered during construction, removal and disposal of hazardous materials, and remediation of contaminated soil and groundwater, will occur in accordance with applicable regulations.

In accordance with CMC 16.55.060.B, no vehicular repair, residential use of pesticides and nutrients, spreading or injection of reclaimed water, or storage tanks are associated with this project. Septic tanks and piping are exempt from consideration as underground storage tanks per WAC 173-360-11(2) (i).

In accordance with CMC 16.55.060.C, the project would comply with the water source protection requirements and recommendations of the EPA, Washington State Department of Health, and the local health district.

The project would be designed and constructed in accordance with the City Design Standards Manual (CMC 16.55.060.D).

None of the specific uses addressed in CMC 16.55.070 are proposed as part of the project.

None of the prohibited uses identified in CMC 16.55.080 are proposed as part of the project.

## 5.0 FREQUENTLY FLOODED AREAS CMC 16.57

The parcel and project site is within the 100-year floodplain of Lacamas Creek (per FEMA FIRM Map 53011C0414D Effective September 5, 2012) (Figure 2). The proposed project outside of Shorelines Jurisdiction is mapped as outside of the designated floodway of Lacamas Creek (FEMA 2012).

**Applicability/Uses and Activities Prohibited**

The base flood elevation at the project site is identified by FEMA as 193 feet (FEMA 2012). The majority of the proposed project is mapped as outside of the designated floodway shown on the same map. Two of the proposed STEP tanks (by the caretaker's house and by the restroom) and associated pipes are within the mapped floodway. However, local topography (i.e. relatively flat at the STEP tank sites with a steep slope to the north towards the lower terrace) suggests that the precise location of the floodway boundary lies beyond both STEP tanks.

No critical facilities, wells, on-site sewage or waste disposal systems, or additional lots are proposed as part of the project (CMC 16.57.020.A-D). The purpose of the project is to decommission on-site septic systems and connect to the City's sewer system.

In accordance with CMC 16.57.020.E, the proposed project does not include new development or encroachment into the floodway. The project would connect existing structures to the City's sewer system and discontinue use of existing septic systems, two of which are within the mapped floodway.

**Additional Report Requirements**

The project site and special flood hazard areas and other flood areas within 300 feet are shown in Figure 2 (CMC 16.57.030.B.1-3).

Proposed development, clearing limits, floodplain, floodway, other critical areas, and shoreline areas are shown in Figures 1-4; no management zones or buildings are proposed (CMC 16.57.030.C.1.).

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

No watercourse alteration is proposed as part of this project (CMC 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 CMC 16.57.030.D.

**Performance Standards**

The project would obtain all necessary permits (CMC 16.57.050.A.).

CMC 16.57.050.B is not applicable because floodway has been designated (FEMA 2012).

CMC 16.57.050.C is not applicable because base flood elevation data is available. The base flood elevation at the project site is 193 feet (FEMA 2012).

In compliance with CMC 16.57.050.D.1, the project would be constructed using materials and methods that are flood resistance and/or minimize flood damage.

In compliance with CMC 16.57.050.D.2, no buildings are proposed within the floodplain.

Utilities would be installed underground (CMC 16.57.050.D.3). The STEP sewer system is water-tight, and all electrical components are NEMA 4 (for wet and submerged conditions). All electrical "J" Boxes are NEMA 4 and are also water-tight. All wire will be fully enclosed in water-tight conduit that will be buried in the same trench for the discharge piping from the STEP tank. Only several feet of wiring will extend from the ground surface to the electrical service panel.

CMC 16.57.050.E-G do not apply because no buildings are proposed.

In accordance with CMC 16.57.050.H, fill and grading proposed as part of this project would not block side channels, inhibit channel migration, increase flood hazards to others, or be placed in the channel migration zone (James Carothers, P.E., City of Camas, pers. comm., 2017). There are no side channels present on or adjacent to the project site. The project is underground and would not inhibit channel migration. The pipes and STEP tanks will be located underground and will not interfere with the movement of floodwaters. The project will be approximately 160 feet from the OHWM of Lacamas

Creek, at the nearest point, and will not be located in slopes or banks that could be susceptible to erosion during a flood.

The sewer pipe will be located underground, and will not result in any change in topography. Pipe fill will be limited to pipe zone bedding material installed at the bottom of the trench and around the pipe. Bedding material will consist of pipe zone gravel backfill sourced from a local quarry. Grading for pipe installation will be limited to that necessary for access, staging, and installation of the pipe, and to restore the area to pre-construction conditions.

No residential units are proposed (CMC 16.57.060.A).

No non-residential buildings are proposed (CMC 16.57.060.B).

The proposed STEP system will be designed to eliminate infiltration of floodwaters into the systems, and discharges from the systems into floodwaters (CMC 16.57.060.C). Unlike the existing septic systems, the new STEP system installations will collect and transport all sewage from Camp Lacamas to the City of Camas Wastewater Treatment Plant. The remaining septic tanks will be decommissioned (per Clark County Public Health regulations) by pumping them dry and backfilling with clean sand. All infiltration of sewage into the underlying soil of the Camp Lacamas Property will upon connection of the new system to the existing residences.

No land division is proposed (CMC 16.57.060.D).

No watercourse alteration is proposed as part of this project (CMC 16.57.060.E).

The project would comply with CMC 16.57.070 because no recreational vehicles would be on site for 180 or more consecutive days as part of the proposed project.

No variance request is being made (CMC 16.57.080).

## 6.0 GEOLOGICAL HAZARDS CMC 16.59

No erosion hazards exist outside of the shoreline jurisdiction of the proposed project (Clark County GIS 2017). No landslide hazards exist on-site or within 300 feet of the project, and there is no evidence of unstable or recent landslides.

The project is not within a Seismic Hazard Area, which includes areas 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 has a liquefaction susceptibility rating of very low, and a Class C soils amplification designation (Clark County GIS 2017).

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

## 7.0 FISH AND WILDLIFE HABITAT CONSERVATION AREAS CMC 16.61

### Waterbodies

No waterbodies occur on the project site outside of the Shoreline Jurisdiction. Lacamas Creek, a perennial stream, is approximately 160 feet north of the project site. This stream flows southeast, entering Lacamas Lake approximately 1 mile southeast of the site (lake level rises and falls based on seasonal drawdown). The site is within Water Resource Inventory Area (WRIA) 28 and the 6th field Hydrologic Unit Code (HUC) Lower Columbia/Sandy 170800010606. No work will occur below the Ordinary High Water Mark of Lacamas Creek.

### Fish

No fish species listed as Threatened, Endangered, or Sensitive (TES), associated Critical Habitat, or Essential Fish Habitat occur on or near the site or in Lacamas Creek upstream of Lacamas Lake Dam, a total passage barrier) approximately 4 miles downstream of the project site (WDFW 2017, NOAA 2016, USFWS 2017). No in-water work is proposed. Sedimentation, erosion control, and spill prevention and control BMPs would be implemented throughout the project to avoid discharges of sediment or hazardous materials into any stream. Therefore, there is no effect on listed aquatic species.

### Wildlife

An Endangered Species Act (ESA) list of species potentially affected by activities at the project site, obtained from the USFWS IPaC service (2017), indicates the potential presence of three TES 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).

The possible presence of threatened or endangered wildlife species in the project site was evaluated through site visits and review of WDFW PHS data (WDFW 2017). PHS does not show any record of these species in or near the project site and none were observed during site visits.

Site visits also established that none of the necessary habitat for these species occurs at the project site or in abutting areas. Oregon spotted frog habitat is large complexes of meadow and wetland with pools, a continuum of vegetation densities, and an absence of non-native predators (USFWS 2016). No Critical Habitat was identified in Clark County for this species. Streaked horned larks nest and winter in flat, open areas with sparse low-stature vegetation and substantial areas of bare ground. Western yellow-billed cuckoos

require large (typically larger than 40 hectares and wider than 100 meters) patches of cottonwood and willow dominated riparian habitat for nesting (Wiles and Kalasz 2017). None of these habitats are present.

Other wildlife that could use or be near the project site include those typically habituated to human presence and highly impacted environments, such as small mammals (i.e., raccoons, opossum, rabbits, squirrels, shrews, and mice), coyote, deer, snakes, and passerine birds. Other bird species such as crows and raptors could use the area for foraging or perching.

**Plants**

No TES plant species or associated habitats are known to occur within the project site and none were observed during site visits.

An Endangered Species Act (ESA) list of species potentially affected by activities at the project site, obtained from the USFWS IPaC service (2017), included two federally-listed plant species: golden paintbrush (*Castilleja levisecta*, federally-listed Threatened, state-listed Endangered) and Bradshaw's lomatium (*Lomatium bradshawii*, federally- and state-listed Endangered).

The possible presence of TES plant species in the project site was evaluated through WDNR WNHP spatial data (2017) and site visits. WNHP rare plant spatial data indicates the presence of six additional state-listed species in the project vicinity: Oregon coyote-thistle (*Eryngium petiolatum,* state-listed Threatened), Hall's aster (*Symphyotrichum hallii*, state-listed Threatened), dense sedge (*Carex densa*, state-listed Sensitive), small-flowered trillium (*Trillium parviflorum*, state-listed Sensitive), Nuttall's quillwort (*Isoetes nuttallii*, state-listed Sensitive), and California compassplant (*Wyethia angustifolia*, state-listed Sensitive). WNHP data also shows 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.

No evidence of any TES plant species was observed within the project site. Small-flowered trillium has been identified in the southwest corner of the parcel, outside of the project site. Site visits established that none of the necessary habitats for Bradshaw's lomatium, golden paintbrush, Oregon coyote-thistle, Hall's aster, dense sedge, Nuttall's quillwort, or California compassplant occur in the project site. Bradshaw's lomatium occurs in grasslands and wet prairies. Golden paintbrush inhabits flat grasslands, mounded prairies, and steep, grassy bluffs. Oregon coyote-thistle inhabits wetlands in prairies and open spaces. Hall's aster inhabits moist to dry prairies and open places. Dense sedge inhabits wet meadows and remnant prairies. Nuttall's quillwort occurs in seasonally wet ground, seeps, and vernal pools. California compass plant occurs in seasonally wet open ground and grassy openings. None of these habitats are present

within the project site. The grassy areas in the project site are disturbed lawns composed of non-native species. The small wetland adjacent to the project site is enclosed on all sides by riparian forest and will not be disturbed by the project.

**State Priority Habitats and Species**

Three priority habitat and species areas (WDFW 2017) are mapped in and abutting the project site: a Cave-rich Area, an Oak Woodland, and a Wood Duck Breeding Area (Figure 4).

The project site lies within the approximately 6 mile by 8.5 mile rectangle mapped across southeastern Clark County as a Cave Rich Areas. However, no caves were observed in the vicinity.

The Oregon white oaks on the parcel are part of the Sifton/Lacamas Oaks mapped by WDFW (2017). Oregon white oak resources on the parcel are either outside of the project site or within the shoreline boundary.

The mapped wood duck (*Aix sponsa*) breeding area is a corridor along both sides of Lacamas Creek, completely overlapping the project site. This species is typically sensitive to disturbance and would not be expected to utilize the developed camp area. The only area identified during site visits as potential wood duck breeding habitat is the oak stand on the lower terrace next to the creek.

Coastal cutthroat trout (*Oncorhynchus clarki*) and Rainbow Trout, WDFW Priority Species, are mapped in Lacamas Creek, adjacent to the project site (WDFW 2017). The project would provide a net benefit to water quality in Lacamas Creek by replacing on-site septic systems with city sewer service.

**Habitats of Local Importance**

Oregon white oak resources on the parcel are either outside of the project site or within the shoreline boundary.

## 8.0 REFERENCES

Clark County GIS. 2017. Clark County GIS MapsOnline. Available online at http://gis.clark.wa.gov/mapsonline. Accessed June to December, 2017.

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US Fish and Wildlife Service (USFWS). 2016. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Oregon Spotted Frog. Federal Register 81: 29335 – 29396. May 11, 2016.

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Wiles, G. J., and K. S. Kalasz. 2017. Draft Status Report for the Yellow-billed Cuckoo in Washington. WDFW, Olympia, Washington. URL: http://wdfw.wa.gov/publications/01881/.

Washington Department of Natural Resources (WDNR). 2017. Washington Natural Heritage Program (WNHP). WNHP Current and Historic Element Occurrences. GIS Data Set. Updated February 2017.

## FIGURES

# Figure 1: Camp Lacamas Vicinity Map



## Legend

- Highway
  - Interstate
  - State
- Arterial
- Collector
  - Public Road
  - DNR
  - DNR Private
- Other
  - Private
  - Alley
  - Driveway
  - Proposed
  - Unknown
- Cities Boundaries
- Urban Growth Boundaries

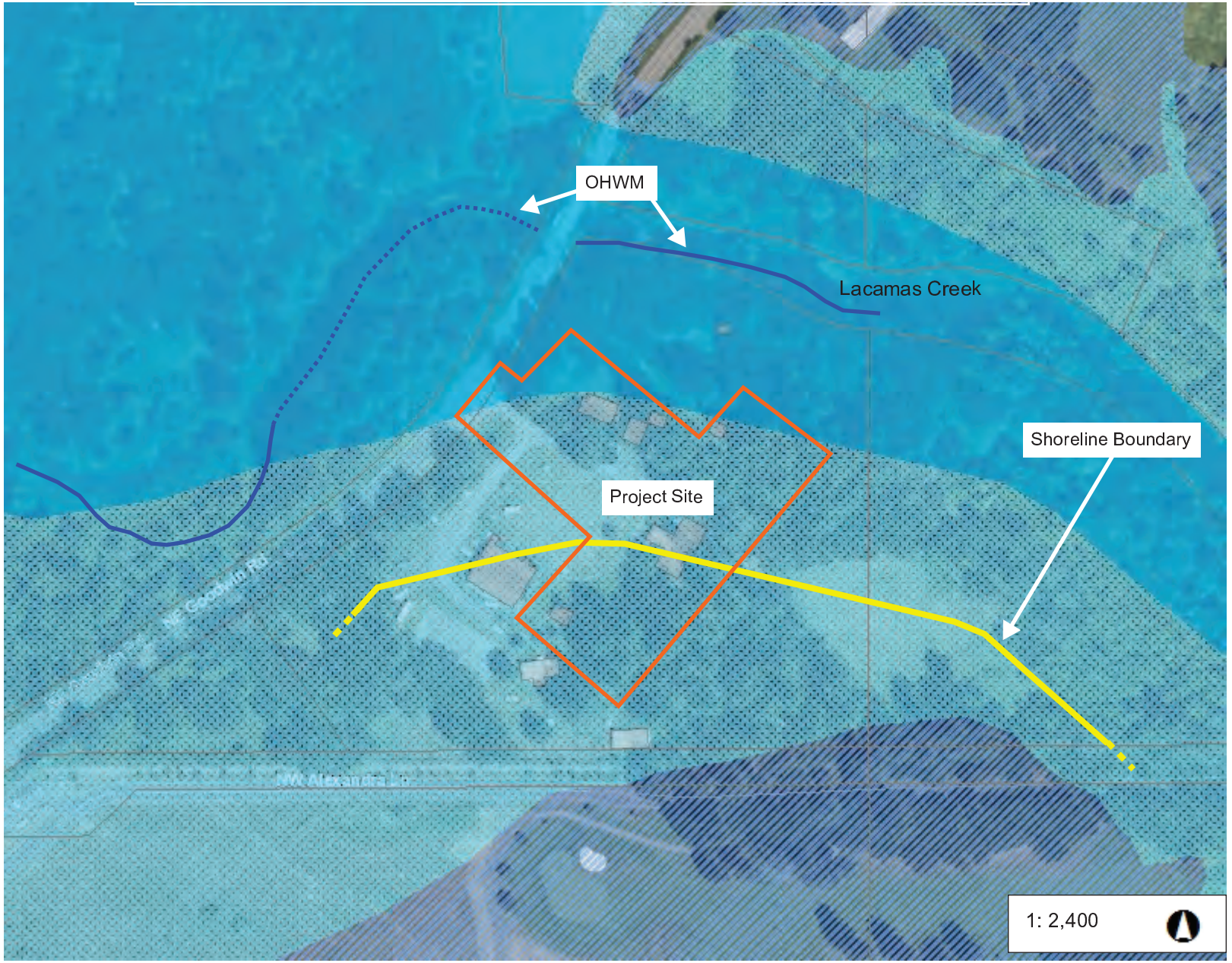
## Notes:

3,000.0 0 1,500.00 3,000.0 Feet

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

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.

# Figure 2: Camp Lacamas Floodplain and Shoreline Boundary





## Legend

- Building Footprints
- Taxlots
- Flood Zone Designation
  - Floodway
  - Floodway Fringe
  - 500 Year Flood Area
  - Area Not Studied
- Roads

## Notes:

400.0 0 200.00 400.0 Feet

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

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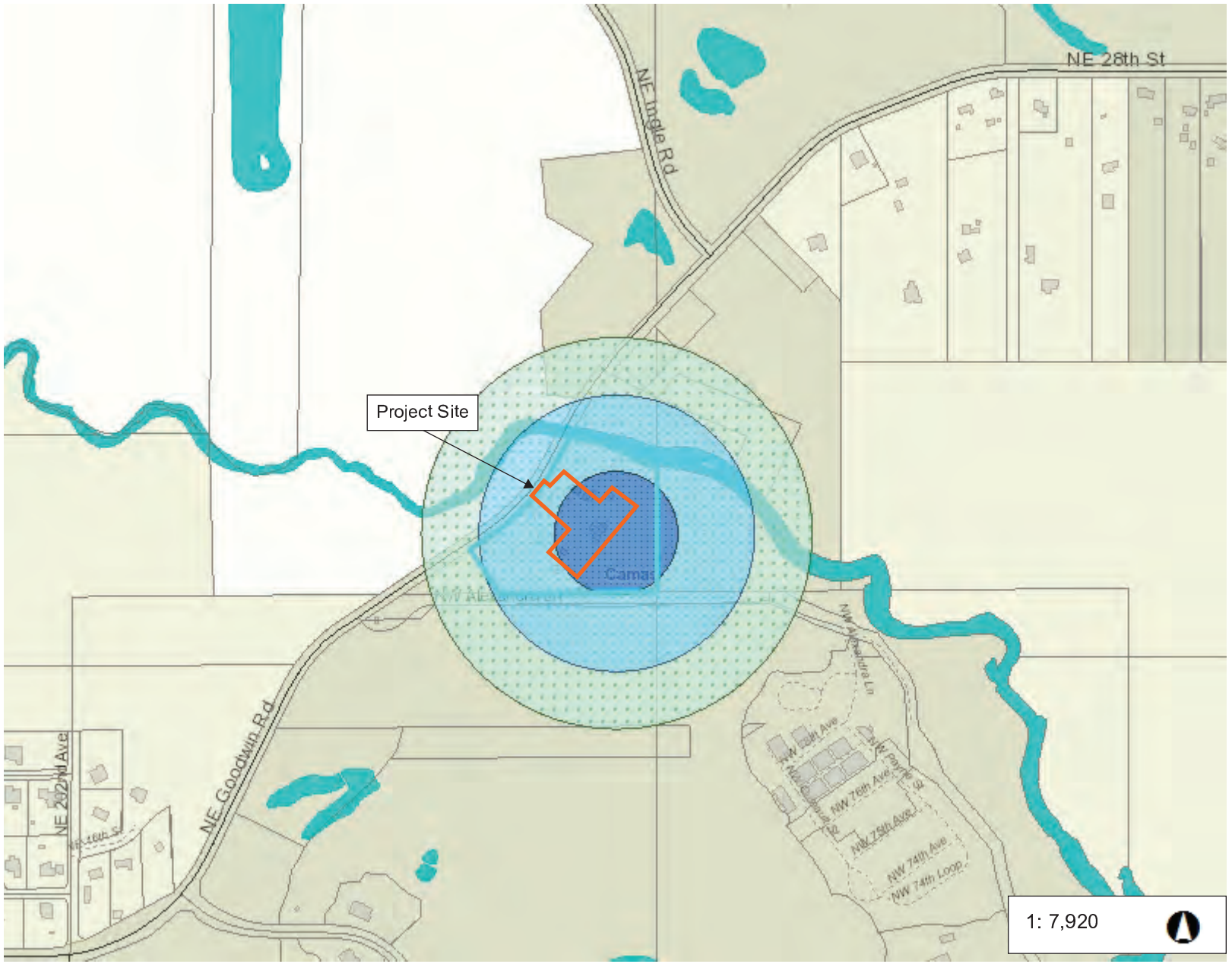
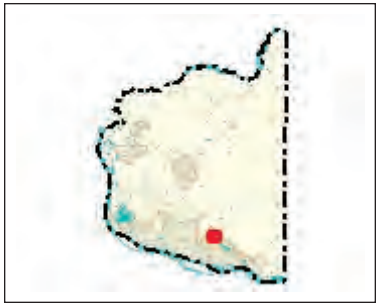
# Figure 3: Camp Lacamas Critical Aquifer Recharge Areas



## Legend

- Public Wellhead Zones
  - 1
  - 5
  - 10
- Private Wellhead Zones
  - 1
  - 5
  - 10
- Wellhead Protection Areas
  - 0
  - 1 Year
  - 5 Years
  - 10 Years
- Building Footprints
- Taxlots
- Cities Boundaries
- Urban Growth Boundaries

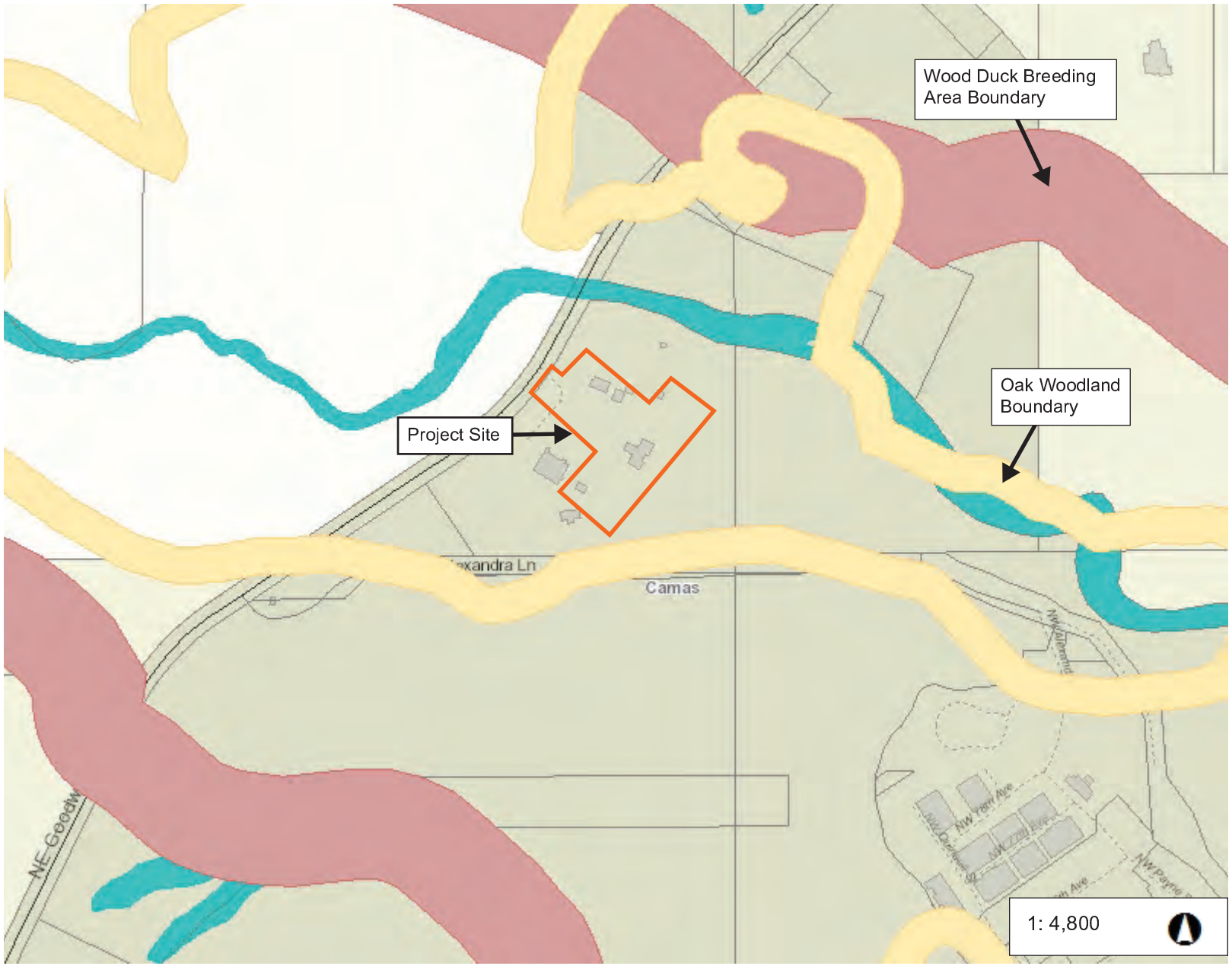
## Notes:

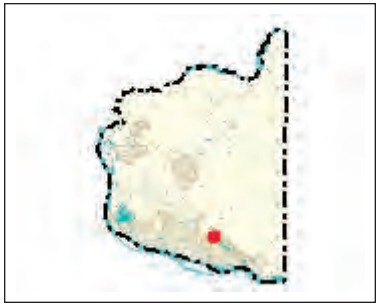
1,320.0 0 660.00 1,320.0 Feet

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

This map was generated by Clark County's "MapsOnline" website. Clark County does not warrant the accuracy, reliability or timeliness of any information on this map, and shall not be held liable for losses caused by using this information.

# Figure 4: Camp Lacamas Priority Species and Habitat



Legend

- Priority Habitat Buffer
- Priority Species Buffer
- Building Footprints
- Taxlots
- Cities Boundaries
- Urban Growth Boundaries

Notes:

800.0 0 400.00 800.0 Feet

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

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## PHOTOGRAPHS

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**Photograph 1:** View looking southwest across camp lawn. Proposed sewer alignment to be right and parallel to the sidewalk and extend to the restroom (green building at back, center). The area beyond the blue spruce (*Picea pungens*) in the foreground is outside of Shoreline jurisdiction. Photograph taken July 28, 2017.

# Appendix E:  Mailing List—Properties within 300 feet

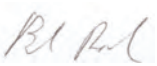
| Owner Name | Mailing Address |
|---|---|
| CITY OF CAMAS | 616 NE 4TH AVE, CAMAS, WA, 98607 |
| CLARK COUNTY PARKS | 4700 NE 78TH ST, VANCOUVER, WA, 98665 |
| COUNTY PROPERTIES EAST LLC | 4600 NW CAMAS MEADOWS DR STE 200, CAMAS, WA, 98607 |
| LACAMAS CREEK COMMUNITIES | 2025 NE GOODWIN RD, CAMAS, WA, 98607 |
| STATE OF WASHINGTON | 1111 WASHINGTON ST SE, OLYMPIA, WA, 98504 |

This document created by the Clark County, Washington Geographic Information System

Number of records 5

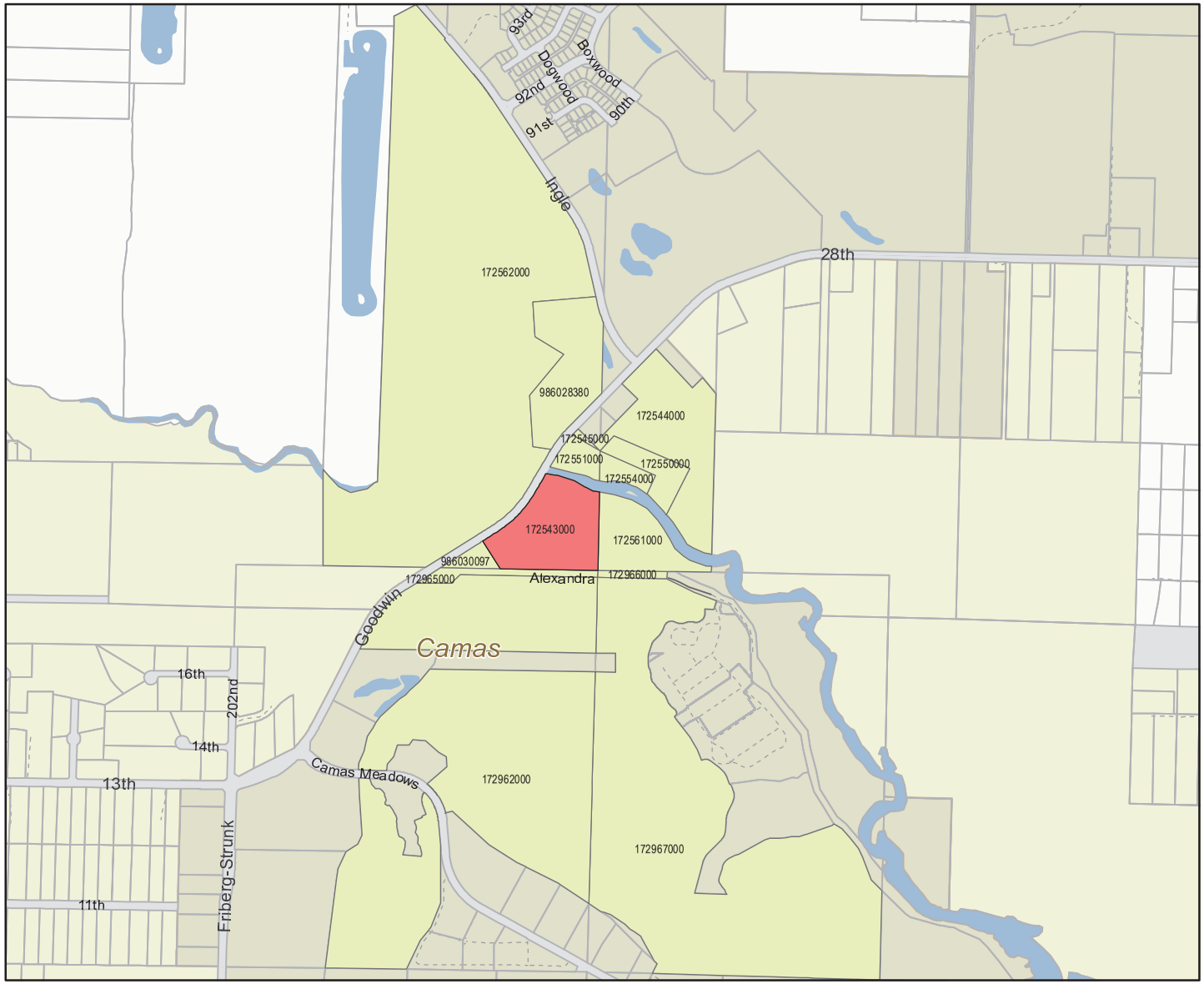
Number of Pages 1

Date Created 12/15/1

Employee Signature 

Employee Name Bob Pool

## PID(s): 172543000 , 300 Foot Buffer




Locator

**Legend**

- Subject Property
- Buffer Selection
- Parcels
- Water Body
- Incorporated
- Urban Growth Area
- Unincorporated

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Scale: 1:14,005

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: 192429

Printed: 12/15/2017

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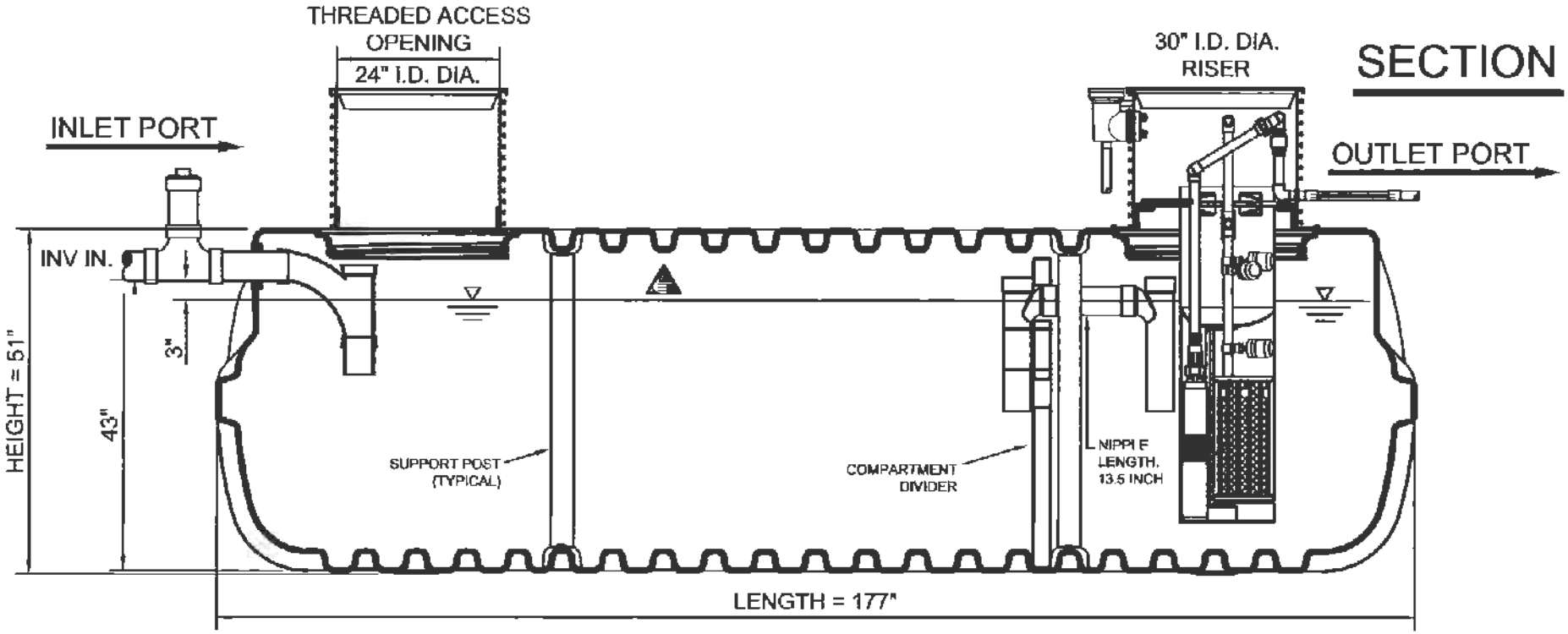
# Appendix F:  Engineering Drawings




## 40" LIQUID LEVEL ▲

## TANK SPECIFICATIONS

| DESIGN CAPACITY | | TOTAL CAPACITY | | WEIGHT |
|---|---|---|---|---|
| GALLONS | LITERS | GALLONS | LITERS | POUNDS |
| 1500 | 5678 | 1771 | 6692 | 640 |

NOTES:

1. TANKS SHALL ONLY BE INSTALLED BY LICENSED CONTRACTORS THAT ARE MANUFACTURER CERTIFIED FOR INSTALLATION.
2. SHOWN WITH TYPE P COMPARTMENT DIVIDER WITH TEES CLOSE COUPLED, INSTALLED WITH ORENCO PUMP BIOTUBE IN THE OUTLET COMPARTMENT.
3. 2-WAY CLEAN OUT ON TANK INLET; SOLVENT WELD OR GASKETED CONNECTIONS REQUIRED, FERNCO COUPLINGS NOT ALLOWED, IRON PLUG W/ 2" SQUARE NUT.
4. FOR TANK LOCATED IN DRIVEWAY - SEE CITY OF CAMAS STEP & STEF TANK INSTALLATION INSTRUCTIONS.
5. SUPPORT POSTS REQUIRED FOR ALL 1500 GALLON TANKS.

# STEP (SEPTIC TANK EFFLUENT PUMP SYSTEM)

SECTION VIEW TYPICAL 1500 GALLON TANK W/ PUMP BIOTUBE EFFLUENT FILTER

| REV. NO. | DATE | BY | APPR. |
|---|---|---|---|
| 1 | 7/10/17 | SCD | SA |
| | | | |
| | | | |
| | | | |

CITY OF CAMAS ~ SANITARY DETAIL

STEF & STEP 1500 GAL HDPE TANK – STEP SYSTEM

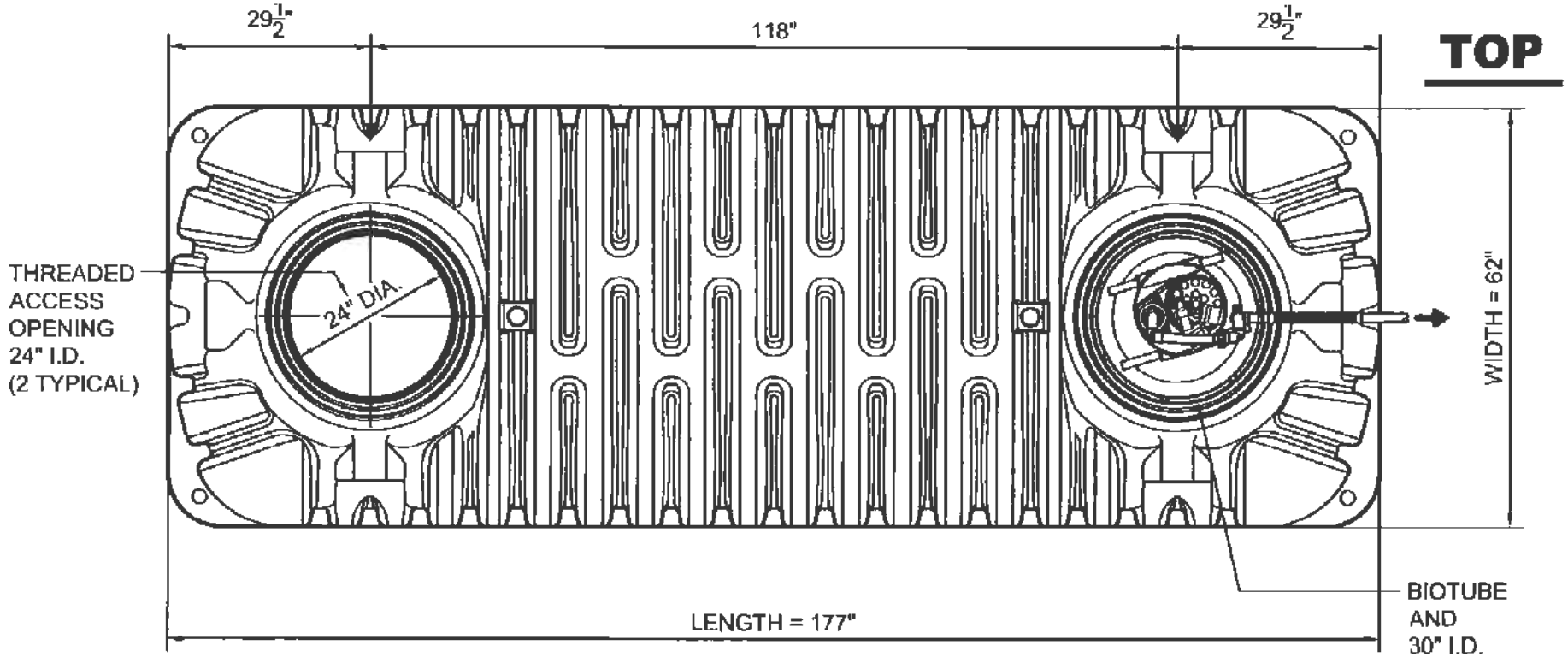
Sam Adams 8-14-17

DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO. S6B

STEF-STEP-TANK-1500 GAL.DWG




# STEP TANK - TOP DOWN VIEW

CUT-AWAY VIEW OF PUMP BIOTUBE EFFLUENT FILTER

TANK NOTES:

1. ACCESS AT OR ABOVE GRADE LEVEL SHALL BE SECURED AGAINST UNAUTHORIZED ACCESS.
2. TANK IS NOT RATED FOR VEHICULAR TRAFFIC LOADING WITHOUT FOLLOWING DRIVEWAY INSTALLATION REQUIREMENTS.
3. ALL RESIN USED SHALL BE COMPLIANT WITH ASTM D 1248 AS REQUIRED BY CSA B66 AND IAPMO / ANSI Z1000-2007.
4. TANK MATERIAL OF CONSTRUCTION SHALL BE HMW-HDPE.
5. PRIMARY DIMENSIONS ARE IN INCHES.
6. MINIMUM TANK WALL THICKNESS SHALL BE 1/4".
7. LABELING WILL INCLUDE: MAUFACTURER NAME, LIQUID CAPACITY, DATE, MAXIMUM BURIAL DEPTH, AND MODEL NUMBER.
8. RISER COVER SHALL CONTAIN THE FOLLOWING: 6" X 3" WARNING:
   "DANGER – DO NOT ENTER – POISON GAS" – WRITTEN IN ENGLISH, FRENCH & SPANISH
9. MAXIMUM BURIAL DEPTH FROM MANUFACTURER IS 36" UNLESS SPECIFICALLY INSTRUCTED OTHERWISE BY THE FACTORY.
10. TANK SHALL BE CERTIFIED TO CSA AND IAPMO STANDARDS.

| REV. NO. | DATE | BY | APPR. |
|---|---|---|---|
| 1 | 7/10/17 | SCD | SA |
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CITY OF CAMAS ~ SANITARY DETAIL

STEF & STEP 1500 GAL HDPE TANK – TOP – STEP BIOTUBE

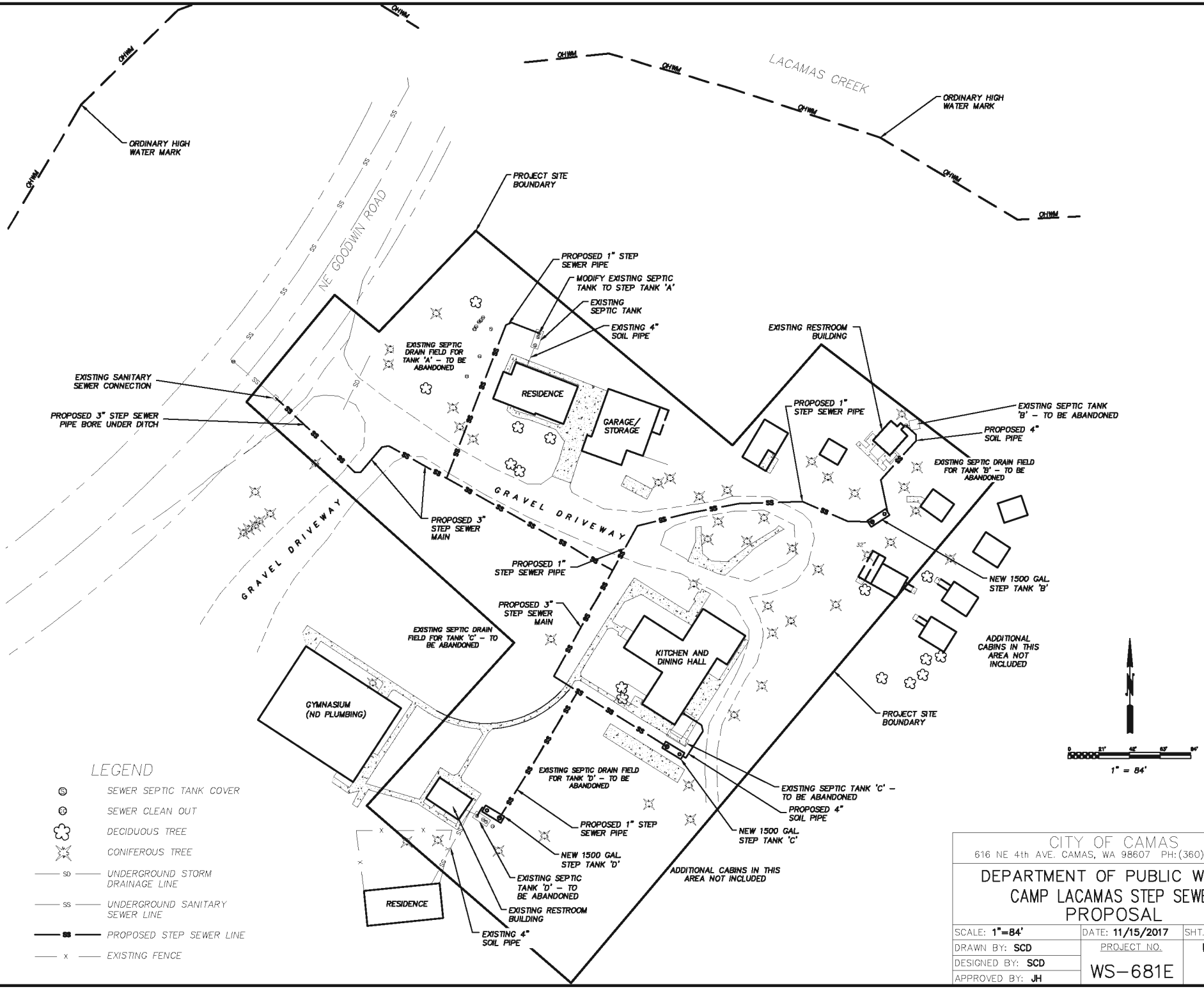
Sam Adams 8-14-17

DETAIL APPROVED BY DATE

NOT TO SCALE

DETAIL NO. S6D

STEF-STEP-TANK-1500 GAL.DWG




CITY OF CAMAS
616 NE 4th AVE. CAMAS, WA 98607 PH:(360) 817-1561

# DEPARTMENT OF PUBLIC WORKS
# CAMP LACAMAS STEP SEWER PROPOSAL

| | | |
|---|---|---|
| SCALE: 1"=84' | DATE: 11/15/2017 | SHT. 1 of 1 |
| DRAWN BY: SCD | PROJECT NO. | FIGURE NO. |
| DESIGNED BY: SCD | WS-681E | 4 |
| APPROVED BY: JH | | |