WATER QUALITY RESOURCE
SITE ASSESSMENT/MITIGATION PLAN

EXHIBIT 8

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Water Quality Resource Site Assessment

Date: March 21, 2018
To: Ed Williams, Old Time Investments, Inc.
Steve Kay, Cascadia Planning + Development Services
From: C. Mirth Walker, PWS, Senior Wetland Scientist
Tom Dee, PWS, Wetland Scientist
Subject: Harmony Road Townhomes, 6115 SE Harmony Road, Milwaukie, Oregon
Section 31D, T1S, R2E, Tax Lot 2200, Clackamas County
Water Quality Resource Site Assessment

INTRODUCTION

SWCA Environmental Consultants (SWCA) conducted a wetland and waters delineation and a vegetated corridor assessment on behalf of Old Time Investments, Inc., to meet the natural resource assessment requirements under the City of Milwaukie Municipal Code (MMC) Natural Resources (NR) Code Section 19.402 (City of Milwaukie 2016). The site was recently annexed into the City of Milwaukie (City) and is zoned R-2. Vegetated Corridors were preliminarily mapped on the site by Metro and the City (City of Milwaukie 2009). This mapping was later removed on the adopted NR Administrative Map when the site was still located outside of the city limits. Water Quality Resources (WQR), including a wetland and a stream (Minthorn Creek), were delineated on the site by certified Professional Wetland Scientists and surveyed and mapped by a licensed Professional Land Surveyor. The wetland delineation report (WDR) has been submitted to the Oregon Department of State Lands (DSL) for review and concurrence. Once the WDR has been approved by DSL (maximum 120 day timeline), then this will satisfy the Type II boundary verification process in MMC 19.402.15.A.2.

The approximately 1.18-acre site (based on the tax lot map; a 1991 survey showed the site as 1.32 acres) is Tax Lot 2200 on Clackamas County Tax Map 1S 2E 31D, located approximately 500 feet west of the intersection of SE Harmony Road and SE Railroad Avenue, at 6115 SE Harmony Road, in Milwaukie, Oregon (Figures 1–3).

EXISTING CONDITIONS

The site is within the Kellogg Creek watershed (Hydrologic Unit Code [HUC] 12: 170900120102) (Oregon Explorer 2017). The site is bordered by SE Harmony Road to the south; an apartment complex to the west; riparian forest, open meadow, the Union Pacific railroad, and SE Railroad Avenue to the north; and an abandoned residence to the east. A single-family residence and surrounding trees were removed from the site in 2010. Land use adjacent to the site is primarily light industry to the south and residential to the west, north, and east. Surrounding topography is

relatively flat and gently undulating. Site topography slopes gently to the north and then steeply down to the creek drainage. Minthorn Creek flows across the site from west to east. The area north of the creek is relatively flat and then slopes up to the north toward the railroad tracks.

The southern portion of the property consists of a cleared, grassy area with a row of trees along SE Harmony Road. Trees include dawn redwood (*Metasequoia glyptostroboides*), Douglas-fir (*Pseudotsuga menziesii*), bird cherry (*Prunus avium*), and big-leaf maple (*Acer macrophyllum*). The understory beneath the row of trees is predominantly Himalayan blackberry (*Rubus armeniacus*) and English ivy (*Hedera helix*). There is a small gravel pad in the southwest corner of the property, adjacent to SE Harmony Road. Vegetation immediately south of the creek is dominated by invasive species such as English laurel (*Prunus laurocerasus*), Himalayan blackberry, and English ivy. Ivy was observed vining high into the trees in the riparian corridor. A sewer line and easement is present along the northern property boundary, and crosses the stream along the eastern property boundary, with a manhole located south of the stream, in an upland area.

The northern portion of the site is riparian forest dominated by Oregon ash (*Fraxinus latifolia*) and black cottonwood (*Populus trichocarpa*), with a mid-story of red-osier dogwood (*Cornus alba*), English hawthorn (*Crataegus monogyna*), and snowberry (*Symphoricarpos albus*). English ivy is abundant throughout the corridor and a thornless blackberry variety (*Rubus* sp.) is spreading into the site from a nearby clearing to the west. Yellow-flag iris (*Iris pseudacorus*) borders the creek, with occasional patches of skunk cabbage (*Lysichiton americanus*).

According to the Natural Resources Conservation Service (NRCS), soils on the majority of the site are mapped as Wapato silty clay loam (Unit 84), with a small portion of Woodburn silt loam, 3%–8% slopes (Unit 91B) in the southwestern corner and Salem silt loam 0%–7% slopes (Unit 76B) in the northwestern corner of the property (NRCS 2015) (Figure 4). Wapato soils are hydric and Salem soils are upland soils. Woodburn soils are upland soils with small hydric inclusions of Huberly and Dayton soils.

No wetlands or waters were mapped on the North Clackamas Urban Area Wetland Inventory and Goal 5 Assessment for Clackamas County (SRI/Shapiro 1994) (Figure 5). The U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (Figure 6) mapped Minthorn Creek as riverine upper perennial, unconsolidated bottom deepwater habitat, with a permanently flooded water regime (R3UBH) (USFWS 2017). The City of Milwaukie's preliminary WQR mapping provided by Metro is shown in Figure 7 (City of Milwaukie 2017). There are no Habitat Conservation Areas (HCA) on the site.

METHODS

SWCA used guidance presented in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (USACE 2010), *Regulatory Guidance Letter 05-05* (USACE 2005), and Oregon Administrative Rules (OAR) (DSL 2017a), to characterize wetlands and waters within the site. The wetlands and waters delineation was conducted on August 25, 2016, by C. Mirth Walker, Professional Wetland Scientist (PWS) and Evan Dulin, wetland scientist. An additional site visit was conducted after city annexation on October 17, 2017, by C. Mirth Walker and Tom Dee, PWS. Soils, vegetation, and

indicators of hydrology were recorded at seven sample plot locations (Attachment A). The wetland boundary, Ordinary High Water Line (OHWL), and sample plot locations were flagged in the field, and mapped by a professional land surveyor. Map accuracy is within ± 1 foot.

The vegetated corridor was assessed according to the MMC NR Table 19.402.11.C, Mitigation Requirements for WQRs. Class A WQRs are in "good" condition, Class B WQRs are in "marginal" condition, and Class C WQRs are in "poor" condition. The City is currently using the Portland Plant List as the "Milwaukie Native Plant List" (City of Portland Bureau of Planning and Sustainability 2016). A list of vegetation observed on the site is provided in Attachment B. Representative site photographs are included in Attachment C.

The wetland was assessed using the Oregon Freshwater Wetland Assessment Method (OFWAM) (Roth et al. 1996), as outlined in MCC 19.402.15.A.2.a.(1)(b).

RESULTS

Water Quality Resources

Minthorn Creek

Minthorn Creek is a freshwater, perennial stream that flows across the center of the site from west to east (Figure 8). The stream is designated a Primary Protected Water Feature because of its perennial character (MMC 19.402.15.D). Minthorn Creek occupies approximately 0.16 acre within the study area, and extends off-site to the east and west. Minthorn Creek is a tributary of Mt. Scott Creek.

The DSL Essential Salmonid Habitat (ESH) mapper (DSL 2017b) illustrates Mt. Scott Creek, approximately 400 feet south of the site, as ESH containing coho salmon (*Oncorhynchus kisutch*) and winter steelhead (*O. mykiss*). Minthorn Creek is not mapped as ESH, and it is assumed that there is a fish passage barrier present. The Oregon Department of Fish and Wildlife (ODFW) Fish Passage Barrier mapper does not depict a barrier at the confluence with Mt. Scott Creek (ODFW 2017).

The OHWL of Minthorn Creek was delineated based on evidence of high water, such as drift deposits (including sediment on tires and some Styrofoam debris), debris wracks, sparse vegetation, soil cracks, and changes in topography and plant communities. The bed and banks are composed of silt loam. The channel is relatively stable due to the abundant root systems of adjacent vegetation. Minthorn Creek overtops its banks seasonally. Floodplain roughness is high, due to abundant riparian vegetation and large woody debris. There is a small concrete dam and weir approximately 50 feet east and downstream of the eastern site boundary. The dam impounds water that backs up into the site throughout much of the year. Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) 41005C0036D indicates there is no 100-year floodplain within the site (FEMA 2017).

Wetland A

Wetland A is a small, approximately 0.12-acre wetland on the north side of Minthorn Creek (Figure 8). The wetland is classified as palustrine forested (PFO) using the *Classification of Deepwater Habitats of the United States* (Cowardin et al. 1979), and as valley slope (SV) and

riverine flow-through (RFT) using the *Guidebook for Hydrogeomorphic (HGM)–based Assessment of Oregon Wetland and Riparian Sites: Statewide Classification and Profiles* (Adamus 2001).

Wetland determination data forms are provided in Attachment A. The wetland was dominated by Oregon ash, red osier dogwood, English Hawthorn, colonial bentgrass (*Agrostis capillaris*), taper-fruit short-scale sedge (*Carex leptopoda*), skunk cabbage, yellow-flag iris, and soft rush (*Juncus effusus*). Soils met the Redox Dark Surface (F6) and Depleted Matrix (F3) hydric soil indicators. The Saturation (A3) wetland hydrology indicator was observed at Plot 6 during the October 2017 site visit.

Wetland A receives hydrology from the hyporheic zone associated with Minthorn Creek and from the slope to the northwest. The wetland is contiguous with the stream and occasionally receives overbank flooding during seasonal precipitation events.

OFWAM results for Wetland A (Attachment D) indicate that Wetland A has intact Water Quality and Hydrologic Control functions and is therefore considered a Title 3 wetland (Metro 2016).

Vegetated Corridors

Vegetated Corridor A: Approximately 0.23 acre (10,230 square feet)
Vegetated Corridor A (VECO A), on the south side of Minthorn Creek, is 50 feet wide based on the Primary Protected Water Feature designation of the stream and the slope being less than 25% (Figure 9), except where there is a small portion of the slope that is greater than 25%. The City has determined that because the steep portion is less than 150 feet in length that the buffer is still 50 feet in width (City of Milwaukie 2017). VECO A is measured from the southern OHWL of Minthorn Creek.

VECO A was in was in poor (Class C) and marginal (Class B) condition, according to Table 19.402.11.C. In VECO Plot A1, the combination of tree, shrub, and herbs cover was at least 80% but canopy coverage was only 25% to 50%. VECO Plot A1 had moderate tree canopy, moderate shrub cover, and very little groundcover. Dominant trees in this area included big-leaf maple and English laurel in the tree canopy. The shrub layer was dominated by English hawthorn and English laurel. English ivy and Himalayan blackberry dominated the understory. VECO Plot A2 was dominated by perennial ryegrass (*Lolium perenne*), with a few mature trees, including western red cedar (*Thuja plicata*), Douglas-fir, and dawn redwood.

Vegetated Corridor B: Approximately 0.25 acre (11,044 square feet)
VECO B, on the north side of Minthorn Creek and Wetland A, is 50 feet wide, based on the Title 3 designation of Wetland A and the slope being less than 25%. VECO B is measured from the northern edge of Wetland A.

VECO B was in good (Class A) condition according to Table 19.402.11.C. The combination of trees, shrubs, and herbs was greater than 80%, with more than 50% tree canopy coverage. Dominant trees included horse chestnut (*Aesculus hippocastanum*) and Oregon ash. The shrub layer was dominated by English laurel and clustered rose (*Rosa pisocarpa*), and the herb layer was dominated by sword fern (*Polystichum munitum*), field horsetail (*Equisetum arvense*), and wild mint (*Mentha arvensis*). Vegetated corridor data are summarized in Table 1.

Table 1. Vegetated Corridor Assessment Summary

Species Name	Common Name	Native Status	VECO A1 Cover	VECO A2 Cover	VECO B Cover
Trees					
Acer macrophyllum	big-leaf maple	Native	30	-	-
Aesculus hippocastanum	horse chestnut	Invasive, Nuisance*	-	-	60
Fraxinus latifolia	Oregon ash	Native	-	-	20
Prunus laurocerasus	English laurel	Invasive, Nuisance*	20	-	20
Shrubs					
Crataegus monogyna	English hawthorn	Invasive	20	-	-
Corylus cornuta	Beaked hazelnut	Native	10	-	-
Ilex aquifolium	English holly	Invasive	10	-	-
Rosa pisocarpa	Clustered rose	Native	-	-	20
Rubus armeniacus	Himalayan blackberry	Invasive, Noxious	10	-	-
Herbs					
Hedera helix	English ivy	Invasive	90	-	-
Lolium perenne	Perennial ryegrass	Non-native	-	100	-
Rubus leucodermis	Black-cap raspberry	Native	-	-	10
Total Aerial Cover			100	100	100
Total Canopy Cover			80	0	80
Corridor Condition			Marginal	Poor	Good

*Nuisance plant according to the Portland Plant List

Functions and Values Assessment

The functions and values of the WQRs within the site were assessed according to MMC 19.402.1.C.2. Seven functions were assessed using best professional judgment.

Vegetated corridors to separate protected water features from development.
VECO A: The southern portion of VECO A has a few large trees but no significant woody cover to separate the WQR from the proposed development. The northern portion of VECO has moderate woody cover to separate the WQR from proposed development.

VECO B contained substantial tree and shrub cover to separate Minthorn Creek and Wetland A from adjacent development.

Microclimate and shade.
VECO A provides moderate microclimate and shade to Minthorn Creek.

VECO B provides substantial microclimate and shade to WQRs within the site.

Streamflow moderation and water storage.
VECO A has considerable slope that conveys surface runoff to Minthorn Creek. Vegetation in the corridor helps to slow surface runoff to help offset peak flows during storm events. There is an upland depression in the northwestern part of the corridor that stores water and promotes infiltration.

VECO B is well vegetated, contains numerous small depressions, and a moderate amount of woody debris. Vegetation and woody debris add floodplain roughness that slows streamflow velocities. The microtopography stores water to attenuate peak flows.

Water filtration, infiltration, and natural purification.
VECO A is mostly steep and water only infiltrates at the toe of slope and in the small depression.

VECO B contains extensive microtopography that promotes infiltration, water filtration, and natural purification.

Bank stabilization and sediment and pollution control.
VECO A and VECO B both promote bank stabilization with abundant vegetation and associated root systems adjacent to Minthorn Creek. Their floodplains and upland depressions trap sediments and nutrients, and prevent them from flowing into the stream.

Large wood recruitment and retention and natural channel dynamics.
VECO A and VECO B both exhibit large wood recruitment and retention but the presence of invasive species hinders the growth of native species that would contribute to future recruitment and retention. Minthorn Creek is unconstrained within the site and possesses natural habitat features such as a convoluted shoreline, overhanging and in-water woody vegetation, and floodplain connection. The dam and weir downstream, just outside of the site, poses a threat to the reach of the stream within the site. If the dam and weir were removed, headcutting would occur and eventually alter the channel profile of the site reach. This could cause channel incision, disconnection from the floodplain, and conversion of adjacent wetland to upland.

Organic material resources.
VECO A provides moderate to minimal organic inputs to Minthorn Creek, and this is gradually decreasing over time, as invasive species suppress new plant growth.

VECO B provides moderate to abundant organic inputs to Minthorn Creek. This is decreasing over time in this area also, with the establishment of invasive species and the suppression of native plants.

Habitat Conservation Areas

There are no Habitat Conservation Areas (HCAs) within the site. There are a low value and a high value HCA approximately 350 feet west of the site.

PROPOSED IMPACTS

The proposed 15-unit multi-family apartment complex, pedestrian walkway, and parking area would permanently impact 2,734 square feet (0.06 acre) of VECO A (Figure 10), leaving 7,496 square feet (0.17 acre) of the vegetated corridor present on the south side of Minthorn Creek. No wetland, stream, or VECO B impacts are proposed.

Water Quality Resource Mitigation

Mitigation will be implemented according to MCC 19.402.11.B and 19.402.11.C. The applicant is proposing enhancement of the remaining VECO A per the planting specifications shown in Tables 2 and 3. VECO A is in poor (1,500 square feet) and marginal (5,883 square feet) condition (Figure 11) and mitigation will conform to the requirements in Table 19.402.11.C for poor condition. Those requirements include:

- Restore disturbed areas with native species from the Milwaukie (Portland) Native Plant List, using a City-approved plan developed to represent the vegetative composition that would naturally occur on the site.
- Plant and/or seed all bare areas to provide 100% surface coverage.
- Inventory and remove debris and noxious materials.

VECO A will be vegetatively enhanced through the removal of invasive vegetation and the installation of native plants. Invasive vegetation is prolific within the corridor, and will be removed by manual, mechanical, and chemical treatment. Invasive trees, shrubs, and vines will be cut and swabbed with herbicide. Invasive and non-native grasses and will be cut and sprayed with herbicide. Treated areas will be reseeded with native herbaceous species.

Native vegetation will be planted throughout the majority of VECO A. There are small pockets of native vegetation that will not require planting with trees and shrubs, but will receive some herbaceous plants. All planted vegetation will be mulched in an area 18 inches in diameter and 3 inches deep, taking care to pull mulch away from the stem. Planted areas of VECO A will be watered with 1 inch of water per week between June 1 and October 1 for the first 2 years after planting. The area is small enough that an intricate irrigation system will not be required, and a few impact sprinklers should be sufficient. Vegetation maintenance must be conducted several times throughout the growing season.

The pre-settlement vegetation class consisted of riparian hardwoods and conifers (Oregon Explorer 2017). Plant species and locations have been selected based on historic composition, site conditions, and public safety. Fast-growing, short-lived species such as red alder (*Alnus rubra*) and black cottonwood have not been proposed within the mitigation area. Large trees have not been proposed immediately adjacent to the proposed development.

VECO A has been divided into two planting areas, based on the light and moisture tolerances of the proposed plants. VECO A1 contains species that prefer moisture and partial sun. VECO A2 contains species that prefer drier soils and full sun to partial shade. Tables 2 and 3 provide plant specifications for VECO A1 and VECO A2, respectively.

VECO A1 is located at the toe of the slope. Parts of the planting area are in full sun and parts are beneath the canopy of existing trees. Grass seed is specified for areas with full sun to partial shade. Ferns are specified in the area under existing canopy. Planting specifications for VECO A1 are shown in Table 2.

VECO A2 occupies the sloped portion of the corridor. This area is in direct sunlight and is drier than VECO A1. This area is currently dominated by a non-native grass species that will be replaced with native upland grasses. Upland plants that are good for stabilizing slopes have been specified in VECO A2. Low-growing shrubs will be planted immediately adjacent to the proposed structure, to avoid future hazards from large trees. Planting specifications for VECO A2 are shown in Table 3.

A few large trees have been recently removed from VECO A, and will be replaced with 0.5-inch caliper trees of the same species. Western red cedar and Douglas-fir were removed but 3 Douglas-fir are specified because western red cedar does not do well in direct sun when it is young.

Table 2. Planting Specifications for VECO A1 (5,883 square feet)

Species Name	Common Name	Quantity	Size	Spacing
Trees				
Fraxinus latifolia	Oregon ash	7	1 gallon	18' on center (o.c.)
Malus fusca	Pacific crabapple	6	1 gallon	18' o.c.
Thuja plicata	Western red cedar	7	1 gallon	18' o.c.
Shrubs				
Cornus alba	Red-osier dogwood	20	1 gallon	8' o.c
Rosa pisocarpa	Clustered rose	20	1 gallon	8' o.c.
Rubus spectabilis	Salmonberry	20	1 gallon	8' o.c.
Symphoricarpos albus	Snowberry	20	1 gallon	8' o.c.
Herbs				
Athyrium cyclosorum	Lady fern	20	1 gallon	8' o.c.
Polystichum munitum	Sword-fern	20	1 gallon	8' o.c.
Grasses				
Agrostis exarata	Spike bentgrass	2 lbs	seed	broadcast
Deschampsia caespitosa	Tufted hairgrass	2 lbs	seed	broadcast
Elymus glaucus	Blue wildrye	2 lbs	seed	broadcast

Table 3. Planting Specifications for VECO A2 (1,500 square feet)

Species Name	Common Name	Quantity	Size	Spacing
Trees				
Acer macrophyllum	Big-leaf maple	3	1 gallon	10' o.c.
Crataegus douglasii	Black hawthorn	3	1 gallon	10' o.c.
Frangula purshiana	Cascara buckthorn	3	1 gallon	10' o.c.
Pseudotsuga menziesii	Douglas-fir	3	1 gallon	10' o.c.
Pseudotsuga menziesii	Douglas-fir	3	0.5" caliper minimum	10' o.c.
Shrubs				
Corylus cornuta	Beaked hazelnut	5	1 gallon	6' o.c
Holodiscus discolor	Oceanspray	5	1 gallon	6 o.c.
Lonicera involucrata	Black twinberry	5	1 gallon	6' o.c.
Physocarpus capitatus	Pacific ninebark	5	1 gallon	6' o.c.
Rubus parviflorus	Thimbleberry	5	1 gallon	6' o.c.
Symphoricarpos albus	Snowberry	5	1 gallon	6' o.c.
Herbs				
Lupinus polyphyllus	Bigleaf lupine	1 lbs	seed	broadcast
Grasses				
Elymus glaucus	Blue wildrye	2 lbs	seed	broadcast
Festuca rubra ssp. rubra	Red fescue	2 lbs	seed	broadcast

MONITORING AND REPORTING

Monitoring of the mitigation site is the ongoing responsibility of the property owner. Plants that die shall be replaced in kind as needed to ensure the minimum 80% survival rate. The City Planning Director may require a maintenance bond to cover the continued health and survival of all plantings. An annual report on the survival rate of all plantings shall be submitted for 2 years.

QUALIFICATIONS

C. Mirth Walker is a certified PWS with 27 years of experience delineating wetlands and streams and conducting inventories and functional assessments of riparian corridors and other habitats in the Pacific Northwest. Tom Dee is a certified PWS with 14 years of experience delineating wetlands and streams and conducting inventories and functional assessments of riparian corridors and other habitats in the Pacific Northwest. Ms. Walker and Mr. Dee have conducted hundreds of wetland and waters delineations, riparian corridor inventories, and functional assessments, and have many years of experience in wetland permitting, designing mitigation plans, and implementing and monitoring mitigation projects.

LIST OF FIGURES:

LIST OF ATTACHMENTS:

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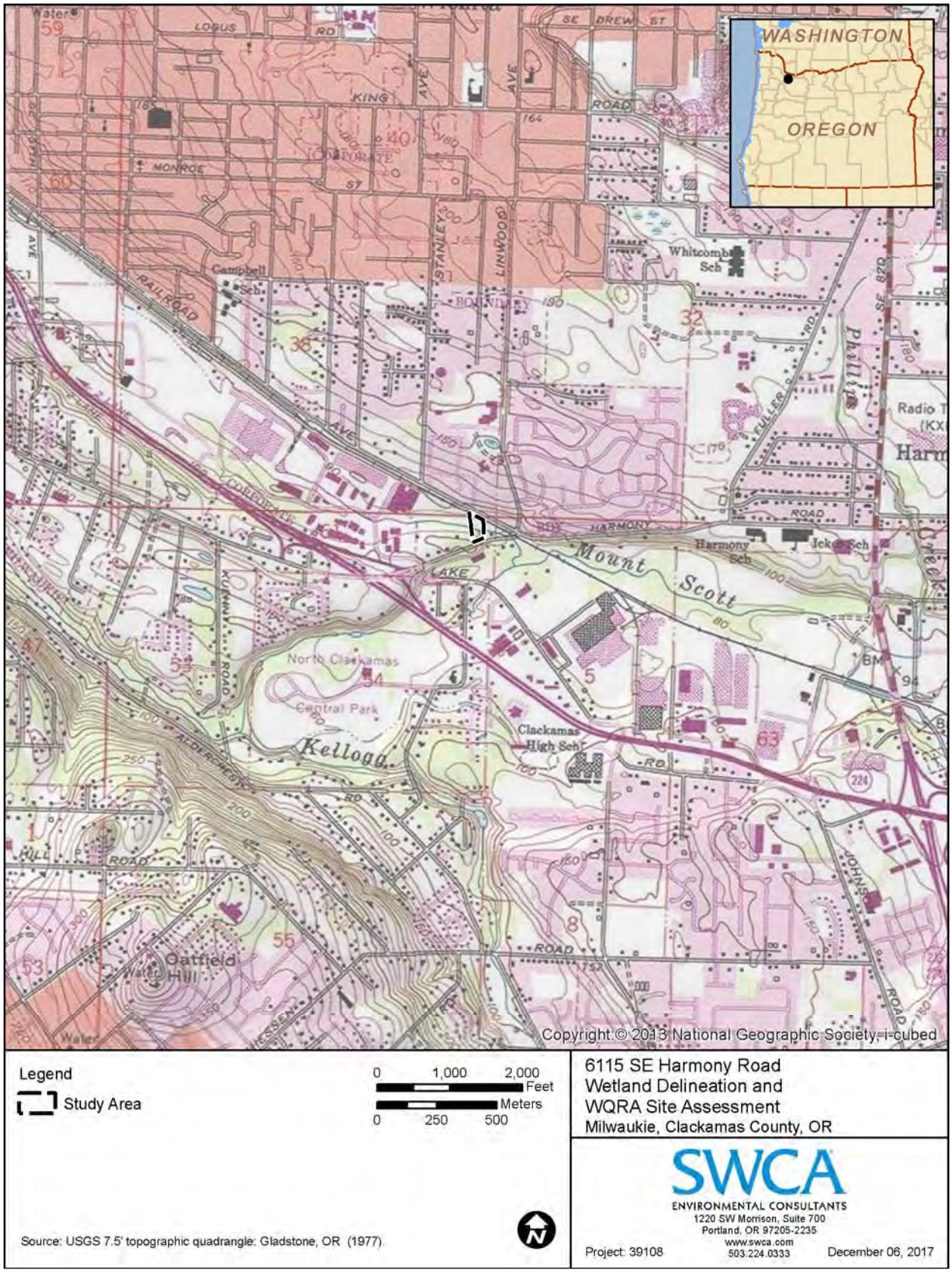


Figure 1. Site location map.

Figure 2. Tax lot map (Metro RLIS aerial base).

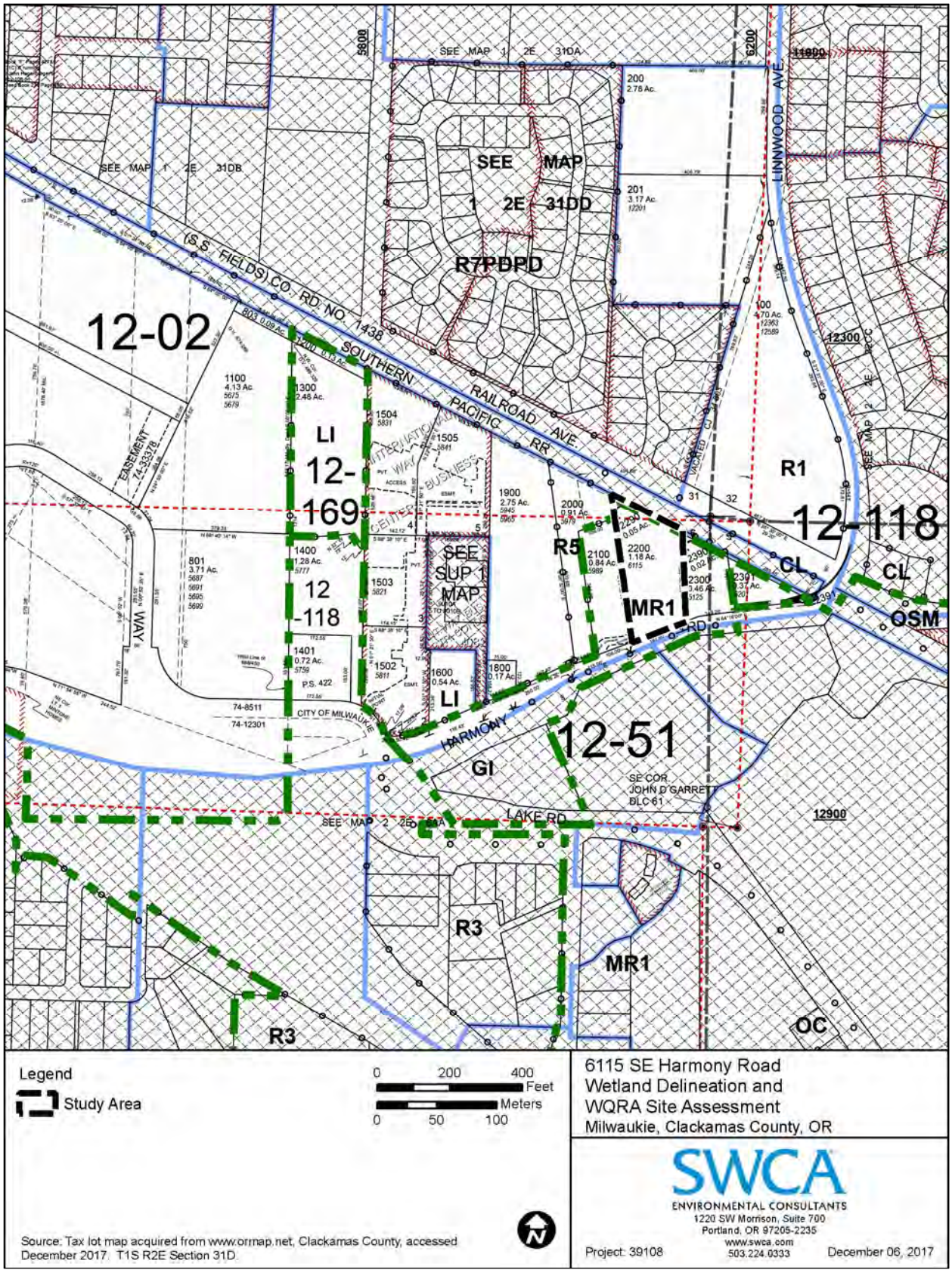


Figure 3. Tax lot map (ORmap paper base).

Figure 4. Soils map.

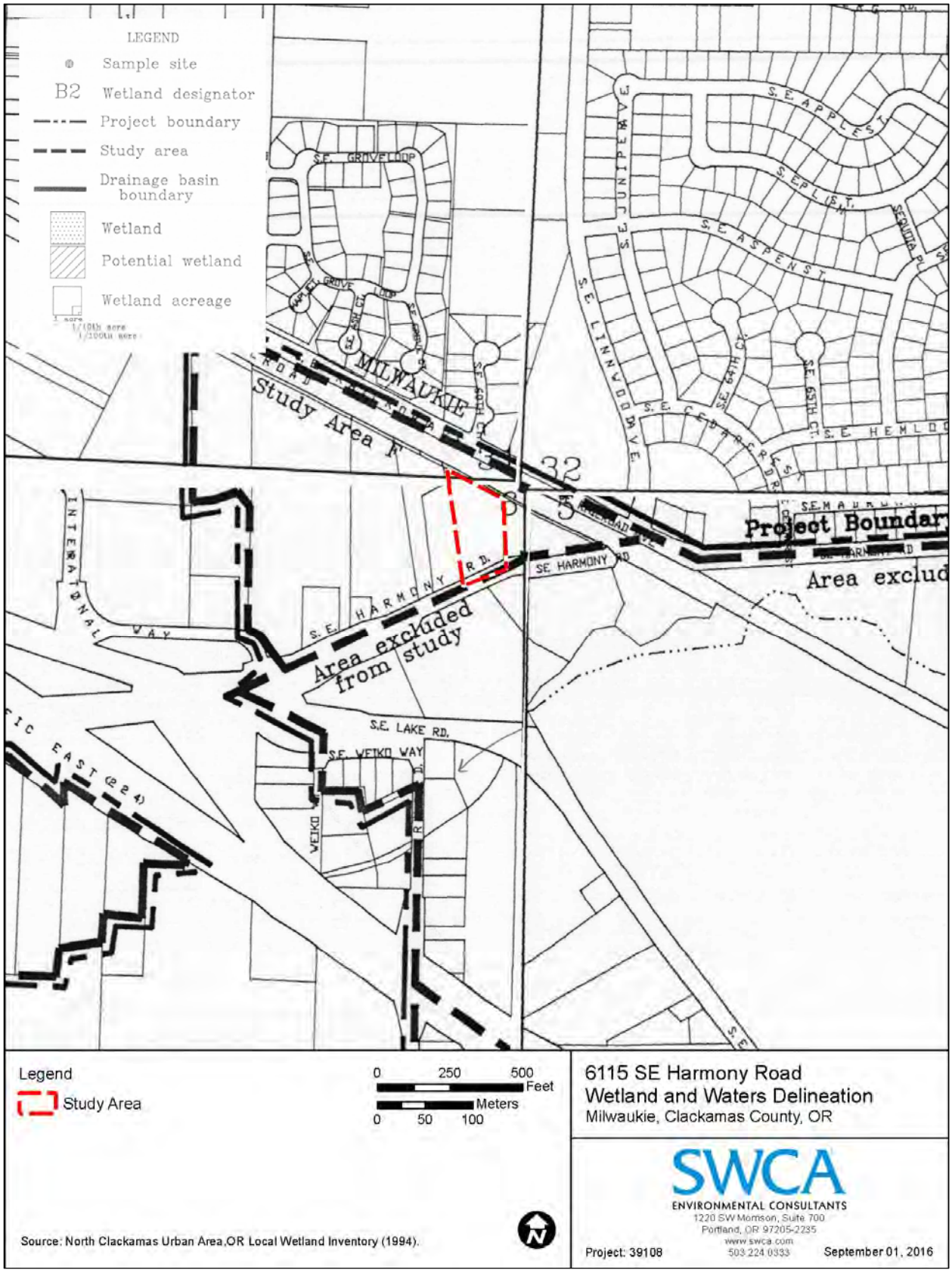


Figure 5. Local Wetland Inventory map.

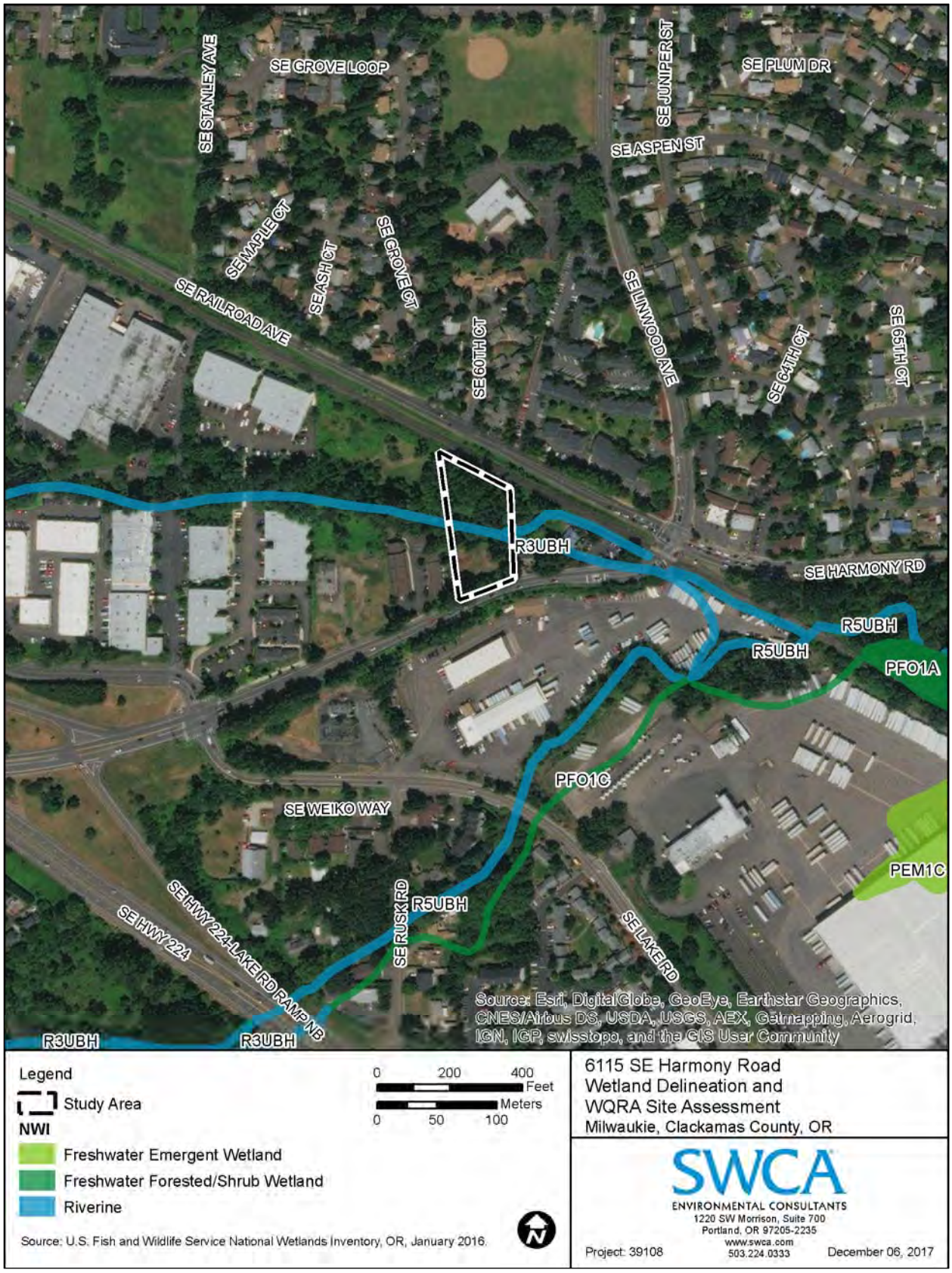


Figure 6. National Wetlands Inventory map .

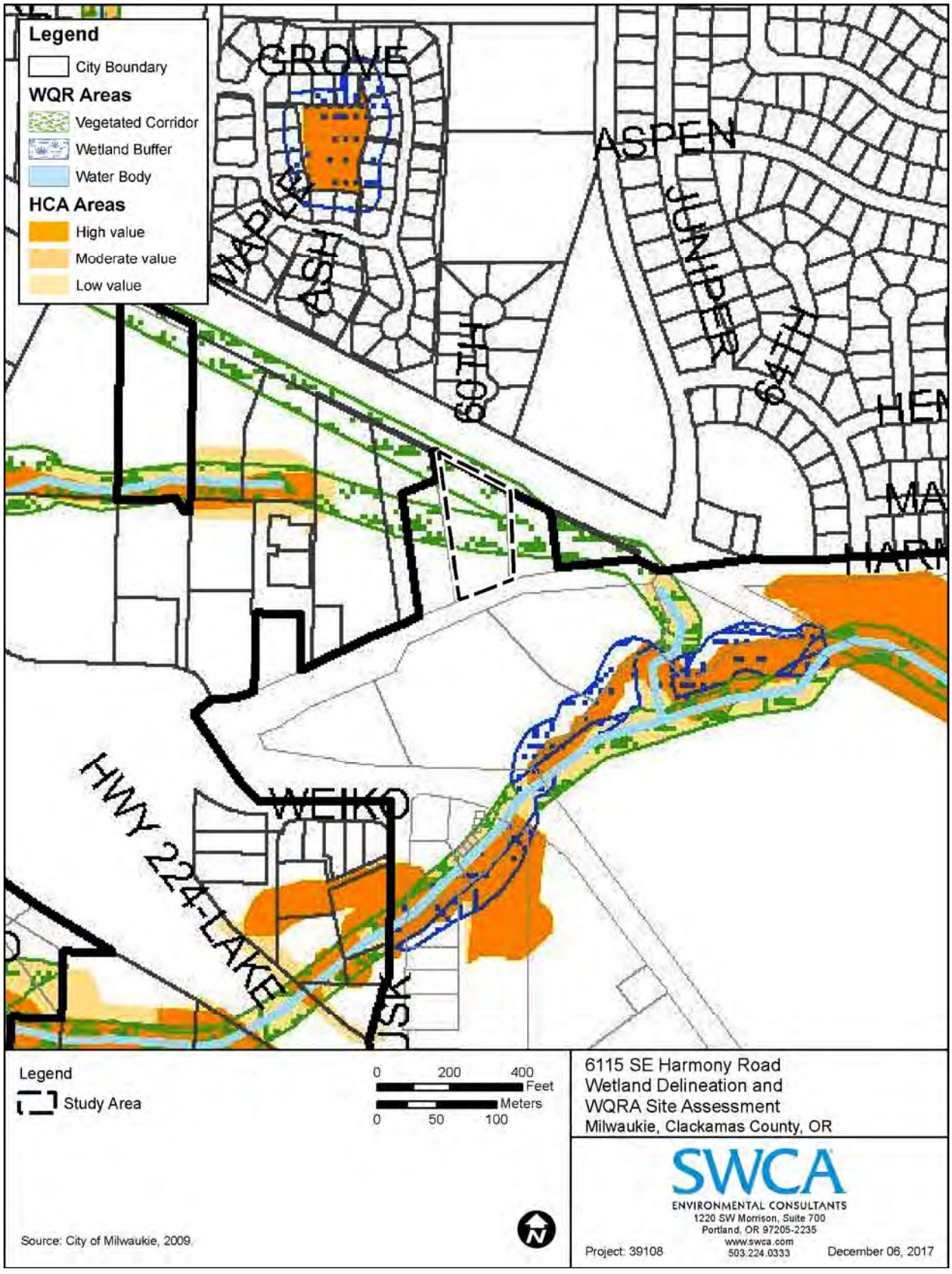
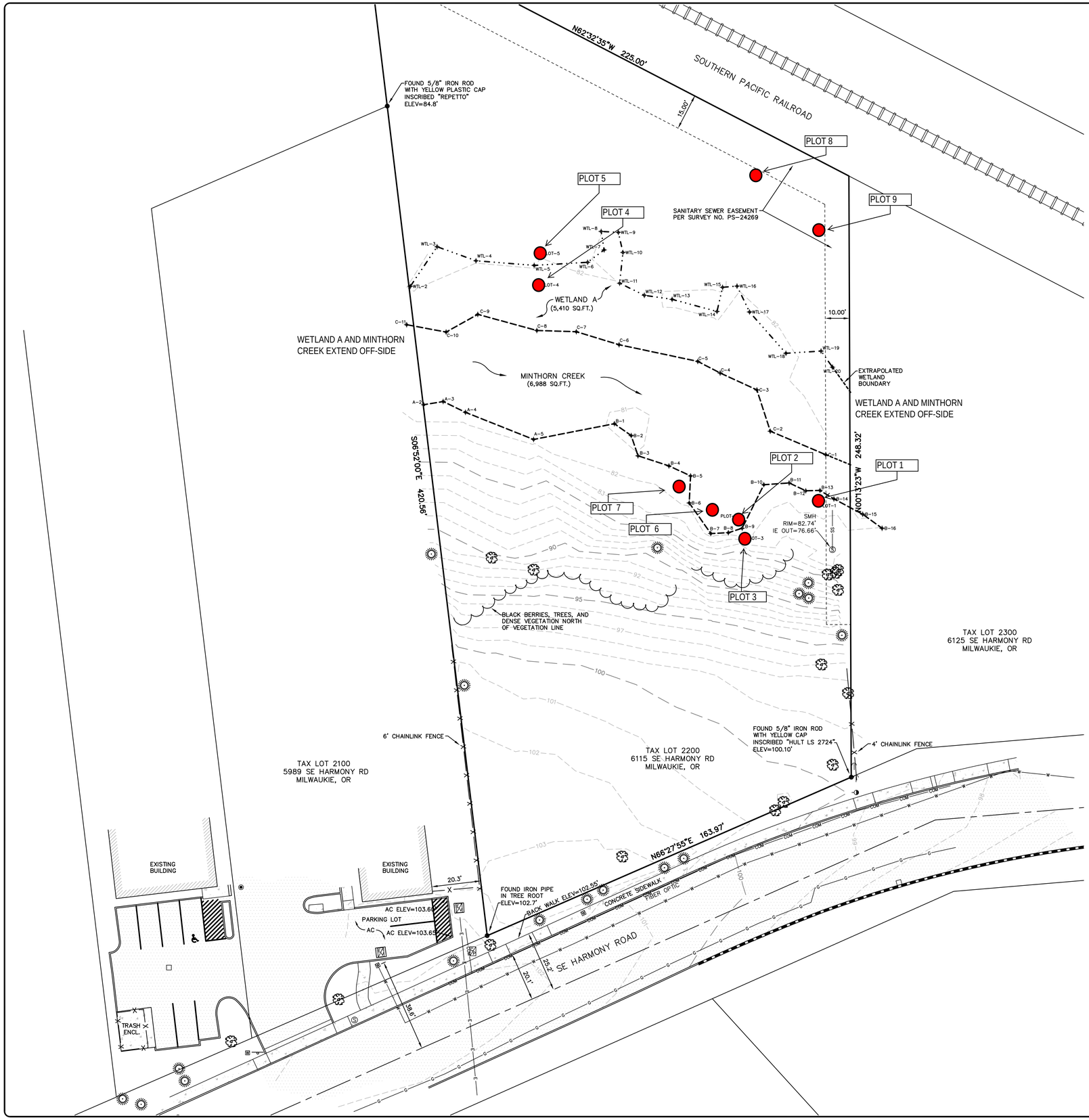
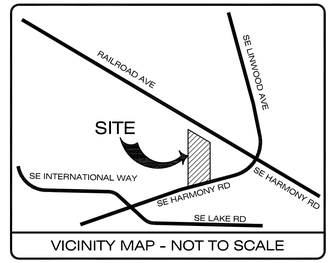
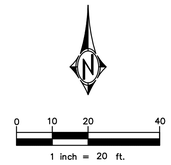


Figure 7. City of Milwaukie's preliminary WQR mapping provided by Metro map.





VICINITY MAP - NOT TO SCALE



SURVEY LEGEND - EXISTING FEATURES

- CONCRETE WALL
- RAIL ROAD
- FENCE
- MINOR CONTOUR
- MAJOR CONTOUR
- WETLAND DELINEATION
- SANITARY SEWER LINE
- GAS LINE
- WATER LINE
- WATER METER/SERVICE
- WATER VALVE
- CATCH BASIN / AREA DRAIN
- SANITARY SEWER MANHOLE
- UTILITY GUY POLE
- UTILITY GUY WIRE
- ELECTRIC VAULT
- COMMUNICATIONS PEDESTAL
- DECIDUOUS TREE
- EVERGREEN TREE
- SURVEY FOUND MONUMENT

GENERAL NOTES:

1. BENCHMARK INFORMATION. 3-1/2" BRONZE DISK IN SIDEWALK PER USBT 2001-040. BEING THE NORTHEAST CORNER OF JOHN GARRETT DLC NO. 61, ALSO BEING THE SOUTHEAST CORNER OF JOHN GARRETT DLC NO. 38 ON THE NORTH LINE OF SECTION 5. SEE CLACKAMAS COUNTY SN 2004-356 SHEET 4 OF 14.
ELEVATION = 85.30'

2. THE BOUNDARY DEPICTED HERE ON IS PRELIMINARY AND IS SUBJECT TO CHANGE. IF ADDITIONAL MONUMENTS ARE FOUND ALONG THE NORTH LINE, THE BOUNDARY RETRACEMENT WILL BE REVISED ACCORDINGLY.

3. THE PURPOSE OF THIS SURVEY WAS TO PROVIDE A TOPOGRAPHIC BASE MAP OF TAX LOT 2200 TAX MAP 1S 2E 31D SHOWING EXISTING CONDITIONS ALONG WITH THE WETLAND DELINEATION AND MARKERS. THE AREA NORTH OF THE HEAVY VEGETATION DEMARKATION HAS NOT BEEN ACCURATELY SURVEYED, OTHER THAN THE WETLAND MARKERS DEPICTED HEREON.

4. AS OF THE DATE OF THIS MAPPING, THERE WERE NO UNDERGROUND UTILITY PAINT MARKINGS TO MAP THE SUBSURFACE UTILIZES.

5. MANHOLES SHOWN HEREON ARE TO CENTER OF MANHOLE LID, NOT CENTER OF STRUCTURE.

6. THE WETLAND, WATER BOUNDARIES AND SAMPLE PLOT LOCATIONS, DELINEATED WITH EITHER FLAGS IN SOIL OR FLAGGING TIED TO BRANCHES, HAVE A HORIZONTAL MAPPING ACCURACY OF ±1'.

SUMMIT JOB NO.: 998-187
SUMMIT JOB NAME: SE HARMONY RD TOPO
PREPARED FOR: ED WILLIAMS
SURVEY DATE: 9/19/16
DRAWN BY: CLM
MODIFIED: 10/05/16 - CLM - ADDED WETLAND BUFFER LINES
MODIFIED: 12/28/17 - CLM - ADDED ADVIL TOPO IN OFFSITE PARKING AREA ON TL 2100
MODIFIED: 02/28/18 - CLM - MODIFIED SENSITIVE AREA LINETYPES

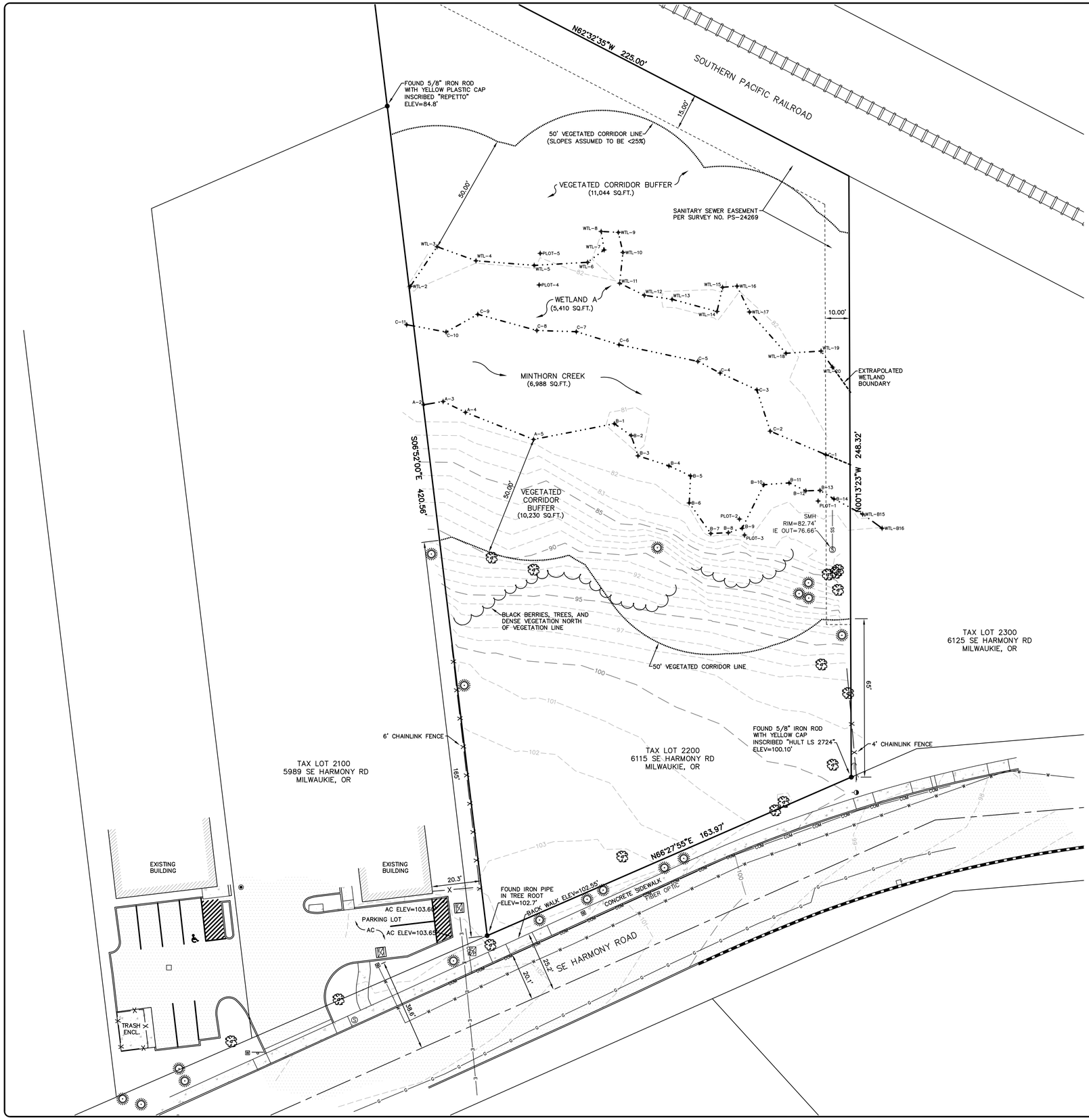
TOPOGRAPHIC SURVEY

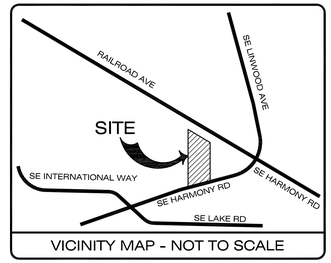
EXISTING CONDITIONS

TAX LOT 2200
TAX MAP 1S 2E 31D
CLACKAMAS COUNTY, OREGON

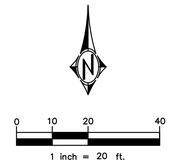
SUMMIT LAND SURVEYORS
12950 SW PACIFIC HIGHWAY, SUITE 255
TIGARD, OREGON 97223
PHONE & FAX: 503.928.5589
www.summitlandsurveyors.com

SHEET 8





VICINITY MAP - NOT TO SCALE



SURVEY LEGEND - EXISTING FEATURES

- CONCRETE WALL
- RAIL ROAD
- FENCE
- MINOR CONTOUR
- MAJOR CONTOUR
- WETLAND DELINEATION
- SANITARY SEWER LINE
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- UTILITY GUY WIRE
- ELECTRIC VAULT
- COMMUNICATIONS PEDESTAL
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- EVERGREEN TREE
- SURVEY FOUND MONUMENT

GENERAL NOTES:

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ELEVATION = 85.30'

2. THE BOUNDARY DEPICTED HERE ON IS PRELIMINARY AND IS SUBJECT TO CHANGE. IF ADDITIONAL MONUMENTS ARE FOUND ALONG THE NORTH LINE, THE BOUNDARY RETRACEMENT WILL BE REVISED ACCORDINGLY.

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4. AS OF THE DATE OF THIS MAPPING, THERE WERE NO UNDERGROUND UTILITY PAINT MARKINGS TO MAP THE SUBSURFACE UTILIZES.

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MODIFIED:

TOPOGRAPHIC SURVEY

EXISTING CONDITIONS

TAX LOT 2200
TAX MAP 1S 2E 31D
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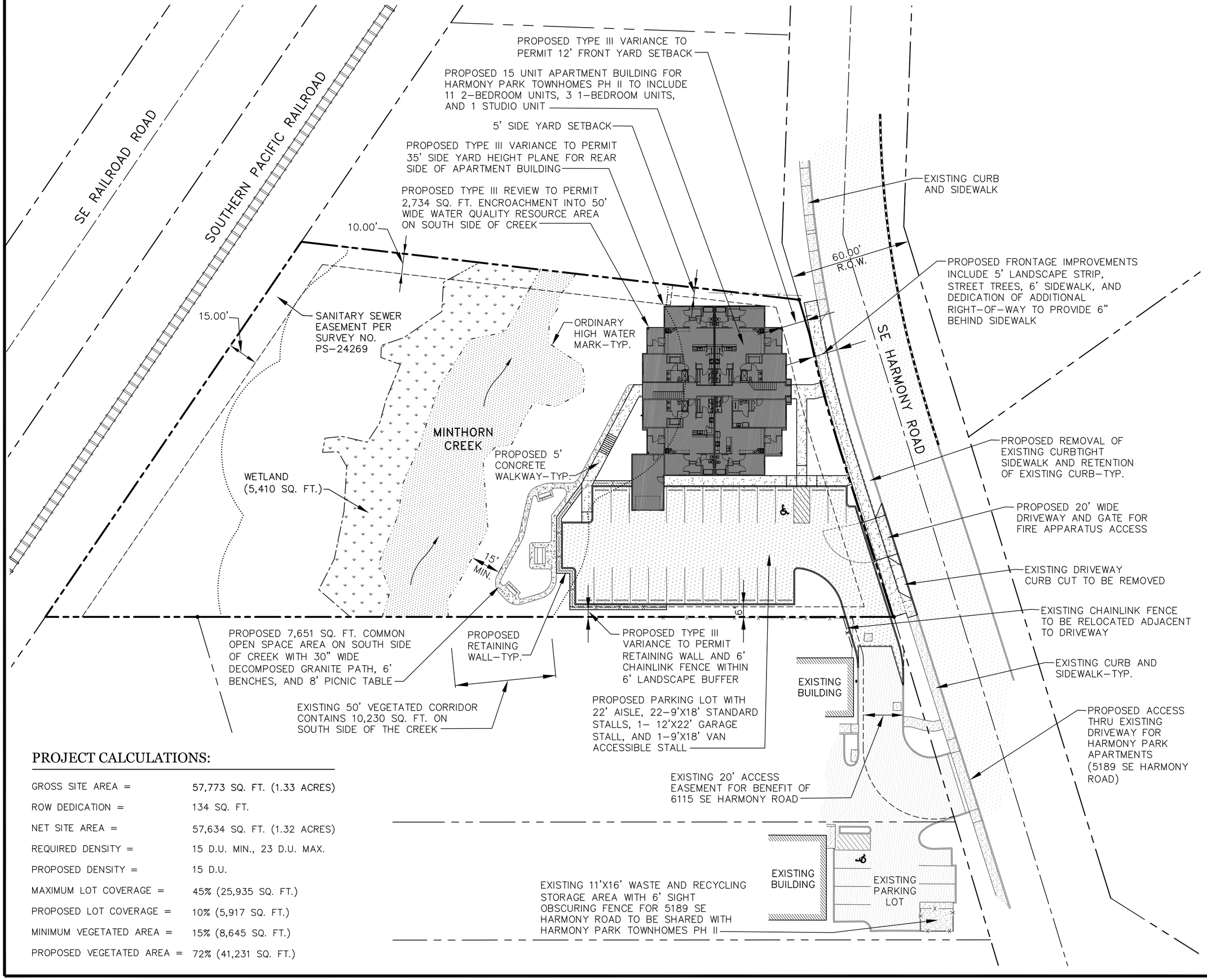
SHEET 9



PROJECT CALCULATIONS:

GROSS SITE AREA =	57,773 SQ. FT. (1.33 ACRES)
ROW DEDICATION =	134 SQ. FT.
NET SITE AREA =	57,634 SQ. FT. (1.32 ACRES)
REQUIRED DENSITY =	15 D.U. MIN., 23 D.U. MAX.
PROPOSED DENSITY =	15 D.U.
MAXIMUM LOT COVERAGE =	45% (25,935 SQ. FT.)
PROPOSED LOT COVERAGE =	10% (5,917 SQ. FT.)
MINIMUM VEGETATED AREA =	15% (8,645 SQ. FT.)
PROPOSED VEGETATED AREA =	72% (41,231 SQ. FT.)

Cascadia
Planning + Development Services
PO Box 1920
Silverton, Oregon 97381
503-804-1089
steve@cascadiapd.com
www.cascadiapd.com

NORTH
1"=30'-0"

CITY OF MILWAUKIE LAND USE APPLICATION:

HARMONY PARK TOWNHOMES PH II

T.L. 2200 / T.M. 1S2E31D
CLACKAMAS COUNTY, OREGON

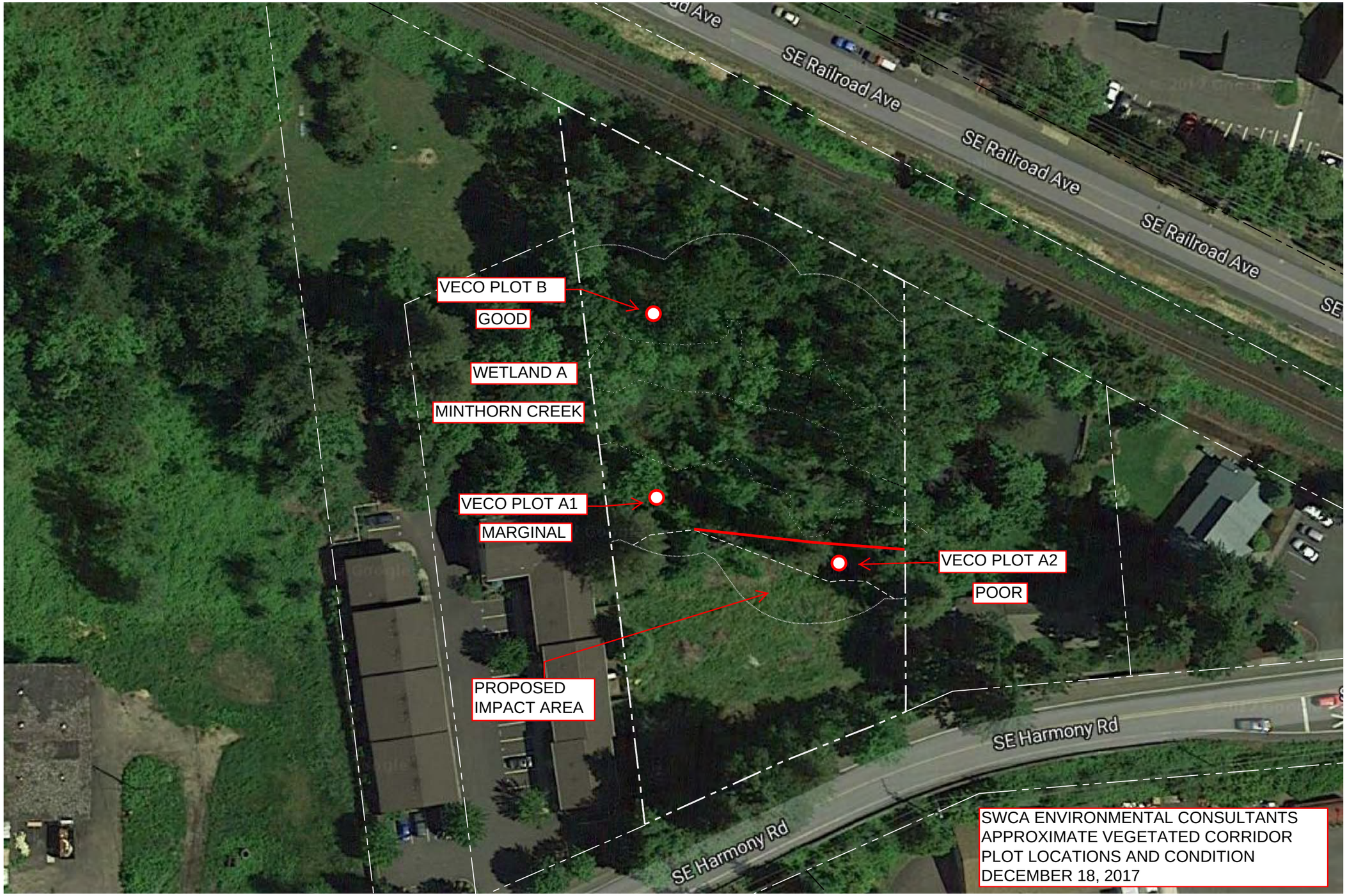
6115 SE HARMONY ROAD
MILWAUKIE, OR 97222

PRELIMINARY SITE PLAN

MARCH 20, 2018

REVISIONS

10



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NORTH
NOT TO SCALE

CITY OF MILWAUKIE LAND USE APPLICATION

HARMONY PARK TOWNHOMES PH II

6115 SE HARMONY ROAD
MILWAUKIE, OR 97222

TAX LOT 2200 TAX MAP 1S2E31D
CLACKAMAS COUNTY, OREGON

AERIAL PHOTOGRAPH

DECEMBER 18, 2017

REVISIONS

△
△
△

ATTACHMENT A:

WETLAND DETERMINATION DATA FORMS

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

Project/Site: Harmony Road Townhomes | City/County: - / Clackamas | Sampling Date: 8/25/2016

Applicant/Owner: Cascadia Planning & Dev. Srvcs/Old Time Investments, Inc. | State: OR | Sampling Point: **P1**

Investigator(s): C. Mirth Walker, Evan Dulin | Section, Township, Range: 31D, T1S, R2E, TL 2200

Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): None | Slope (%): 1

Subregion (LRR): A, Northwest Forests and Coast | Lat: 45.432065 | Long: -122.600305 | Datum: NAD 1983

Soil Map Unit Name: Wapato silty clay loam (84) | NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Precipitation prior to fieldwork: No rainfall 2 weeks prior, 6.41" above normal for WYTD, 2.06" below normal for CYTD.

Remarks:

VEGETATION

Tree Stratum (Plot size: 30' r)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Fraxinus latifolia*	30%	Yes	FACW
2. *Alnus rubra*	10%	Yes	FAC
3. *Salix lasiandra*	10%	Yes	FACW
4.			
	50% = Total Cover		
Sapling/Shrub Stratum (Plot size: 10' r)			
1. *Rubus armeniacus*	80%	Yes	FAC
2. *Prunus laurocerasus*	10%	No	NOL
3.			
4.			
5.			
	90% = Total Cover		
Herb Stratum (Plot size: 5' r)			
1. *Hedera helix*	95%	Yes	FACU
2. *Ranunculus repens*	3%	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	98% = Total Cover		
Woody Vine Stratum (Plot size: 10' r)			
1.			
2.			
	0% = Total Cover		

% Bare Ground in Herb Stratum 2%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	40	x 2 =	80
FAC species	93	x 3 =	279
FACU species	95	x 4 =	380
UPL species	10	x 5 =	50
Column Totals:	238 (A)		789 (B)

Prevalence Index = B/A = 3.32

Hydrophytic Vegetation Indicators:

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

[1]Indicators of hydric soil and wetland hydrology must be present.

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

Remarks:

Trees are narrow diameter at breast height: Oregon ash is 10", alder 7", willow 5".

Entered by: NED QC by: cmw

SOIL

Sampling Point: **P1**

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2	100					SiL	
2-7+	10YR 3/2	96	7.5YR 3/3	4	C	M	SiL	faint redox

[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: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Shovel refusal at 7" from large buried rock.

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): N/A
Water Table Present?	Yes	___	No	X	Depth (inches): >7
Saturation Present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): >7

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

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

Remarks:
No indicators of hydrology.

Entered by: NED QC by: cmw

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

Project/Site: Harmony Road Townhomes | City/County: - / Clackamas | Sampling Date: 8/25/2016

Applicant/Owner: Cascadia Planning & Dev. Srvcs/Old Time Investments, Inc. | State: OR | Sampling Point: **P2**

Investigator(s): C. Mirth Walker, Evan Dulin | Section, Township, Range: 31D, T1S, R2E, TL 2200

Landform (hillslope, terrace, etc.): Stream floodplain | Local relief (concave, convex, none): Concave | Slope (%): <2

Subregion (LRR): A, Northwest Forests and Coast | Lat: 45.432050 | Long: -122.600420 | Datum: NAD 1983

Soil Map Unit Name: Wapato silty clay loam (84) | NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Precipitation prior to fieldwork: No rainfall 2 weeks prior, 6.41" above normal for WYTD, 2.06" below normal for CYTD.

Remarks:

Sample plot was taken below the OHWM of Minthorn Creek. Area is considered a water and not a wetland.

VEGETATION

Tree Stratum (Plot size: 30' r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0% = Total Cover		
Sapling/Shrub Stratum (Plot size: 10' r)			
1. *Prunus laurocerasus*	95%	Yes	NOL
2. *Rubus armeniacus*	3%	No	FAC
3.			
4.			
5.			
	98% = Total Cover		
Herb Stratum (Plot size: 5' r)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	0% = Total Cover		
Woody Vine Stratum (Plot size: 10' r)			
1.			
2.			
	0% = Total Cover		

% Bare Ground in Herb Stratum 100%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species 0	x 1 =	0
FACW species 0	x 2 =	0
FAC species 3	x 3 =	9
FACU species 0	x 4 =	0
UPL species 95	x 5 =	475
Column Totals: 98 (A)		484 (B)

Prevalence Index = B/A = 4.94

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.

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

Remarks: Entered by: NED QC by: cmw

Prunus laurocerasus is rooted upslope of floodplain area but shades the floodplain area. *Rubus armeniacus* is rooted at the OHWM boundary.

SOIL

Sampling Point: **P2**

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/1	100					SiL	pebbly
9-15+	10YR 3/1	67	7.5YR 4/4	3	C	M	SiL	pebbly, ~mucky
			10YR 3/2	30	C	M	SiL	pebbly, faint redox
@25	2.5Y 3/1	90	10YR 3/2	10	C	M	SiL	faint redox

[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: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Rounded and broken rocks up to 3" diameter with organics in soil profile. Soil was moist. Probed below 15 inches.

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)
- X 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):	N/A	
Water Table Present?	Yes ___	No X	Depth (inches):	>15	**Wetland Hydrology Present?**
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches):	25	**Yes** **X** **No** ___

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

Remarks:
Sediments on tires along OHWM boundary.

Entered by: NED QC by: cmw

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

Project/Site: Harmony Road Townhomes City/County: - / Clackamas Sampling Date: 8/25/2016

Applicant/Owner: Cascadia Planning & Dev. Srvcs/Old Time Investments, Inc. State: OR Sampling Point: **P3**

Investigator(s): C. Mirth Walker, Evan Dulin Section, Township, Range: 31D, T1S, R2E, TL 2200

Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): Convex Slope (%): 3

Subregion (LRR): A, Northwest Forests and Coast Lat: 45.432019 Long: -122.600394 Datum: NAD 1983

Soil Map Unit Name: Wapato silty clay loam (84) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Precipitation prior to fieldwork: No rainfall 2 weeks prior, 6.41" above normal for WYTD, 2.06" below normal for CYTD.

Remarks:
Sample plot located about 8' SE of P2.

VEGETATION

Tree Stratum (Plot size: 30' r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0% = Total Cover		
Sapling/Shrub Stratum (Plot size: 10' r)			
1. *Prunus laurocerasus*	95%	Yes	NOL
2. *Rubus armeniacus*	5%	No	FAC
3.			
4.			
5.			
	100% = Total Cover		
Herb Stratum (Plot size: 5' r)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	0% = Total Cover		
Woody Vine Stratum (Plot size: 10' r)			
1.			
2.			
	0% = Total Cover		

% Bare Ground in Herb Stratum 100%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species 0	x 1 =	0
FACW species 0	x 2 =	0
FAC species 5	x 3 =	15
FACU species 0	x 4 =	0
UPL species 95	x 5 =	475
Column Totals: 100 (A)		490 (B)

Prevalence Index = B/A = 4.90

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.

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

Remarks:

Entered by: NED QC by: cmw

SOIL

Sampling Point: **P3**

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

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

[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: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Shovel refusal at 10" from buried rocks.

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): N/A
Water Table Present?	Yes	___	No	X	Depth (inches): >10
Saturation Present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): >10

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

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

Remarks:

Entered by: NED QC by: cmw

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

Project/Site: Harmony Road Townhomes City/County: - / Clackamas Sampling Date: 8/25/2016

Applicant/Owner: Cascadia Planning & Dev. Srvcs/Old Time Investments, Inc. State: OR Sampling Point: **P4**

Investigator(s): C. Mirth Walker, Evan Dulin Section, Township, Range: 31D, T1S, R2E, TL 2200

Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): <2

Subregion (LRR): A, Northwest Forests and Coast Lat: 45.432292 Long: -122.600752 Datum: NAD 1983

Soil Map Unit Name: Wapato silty clay loam (84) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Precipitation prior to fieldwork: No rainfall 2 weeks prior, 6.41" above normal for WYTD, 2.06" below normal for CYTD.

Remarks:
Sample plot located on north side of stream.

VEGETATION

	Absolute	Dominant	Indicator
Tree Stratum (Plot size: 30' r)	% Cover	Species?	Status
1. *Fraxinus latifolia*	70%	Yes	FACW
2.			
3.			
4.			
	70% = Total Cover		
Sapling/Shrub Stratum (Plot size: 10' r)			
1. *Fraxinus latifolia*	10%	Yes	FACW
2. *Cornus alba*	10%	Yes	FACW
3. *Crataegus monogyna*	5%	No	FAC
4. *Rubus armeniacus*	5%	No	FAC
5.			
	30% = Total Cover		
Herb Stratum (Plot size: 5' r)			
1. *Agrostis capillaris*	50%	Yes	FAC
2. *Carex leptopoda*	20%	Yes	FAC
3. *Equisetum arvense*	10%	No	FAC
4. *Mentha arvensis*	10%	No	FACW
5. *Bidens frondosa*	3%	No	FACW
6.			
7.			
8.			
9.			
10.			
11.			
	93% = Total Cover		
Woody Vine Stratum (Plot size: 10' r)			
1. *Rubus leucodermis*	3%	No	FACU
2.			
	3% = Total Cover		

% Bare Ground in Herb Stratum 7%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species 0	x 1 =	0
FACW species 103	x 2 =	206
FAC species 90	x 3 =	270
FACU species 3	x 4 =	12
UPL species 0	x 5 =	0
Column Totals: 196 (A)		488 (B)
Prevalence Index = B/A =		2.49

Hydrophytic Vegetation Indicators:

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

[1]Indicators of hydric soil and wetland hydrology must be present.

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

Remarks:
Lysichiton americanus and *Iris pseudacorus* (both OBL) also occur nearby in the wetland area.

Entered by: NED QC by: cmw

SOIL

Sampling Point: **P4**

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 2/2	100					SiL	
4-12	10YR 3/1	90	5YR 3/4	10	C	M, PL	SiL	

[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: None

Depth (inches): N/A

Hydric Soil Present? Yes X No ___

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Shovel refusal at 12" from large living roots.

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

Wetland Hydrology Present? Yes X No ___

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

Remarks:

Entered by: NED QC by: cmw

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

Project/Site: Harmony Road Townhomes | City/County: - / Clackamas | Sampling Date: 8/25/2016

Applicant/Owner: Cascadia Planning & Dev. Srvcs/Old Time Investments, Inc. | State: OR | Sampling Point: **P5**

Investigator(s): C. Mirth Walker, Evan Dulin | Section, Township, Range: 31D, T1S, R2E, TL 2200

Landform (hillslope, terrace, etc.): Terrace | Local relief (concave, convex, none): Convex | Slope (%): <2

Subregion (LRR): A, Northwest Forests and Coast | Lat: 45.432317 | Long: -122.600797 | Datum: NAD 1983

Soil Map Unit Name: Wapato silty clay loam (84) | NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Precipitation prior to fieldwork: No rainfall 2 weeks prior, 6.41" above normal for WYTD, 2.06" below normal for CYTD.

Remarks:
Sample plot is located about 15' North of P4.

VEGETATION

Tree Stratum (Plot size: 30' r)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus balsamifera*	30%	Yes	FAC
2. *Thuja plicata*	10%	Yes	FAC
3. *Abies grandis*	5%	No	FACU
4. *Fraxinus latifolia*	5%	No	FACW
	50%	= Total Cover	
Sapling/Shrub Stratum (Plot size: 10' r)			
1. *Crataegus monogyna*	30%	Yes	FAC
2. *Ilex aquifolium*	10%	Yes	FACU
3. *Prunus caroliniana*	5%	No	FACU
4.			
5.			
	45%	= Total Cover	
Herb Stratum (Plot size: 5' r)			
1. *Hedera helix*	80%	Yes	FACU
2. *Polystichum munitum*	5%	No	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	85%	= Total Cover	
Woody Vine Stratum (Plot size: 10' r)			
1. *Rubus leucodermis*	5%	Yes	FACU
2.			
	5%	= Total Cover	

% Bare Ground in Herb Stratum 15%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species 0	x 1 =	0
FACW species 5	x 2 =	10
FAC species 70	x 3 =	210
FACU species 110	x 4 =	440
UPL species 0	x 5 =	0
Column Totals: 185 (A)		660 (B)

Prevalence Index = B/A = 3.57

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.

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

Remarks:
Fraxinus latifolia is rooted at boundary overhanging the sample plot.

Entered by: NED QC by: cmw

SOIL

Sampling Point: **P5**

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/1	100					SiL	
3-9+	10YR 3/1	99	10YR 3/2	1	C	M	SiL	faint redox

[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: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

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):	N/A
Water Table Present?	Yes ___	No X	Depth (inches):	>9
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	>9

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

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

Remarks:

Entered by: NED QC by: cmw

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

Project/Site: Harmony Road Townhomes City/County: Milwaukie / Clackamas Sampling Date: 10/17/2017

Applicant/Owner: Cascadia Planning & Dev. Srvcs/Old Time Investments, Inc. State: OR Sampling Point: **P6**

Investigator(s): C. Mirth Walker, Tom Dee Section, Township, Range: 31D, T1S, R2E, TL 2200

Landform (hillslope, terrace, etc.): Floodplain bench Local relief (concave, convex, none): concave Slope (%): 1

Subregion (LRR): A, Northwest Forests and Coast Lat: Long: Datum:

Soil Map Unit Name: Wapato silty clay loam (84) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks)

Are Vegetation ,Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation ,Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Precipitation prior to fieldwork:

Remarks:

Below OHWM of Minthorn Creek; 2 feet downslope of P2

VEGETATION

	Absolute	Dominant	Indicator
Tree Stratum (Plot size: 30' r)	% Cover	Species?	Status
1. *Salix lasiandra*	10%	Yes	FACW
2.			
3.			
4.			
	10% = Total Cover		
Sapling/Shrub Stratum (Plot size: 10' r)			
1. *Prunus laurocerasus*	40%	Yes	NOL
2. *Rubus armeniacus*	5%	No	FAC
3.			
4.			
5.			
	45% = Total Cover		
Herb Stratum (Plot size: 5' r)			
1. *Galium aparine*	5%	Yes	FACU
2. *Solanum dulcamara*	5%	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	10% = Total Cover		
Woody Vine Stratum (Plot size: 10' r)			
1.			
2.			
	0% = Total Cover		

% Bare Ground in Herb Stratum 90%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	10	x 3 =	30
FACU species	5	x 4 =	20
UPL species	40	x 5 =	200
Column Totals:	65 (A)		270 (B)

Prevalence Index = B/A = 4.15

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.

Hydrophytic Vegetation Present? Yes No X

Remarks:

Entered by: KL QC by: cmw

SOIL

Sampling Point: **P6**

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/1	100					SiCL	w/ rounded gravel
5-11	10YR 4/1	85	10YR 5/8	10	C	M	SiCL	w/ rounded gravel
			2.5YR 4/8	5	C	M		
11-20	10YR 4/1	100					SiCL	w/ rounded gravel

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: None

Depth (inches): N/A

Hydric Soil Present? Yes X No ___

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Wetland Hydrology Present? Yes X No ___

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

Remarks:

Entered by: KL QC by: cmw

Glistening peds at 12"; moist to surface. Laurel rooted upslope of depression.

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

Project/Site: Harmony Road Townhomes City/County: Milwaukie / Clackamas Sampling Date: 10/17/2017

Applicant/Owner: Cascadia Planning & Dev. Srvcs/Old Time Investments, Inc. State: OR Sampling Point: **P7**

Investigator(s): C. Mirth Walker, Tom Dee Section, Township, Range: 31D, T1S, R2E, TL 2200

Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): convex Slope (%): 2

Subregion (LRR): A, Northwest Forests and Coast Lat: Long: Datum:

Soil Map Unit Name: Wapato silty clay loam (84) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks)

Are Vegetation ,Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation ,Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Precipitation prior to fieldwork:

Remarks:

Upslope of P6 to West.

VEGETATION

	Absolute	Dominant	Indicator
Tree Stratum (Plot size: 30' r)	% Cover	Species?	Status
1. *Alnus rubra*	10%	Yes	FAC
2.			
3.			
4.			
	10% = Total Cover		
Sapling/Shrub Stratum (Plot size: 10' r)			
1. *Prunus laurocerasus*	40%	Yes	NOL
2. *Rubus armeniacus*	10%	Yes	FAC
3.			
4.			
5.			
	50% = Total Cover		
Herb Stratum (Plot size: 5' r)			
1. *Hedera helix*	15%	Yes	FACU
2. *Polystichum munitum*	5%	Yes	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	20% = Total Cover		
Woody Vine Stratum (Plot size: 10' r)			
1.			
2.			
	0% = Total Cover		

% Bare Ground in Herb Stratum 80%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 40% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	20	x 3 =	60
FACU species	20	x 4 =	80
UPL species	40	x 5 =	200
Column Totals:	80 (A)		340 (B)

Prevalence Index = B/A = 4.25

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.

Hydrophytic Vegetation Present? Yes No X

Remarks:

Entered by: KL QC by: cmw

SOIL

Sampling Point: **P7**

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR 4/2	100					SiL	w/ 5" rounded river rock
11-18	10YR 5/3	100					SiL	

[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: None

Depth (inches): N/A

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

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

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

Remarks:

Entered by: KL QC by: cmw

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

Project/Site: Harmony Road Townhomes | City/County: Milwaukie / Clackamas | Sampling Date: 12/5/2017

Applicant/Owner: Cascadia Planning & Dev. Srvcs/Old Time Investments, Inc. | State: OR | Sampling Point: **P8**

Investigator(s): C. Mirth Walker, Tom Dee | Section, Township, Range: 31D, T1S, R2E, TL 2200

Landform (hillslope, terrace, etc.): terrace | Local relief (concave, convex, none): concave | Slope (%): 3

Subregion (LRR): A, Northwest Forests and Coast | Lat: | Long: | Datum: NAD 1983

Soil Map Unit Name: Wapato silty clay loam (84) | NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks)

Are Vegetation ,Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation ,Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Precipitation prior to fieldwork: 3.48 inches 2 weeks prior (Portland); 1.94" above normal WYTD; 11.73" above normal CYTD.

Remarks:
Central north sewer easement.

VEGETATION

Tree Stratum (Plot size: 30' r)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus balsamifera*	60%	Yes	FAC
2.			
3.			
4.			
	60% = Total Cover		
Sapling/Shrub Stratum (Plot size: 10' r)			
1. *Fraxinus latifolia*	20%	Yes	FACW
2. *Prunus laurocerasus*	10%	Yes	NOL
3. *Crataegus monogyna*	5%	No	FAC
4. *Corylus cornuta*	2%	No	FACU
5. *Ilex aquifolium*	2%	No	FACU
	39% = Total Cover + 2 = 41%		
Herb Stratum (Plot size: 5' r)			
1. *Hedera helix*	95%	Yes	FACU
2. *Polypogon monspeliensis*	5%	No	FACW
3. *Equisetum arvense*	1%	No	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	101% = Total Cover		
Woody Vine Stratum (Plot size: 10' r)			
1. *Rubus ursinus*	5%	Yes	FACU
2. *Rubus armeniacus*	5%	Yes	FAC
	10% = Total Cover		

% Bare Ground in Herb Stratum 0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	25	x 2 =	50
FAC species	71	x 3 =	213
FACU species	104	x 4 =	416
UPL species	10	x 5 =	50
Column Totals:	210 (A)		729 (B)

Prevalence Index = B/A = 3.47

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.

Hydrophytic Vegetation Present? Yes No **X**

Remarks:
Sapling/Shrub Stratum also has 1% each *Thuja plicata* (FAC) and *Cornus alba* (FACW)

Entered by: KL QC by: cmw

SOIL

Sampling Point: **P8**

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	100					SiL	
4-14+	10YR 4/1	98	10YR 4/6	2	C	M	gr SiL	and rounded cobbles

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: None

Depth (inches): N/A

Hydric Soil Present? Yes X No ___

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)

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:
Moist throughout.

Entered by: KL QC by: cmw

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

Project/Site: Harmony Road Townhomes City/County: Milwaukie / Clackamas Sampling Date: 12/5/2017

Applicant/Owner: Cascadia Planning & Dev. Srvcs/Old Time Investments, Inc. State: OR Sampling Point: **P9**

Investigator(s): C. Mirth Walker, Tom Dee Section, Township, Range: 31D, T1S, R2E, TL 2200

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): concave Slope (%): 2

Subregion (LRR): A, Northwest Forests and Coast Lat: Long: Datum: NAD 1983

Soil Map Unit Name: Wapato silty clay loam (84) NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks)

Are Vegetation ,Soil , or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes X No

Are Vegetation ,Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Precipitation prior to fieldwork: 3.48 inches 2 weeks prior (Portland); 1.94" above normal WYTD; 11.73" above normal CYTD.

Remarks:
NE corner of site.

VEGETATION

Tree Stratum (Plot size: 30' r)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus balsamifera*	70%	Yes	FAC
2.			
3.			
4.			
	70% = Total Cover		
Sapling/Shrub Stratum (Plot size: 10' r)			
1. *Symphoricarpos albus*	20%	Yes	FACU
2. *Crataegus monogyna*	10%	Yes	FAC
3. *Physocarpus capitatus*	5%	No	FACW
4. *Fraxinus latifolia*	5%	No	FACW
5. *Thuja plicata*	4%	No	FAC
	44% = Total Cover + 1 = 45%		
Herb Stratum (Plot size: 5' r)			
1. *Hedera helix*	95%	Yes	FACU
2. *Juncus patens*	5%	No	FACW
3. *Equisetum arvense*	5%	No	FAC
4. *Polystichum munitum*	5%	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	110% = Total Cover		
Woody Vine Stratum (Plot size: 10' r)			
1.			
2.			
	0% = Total Cover		

% Bare Ground in Herb Stratum 0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

	Total % Cover of:	Multiply by:	
OBL species	0	x 1 =	0
FACW species	15	x 2 =	30
FAC species	89	x 3 =	267
FACU species	120	x 4 =	480
UPL species	0	x 5 =	0
Column Totals:	224 (A)		777 (B)

Prevalence Index = B/A = 3.47

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.

Hydrophytic Vegetation Present? Yes No **X**

Remarks:
Ilex aquifolium 1% FACU in S/S Stratum.

Entered by: KL QC by: cmw

SOIL

Sampling Point: **P9**

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/1	99	10YR 4/6	1	C	M	SiL	Rounded cobbles

[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: Rock refusal

Depth (inches): 12

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

Remarks: S = sand; Si = silt; C = clay; L = loam or loamy; co = coarse; f = fine; vf = very fine; + = heavy (more clay); - = light (less clay)
Tiny shard of broken glass in pit. Very rocky.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___	
Water Table Present?	Yes X	No ___	Depth (inches): 6	**Wetland Hydrology Present?**
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): surface	**Yes** **X** **No** ___

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

Remarks: Entered by: KL QC by: cmw

Winter High Water Table; dam/weir on Minthorn Creek may back-up water into soil. Very slight small depression, not a linear feature, no geomorphic position.

ATTACHMENT B:

SITE VEGETATION LIST

6115 SE Harmony Road
Site Vegetation List
August 25, 2016, and October 17 and December 5, 2017

Common Name	Scientific Name	Wetland Indicator Status	Native and Invasive, Noxious
NATIVE			
grand fir	*Abies grandis*	FACU	native
big-leaf maple	*Acer macrophyllum*	FACU	native
red alder	*Alnus rubra*	FAC	native
devil's-pitchfork	*Bidens frondosa*	FACW	native
taper-fruit short-scale sedge	*Carex leptopoda*	FAC	native
red osier dogwood	*Cornus alba*	FACW	native
beaked hazelnut	*Corylus cornuta*	FACU	native
field horsetail	*Equisetum arvense*	FAC	native
Oregon ash	*Fraxinus latifolia*	FACW	native
sticky-willy	*Galium aparine*	FACU	native
lamp rush	*Juncus effusus*	FACW	native
spreading rush	*Juncus patens*	FACW	native
yellow-skunk-cabbage	*Lysichiton americanus*	OBL	native
American wild mint	*Mentha arvensis*	FACW	native
Pacific ninebark	*Physocarpus capitatus*	FACW	native
western or pineland sword fern	*Polystichum munitum*	FACU	native
balsam poplar (black cottonwood)	*Populus balsamifera*	FAC	native
Oregon white oak	*Quercus garryana*	FACU	native
white-stem raspberry	*Rubus leucodermis*	FACU	native
California dewberry	*Rubus ursinus*	FACU	native
Pacific willow	*Salix lasiandra*	FACW	native
giant sequoia	*Sequoiadendron giganteum*	NOL	native (to California)
common snowberry	*Symphoricarpos albus*	FACU	native
western arborvitae (western red cedar)	*Thuja plicata*	FAC	native
squashberry	*Viburnum edule*	FACW	native
NON-NATIVE			
horse chestnut*	*unknown species*	unknown species	unknown species
colonial bent	*Agrostis capillaris*	FAC	non-native
English hawthorn*	*Crataegus monogyna*	FAC	non-native
English ivy*	*Hedera helix*	FACU	invasive, noxious
English holly*	*Ilex aquifolium*	FACU	non-native
spotted touch-me-not	*Impatiens capensis*	FACW	non-native
pale-yellow iris (yellow flag)*	*Iris pseudacorus*	OBL	noxious
European privet*	*Ligustrum vulgare*	FACU	non-native
perennial rye grass	*Lolium perenne*	FAC	non-native
dawn redwood	*Metasequoia glyptostroboides*	NOL	non-native
Portuguese laurel*	*Prunus lusitanica*	NOL	non-native
English laurel*	*Prunus laurocerasus*	NOL	non-native
creeping buttercup	*Ranunculus repens*	FAC	non-native
Himalayan blackberry*	*Rubus armeniacus*	FAC	invasive, noxious
thornless blackberry	*Rubus* species	-	non-native
climbing (bittersweet) nightshade*	*Solanum dulcamara*	FAC	invasive
NATIVE STATUS UNKNOWN			
knotweed or smartweed	*Polygonum species*	OBL to NOL	-
rose	*Rosa species*	FAC to UPL	-

*Priority target non-native species for removal; all are on the City of Portland Nuisance Plant List.

Wetland Indicator Status and taxonomy for the Western Mountains, Valleys, and Coast Region per the National Wetland Plant List 2016 v3.3. Accessed May 3, 2016. http://rsgisias.crrel.usace.army.mil/NWPL/

Portland Plant List. Available at: https://www.portlandoregon.gov/citycode/article/322280 Accessed September 22, 2016 and November 7, 2017

WETLAND INDICATOR STATUS (WIS)	
OBL	Obligate Wetland Plant – Almost always occurs in wetlands (hydrophyte), rarely in uplands
FACW	Facultative Wetland Plant - Usually occur in wetlands (hydrophyte), but may occur found in non-wetlands
FAC	Facultative Plant – Occurs in wetlands (hydrophyte) and uplands (nonhydrophyte)
FACU	Facultative Upland Plant - Usually occur in non-wetlands (non-hydrophyte), but may occur in wetlands
UPL	Upland Plant - Almost always occurs in uplands (non-hydrophyte), almost never occurs in wetlands. UPL plants have a WIS in other regions
NOL	Not Listed - Plants that are not on the National Wetland Plant List are assumed to be UPL and have no WIS in any region

ATTACHMENT C:

REPRESENTATIVE SITE PHOTOGRAPHS

Photo 1. View north of western portion of vegetated corridor. Photo date October 17, 2017.

Photo 2. View north of central portion of vegetated corridor. Photo date October 17, 2017.

Photo 3. View north of eastern portion of vegetated corridor. Photo date October 17, 2017.

Photo 4. View east of lot. Photo date October 17, 2017.

Photo 5. View northwest of manhole. Photo date August 25, 2016.

Photo 6. View west of typical condition vegetated corridor. Photo date October 17, 2017.

Photo 7. View north of Plot 6, below ordinary high water line of Minthorn Creek. Photo date October 17, 2017.

Photo 8. View northeast of Minthorn Creek from eastern propery line. Photo date October 17, 2017.

ATTACHMENT D:

OFWAM DATA FORMS

FOR CITY OF MILWAUKIE NATURAL RESOURCE ASSESSMENT

OREGON FRESHWATER WETLAND ASSESSMENT METHODOLOGY

APRIL 1996

Oregon

Freshwater Wetland Assessment Methodology

Prepared by:

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Natural Resources Conservation Service

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Patty Snow
Oregon Department of Fish and Wildlife

Richard Sumner
U.S. Environmental Protection Agency

Editing, graphics and layout by Scott McCannell. Cover design by Frank Roth and cover illustration by Sandra Noel.

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This manual is published by: Wetlands Program
Oregon Division of State Lands
775 Summer St. NE
Salem, OR 97310

Revised Edition, April 1996

The origins of this manual

The template for this evaluation method, the *Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire,* was published in 1991 by the New Hampshire Department of Environmental Services. The New Hampshire method was based on a similar method developed by the Connecticut Department of Environmental Protection. The *Oregon Freshwater Wetland Assessment Methodology* uses some of the same wetland functions developed in the previous two publications. A general wetland characterization, a wetlands of special interest for protection category, and sensitivity to impacts and enhancement potential sections have been added. Some functions used in the New Hampshire or Connecticut methodologies have been combined or removed. All were modified to reflect wetland types found in Oregon. The revised edition clarifies and rearranges some questions, directions and answers found in the December 1993 edition.

The methodology was written by an inter-agency group that worked together for two and a half years. The size and make-up of the group fluctuated, but the following people and other representatives from their agencies were authors of various sections:

Emily Roth
Oregon Division of State Lands

Patty Snow
Oregon Department of Fish and Wildlife

Richard Olsen (and **Mike Nixon**)
Oregon Department of Environmental Quality

Richard Sumner
U.S. Environmental Protection Agency, Corvallis

A July 1993 draft of the Oregon Method was field tested in four areas of the state located within Clatsop, Linn, Benton and Deschutes counties and the Portland metropolitan area. In each area, a group of wetlands experts selected an assortment of familiar wetlands. They evaluated the functions of each wetland based upon their best professional judgment. We then brought together a second group of individuals, including community planners and interested community members. They visited some of the same wetlands and conducted an evaluation using the Oregon Method. The results of their evaluation were then compared to those of the expert group. We used the information from the comparison test to refine the final document.

This edition of the *Oregon Freshwater Wetland Assessment Methodology* is a modification of the original. Changes reflect suggestions of numerous users. We appreciate any comments or suggestions you have concerning the methodology. Suggestions will be evaluated and incorporated into future editions.

Submit comments concerning the methodology or requests for additional copies of this manual to:

Wetlands Program
Oregon Division of State Lands
775 Summer St. N.E.
Salem, OR 97310
(503) 378-3805

The development of this methodology was funded in part by a grant from the U.S. Environmental Protection Agency.

The Oregon Method should be cited as follows:

> Roth, E.M., R.D. Olsen, P.L. Snow, and R.R. Sumner. 1993. *Oregon Freshwater Wetland Assessment Methodology.* Ed. by S.G. McCannell. Oregon Division of State Lands. Salem, OR.

Acknowledgments: second edition

The Oregon Freshwater Wetland Methodology had been in use for almost two years, at least two growing seasons, when we started these revisions. Coastal, central, eastern, Willamette Valley, and southern Oregon wetlands were assessed for either wetland inventories or training sessions. We learned that some clarifications needed to be made and responses simplified, but luckily, no one encountered any fatal flaws.

The revisions were made possible due to the invaluable critique and reasonable suggestions from:

- Lisa Heigh, a graduate student at Oregon State University, who put it through a consistency test, using it as a basis for her masters project.
- The consultant community, our main users, who gave feedback on both clarification and scientific value. I would especially like to thank Mirth Walker and Christie Galen of Fishman Environmental Services and John van Staveren of Pacific Habitat Services.
- Richard Sumner, one of the principal authors and grant wizard extraordinaire at EPA's Corvallis laboratory.

Numerous others also suggested revisions that helped make the second edition more user friendly. They included EnviroCorps members, various people who braved our wetland identification and assessment trainings, and citizen users. I thank them all "en masse."

These revisions would not have been undertaken if it wasn't for Janet Morlan with the Oregon Division of State Lands and Ken Bierly, now working in the Governor's Office on Watershed Health (taking a breather from the Division). Without their subtle yet consistent prodding, I would never have attempted and completed the revisions. They help me keep at least one of my feet mired in the wetland mucks of Oregon. Thanks Janet and Ken.

My final thanks goes to the editor, Scott McCannell. As with the original, his patience persisted with my delays, revisions and the contracting process.

Cheers!

Emily Roth
NRCS/Community Resource Conservation Center
March 1996

Acknowledgments: first edition

The inter-agency working team consisted of more than just the authors. We would like to give a special thanks to Frank Flynn and Lynn Beaton with the Oregon Department of Land Conservation and Development, Jim Goudzwaard with the U.S. Army Corps of Engineers—Portland District, and Steve Morris and Michelle Day with the U.S. National Marine fisheries Service for attending meetings, reviewing numerous drafts of the text and providing valuable input throughout the entire process. We would also like to thank Bob Frenkel, Marv Yoshinaka, Peggy Elting, Rosemary Furfey, John Christy, and Tom Robertson for their participation in the process. For various reasons, they could not continue through the entire development of the manual, but their contributions helped to strengthen the methodology.

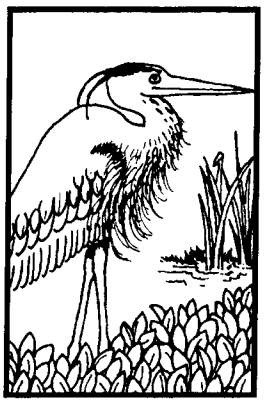
We relied on Karen Strohmeyer, Rosemary Furfey, Neil Maine, Steve Moser and Dave Leslie to organize our field testing groups. Their efforts and feedback made the methodology more user friendly and led to many revisions. Lynn Putnam assisted the inter-agency group with the initial testing. She endured the "group process" and even managed to out shout us a few times. Also, a special thanks to all the people who participated in the field testing; they are too numerous to list here.

Many Colleagues supported us from start to finish. Ken Bierly tried to keep us honest and encouraged us to stick with it (though we doubt he ever read it). Scott Leibowitz provided technical assistance; his comments caused us to re-examine basic thought patterns but not change too much copy. Allen "Chip" Dale and Donavin Leckenby assisted in the initial development of the habitat indices. Again, the list of colleagues that supported us with their patience, comments and critical review are too long to mention. Without them, it would never have been completed. We thank them all "en masse."

Finally, many thanks go to our editor, Scott McCannell of Word Design & Graphics, Inc. His patience with our delays, revisions and then requests for a "rush" to get the draft out may entitle him to "sainthood," or at least a good beer.

Cheers!

Emily Roth
Oregon Division of State Lands
November 1993



Wildlife habitat

Wetlands provide habitat for many wildlife species. A single wetland often cannot satisfy all requirements for wildlife use, so its proximity to other bodies of water or upland areas is important. Buffers and corridors are also essential for this reason, and they reduce human disturbance as well. Many species also have special habitat requirements: Good water quality is necessary for amphibians and mammals; structural diversity is important for birds; and a combination of open water and grazing areas is important for waterfowl.

For this assessment, **urban wetlands are those within urban growth boundaries or urban or rural service areas.** Because of the impacts of human activities, urban wetlands may not satisfy as many habitat requirements as wetlands in undeveloped areas. This should not be interpreted to mean that urban wetlands have limited value for all wildlife. The importance of an urban wetland may be increased because of its location and surroundings.

Assessment questions

Question 1

How many Cowardin wetland classes are present?

Directions

See question 21 in the Wetland Characterization. Count only those Cowardin classes for which you answered "a," "b" or "c." For urban areas, also consider the mix of species (Question 22 in the Wetland Characterization.)

Rural areas:

a. Three or four.

b. Two.

c. One.

Urban areas:

a. Two or more.

b. One class with more than five plant species.

c. One class with five or fewer plant species.

Rationale

In Northwest wetlands, vegetation is the most important component of wildlife habitat. It is widely recognized that plant community diversity increases animal community diversity. The existence of two Cowardin classes adjacent to each other may also improve wildlife habitat value because some wetland wildlife species use the edge between plant communities. ("Edge" describes the border between vegetation types or between a vegetation type and open water.)

Structural diversity is also important. If several layers of vegetation are present, more diverse habitat types are provided. (Different birds nest in different layers.) In addition, the number of layers affects the amount of natural debris, which is necessary for amphibians and other wildlife.

Notes

a. PFO and PEM, PAB

Question 2

What is the dominant wetland vegetation cover type?

a. Woody vegetation.
b. Emergent vegetation and ponding, or open water only.
c. Emergent vegetation or wet meadow.

Directions

See question 23 in the Wetland Characterization.

Rationale

Wooded and shrub wetlands provide habitat for the largest overall species assemblages. Emergent wetlands associated with open water are also an essential habitat for a large number of wetland species, particularly waterfowl, amphibians and wading birds. Emergent wetlands without open water provide habitat for wetland species to a lesser degree.

Question 3

What is the degree of Cowardin class interspersion for the wetland being observed?

a. High.
b. Moderate.
c. Low.

Directions

See question 24 in the Wetland Characterization.

Rationale

Interspersion occurs when two or more wetland types or upland inclusions create a mosaic or pattern. In a wetland composed of approximately concentric bands of vegetation, such as cattails ringed by shrubs, interspersion is low. At the opposite extreme, small patches of shrubs scattered throughout an emergent marsh represent a high degree of interspersion.

When two or more vegetation types are highly interspersed, a great deal of edge is created. Edge is important because many wildlife species are edge dwellers. Generally, the greater the edge, the greater the diversity of wildlife.

Notes

a.

b.

Question 4

If the wetland contains unvegetated open water, how many acres of unvegetated open water are present?

Directions

See question 28 in the Wetland Characterization.

Rural areas:
a. More than 3 acres .
b. Between 0.5 and 3 acres.
c. Less than 0.5 acres.

Urban areas:
a. More than 1 acre.
b. Between 0.5 and 1 acre.
c. Less than 0.5 acres.

Rationale

Open water is essential to a number of wetland wildlife species, including waterfowl, wading birds, amphibians and some reptiles.

Notes

c.

Question 5

How is the wetland connected to another body of water, such as a stream, lake or pond?

Directions

See question 18 in the Wetland Characterization.

a. The wetland is connected by surface water to another body of water.
b. No surface water connection exists to another body of water, but other bodies of water lie within 1 mile of the wetland.
c. No surface-water connection exists to another body of water, and no other bodies of water lie within 1 mile of the wetland.

Rationale

Wetland wildlife species will often use surface water to travel between a wetland and deep water. Also, water must be available during critical phases for the wildlife that use it. Water available during the nesting season is more valuable to wildlife than water available only during the winter.

a.

Question 6 *(for Western OR only)*

How is the wetland connected to other wetlands?

Directions

See question 27 in the Wetland Characterization.

a. Connected to other wetlands within a 3-mile radius by a perennial or intermittent stream, irrigation or drainage ditch, culvert, canal or lake.
b. Not connected by surface waters, but other unconnected wetlands lie within a 3-mile radius.
c. Not connected to other wetlands by surface waters, and no other unconnected wetlands lie within a 3-mile radius.

Rationale

Proximity to other wetlands increases a wetland's utility as habitat. Nearby wetlands sometimes contain features absent from the assessment wetland. For example, birds such as the great blue heron may roost near one wetland but travel to another to fish if the wetland where they roost doesn't have an ample supply of fish.

This criterion applies only in western Oregon. Because of the dry climate in eastern Oregon, isolated wetlands provide important habitat to both local and migratory species.

Question 7

What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland?

Directions

See questions 7 and 8 in the Wetland Characterization. If both "a" and "b" apply, choose "a."

a. No upstream or adjacent reaches are listed as *water quality limited,* and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants.
b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants.
c. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants.

Rationale

Poor water quality can harm many terrestrial and aquatic species. The character of a wetland ecosystem can change when exposed to nutrients and other chemicals beyond tolerable limits. Excess nutrients, for example, can cause oxygen deficiencies, which in turn can cause a change in the species composition of both plant and animal communities. Studies in Washington and elsewhere have indicated that amphibians are especially sensitive to water quality.

Notes

a.

b.

Question 8

What is the dominant existing land use within 500 feet of the wetland's edge?

a. Exclusive Forest Use or Open Space.
b. Agriculture.
c. Developed uses.

Directions

See question 15 in the Wetland Characterization. If the responses you gave to question 15 in the Characterization indicate that two or more land-use categories are equally dominant, pick the one that will yield the lowest letter response for this question. (Example: In question 15 of the Wetland Characterization, you responded "b. Between 20% and 50%" to both *Exclusive Forest Use lands* and *developed uses,* and the remainder of your responses to question 15 were "a. Less than 20%." For this Wildlife Habitat question, you would respond "a. .Exclusive Forest Use or Open Space.")

Rationale

Wildlife habitat generally deteriorates as land use changes from forested land to agricultural land to urban land. Certain game species, such as deer and some waterfowl, may benefit from land clearing. However, the majority of wildlife species are affected adversely when the land is developed because of fencing, lighting and loss of habitat.

Notes

c.

Question 9a

For **rural areas:** What percentage of the wetland's edge is bordered by upland wildlife habitat that is at least 150 feet wide?

a. Greater than 40%.
b. Between 10% and 40%.
c. Less than 10%.

Question 9b

For **urban areas:** What percent of the wetland's edge is bordered by a vegetative buffer at least 25 feet wide?

a. Greater than 40%.
b. Between 10 and 40%.
c. Less than 10%.

Directions

For rural areas, see question 25 in the Wetland Characterization. For urban areas, see question 26 in the Wetland Characterization.

Rationale

A buffer zone, an uncut or undisturbed area of vegetation providing wildlife cover, increases a wetland's wildlife habitat potential. It provides habitat for both upland animals and wetland dependent species that require upland habitat for parts of their life cycle. A buffer zone also decreases the impacts of disturbance on the wetland. This is particularly important for nesting birds, which may be disturbed by people and household pets.

Well-vegetated buffer areas and corridors are particularly significant in urban areas because of their beneficial effect on water quality as well as their value for wildlife.

Wildlife habitat: assessment criteria

The wetland provides diverse wildlife habitat if:	At least four questions are answered "a," and no more than one is answered "c."
The wetland provides habitat for some wildlife species if:	Answers do not satisfy the above- or below-listed criteria.
The wetland's wildlife habitat function is lost or not present if:	All questions are answered "c."

Notes

a.

The wetland provides habitat for some species.

Fish habitat

This index assesses the contribution of wetlands connected to streams, rivers, lakes or ponds to fish habitat. **or this index, "connected to" implies a surface-water connection.** The assessment should be done on the reach of the stream or on a section of lake that actually borders the wetland or is contained within the wetland.

Notes

A stream is defined as a waterbody with a distinct channel and flow. Examples include sloughs, perennial streams and intermittent streams. If dikes or berms have been built on the stream banks between the stream and wetland that do not allow continual exchange of surface water, do not complete this index. If both a stream and lake are present, choose the one with the longest wetland surface connection.

Wetlands that contribute to habitat for fish include areas with dense, overhanging vegetation. This vegetation provides shade, cover and food sources to related waterways and lakes. Wetlands also provide spawning, rearing and resting opportunities for fish. However, a wetland need not actually contain fish to contribute to fish habitat because wetlands may perform important functions for fish-bearing waters downstream.

The assessment of fish habitat is divided into two parts. Part A evaluates the wetland habitat connected to rivers and streams. If there is no stream or river associated with the wetland, then leave Part A out of the assessment. Part B evaluates the wetland habitat connected to ponds (water greater than 6 feet deep) and lakes. If there is no lake or pond connected to the wetland, then leave Part B out of the assessment. If no stream, river, pond or lake is connected to the wetland, then leave this index out of the assessment altogether.

Assessment questions: Part A—streams

Question 1

What percentage of the stream is shaded by stream-side (riparian) vegetation?

Directions

See question 31 in the Wetland Characterization.

Western Oregon:

a. More than 75%.

b. Between 50% and 75%.

c. Less than 50%.

Eastern Oregon:

a. 50% or more.

b. 25% or more, but less than 50%.

c. Less than 25%.

Rationale

Many Oregon streams are unsuitable for anadromous and resident fish because riparian vegetation has been cleared. High water temperatures that result from removal of stream-side vegetation can make a stream unsuitable for some fish species. Salmonids and some resident fish are particularly susceptible to elevated water temperatures. The amount and type of stream-bank cover also affects the amount of large woody debris in the stream or river system. In addition, stream-bank vegetation provides habitat for insects, an important food source for salmonids.

Question 2

What is the physical character of the stream channel?

Directions

See question 30 in the Wetland Characterization.

a. The stream is in a natural channel, or modified portions of the stream are returning to a natural channel.

b. Only portions of the stream channel are modified.

c. The stream is extensively modified or confined in a non-vegetated channel or pipe.

Rationale

Although the species or age composition of low- and high-gradient streams is different, both can provide habitat for fish. Artificially channelized or extensively modified streams, however, usually do not provide fish habitat as well as natural stream channels.

Notes

a.

b.

Question 3

What percentage of the entire stream contains instream structures such as large woody debris, floating submerged vegetation, large rocks or boulders?

a. More than 25%.
b. Between 10% and 25%.
c. Less than 10%.

Directions

See question 32 in the Wetland Characterization.

Rationale

Cover is essential for good fish habitat. It provides refuge from predators and serves as substrate for insect larva, which are a good food source for some fish species. The presence of large pieces of woody material in pools is essential for providing adequate winter habitat for salmonid species. In addition, large pieces of woody material contribute to bank stability, dissipate energy, generate pool formation and encourage meandering. The breakdown of this material is also important in the nutrient cycle of the stream or river.

Question 4

What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland?

a. No upstream or adjacent reaches are listed as *water quality limited,* and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants.
b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants.
c. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants.

Directions

See questions 7 and 8 in the Wetland Characterization. If both "a" and "b" apply, choose "a."

Rationale

Poor water quality can harm many aquatic species. The whole character of a wetland ecosystem can change when it is exposed to nutrients and other chemicals beyond tolerable limits. Excess nutrients, for example, can cause oxygen deficiencies, which in turn can cause a species composition change in both plant and animal communities.

Notes

b.

b.

Question 5

What is the dominant existing land use within 500 feet of the wetland's edge?

a. Exclusive Forest Use or Open Space.
b. Agriculture.
c. Developed uses.

Directions

Refer to the directions for question 8 of the wildlife habitat assessment questions.

Rationale

Fish habitat generally deteriorates as land use becomes more intensive, e.g., changes from forested land to agricultural land (including rangeland) to urban land. The change in intensity often changes the structure of the habitat and increases runoff, pollutant loading and sedimentation.

Question 6

Are fish present in a stream, lake or pond associated with the wetland?

a. Salmon, trout or sensitive species are present at some time during the year.
b. Species not covered in "a" are present at some time during the year.
c. No species are present at any time during the year.

Directions

See question 29 in the Wetland Characterization.

Rationale

The potential for a wetland to benefit fish is directly related to the presence of fish in the stream or river reach within or adjacent to the wetland.

Part B—lakes and ponds

Question 1

Does the lake or pond contain areas of both deep and shallow water?

a. Yes.
b. Cannot be determined.
c. No.

Directions

See question 33 in the Wetland Characterization.

Rationale

The depth of the pond or lake is important for spawning and may be important for rearing. A mixture of shallow, medium and deeper water is optimum to provide different habitat types.

Notes

c.

b. or c.

Minthorn Creek is not shown on the StreamNet mapper website. (http://psmfc.maps.arcgis.com/apps/webappviewer/index.html?id=3be91b0a32a9488a901c3885bbfc2b0b)

Question 2

What percentage of the wetland complex contains cover objects such as submerged logs, floating or submerged vegetation, large rocks or boulders?

a. More than 25%.
b. Between 10% and 25%.
c. Less than 10%.

Directions

See question 35 in the Wetland Characterization.

Rationale

Cover is essential for good fish habitat. It provides refuge from predators and serves as substrate for insect larva, which are a food source for some fish species. The presence of large pieces of woody material in wetlands is essential for providing adequate winter habitat for salmonid species. In addition, large pieces of woody material contribute to bank stability and dissipate energy. The breakdown of this material is also important in the nutrient cycle of the pond or lake.

Question 3

What percentage of the shoreline is shaded at the water's edge by forested or scrub-shrub vegetation?

a. 60% or more.
b. 20% or more, but less than 60%.
c. Less than 20%.

Directions

See question 34 in the Wetland Characterization.

Rationale

Shoreline cover provides shading, which moderates water temperature in lakes and ponds. High water temperatures that result from removal of lake-side vegetation can make a lake unsuitable for some fish species. Shoreline vegetation also provides food, large pieces of woody debris and cover from predators. Woodland and scrubland vegetation provides more shading than herbaceous vegetation.

Notes

Question 4

What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland?

Directions

See questions 7 and 8 in the Wetland Characterization. If both "a" and "b" apply, choose "a."

a. No upstream or adjacent reaches are listed as *water quality limited,* and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants.
b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants.
c. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants.

Rationale

See Part A question 4.

Question 5

What is the dominant existing land use within 500 feet of the wetland's edge?

Directions

Refer to the directions for question 8 of the wildlife habitat assessment questions.

a. Exclusive Forest Use or Open Space.
b. Agriculture.
c. Developed uses.

Rationale

See Part A question 5.

Question 6

Are fish in a stream, lake or pond associated with the wetland?

Directions

See question 29 in the Wetland Characterization.

a. Salmon, trout or sensitive species are present at some time during the year.
b. Species not covered in "a" are present at some time during the year.
c. No species are present at any time during the year.

Rationale

The potential for a wetland to benefit fish is directly related to the presence of fish in the pond or lake.

Notes

Fish habitat: assessment criteria

The wetland's fish habitat function is intact if:	Any three questions are answered "a," and no more than one is answered "c."
The wetland's fish habitat function is impacted or degraded if:	Answers do not satisfy the above- or below-listed criteria.
The wetland's fish habitat function is lost or not present if:	All questions are answered "c."

Notes

Fish habitat is impacted or degraded.

Water quality (pollutant removal)

Sediment trapping

During periods of heavy rainfall, water runoff may cause erosion and increase solids suspended in receiving surface waters. The excess sediment entering water systems can damage aquatic ecosystems. For example, sediment accumulation in stream bottoms can smother spawning areas and kill aquatic insect larvae. It can also reduce the storage capacity of downstream water supply reservoirs.

Wetlands perform an important function by trapping sediment from waters that pass through them. As water flows through wetlands, it is slowed by vegetation, and sediment settles to the bottom before the water moves farther downstream. As much as 90% of the solids suspended in the water may be removed as the water moves through wetlands, resulting in cleaner water entering streams, rivers, lakes and estuaries.

Nutrient attenuation

Nitrogen and phosphorus are the two nutrients most often associated with water pollution. They are also main ingredients of fertilizers used on agricultural fields and lawns, and both are found in high concentrations in discharges from sewage treatment plants and livestock operations. Excessive amounts of nitrogen and phosphorus in lakes and slow-moving streams can cause algal blooms and subsequent oxygen deficiencies, which may kill fish and reduce water quality. The processes that occur as a result of excess nutrients are lumped together under the term "eutrophication." Within limits, wetlands can reduce nutrient levels so that the effects of eutrophication on downstream areas are prevented or reduced. This index considers only point and non-point pollutant sources that are due to land uses in the watershed.

Assessment questions

Question 1

What is the wetland's primary source of water?

Directions

See question 36 in the Wetland Characterization.

a. Surface flow, including streams and ditches.
b. Precipitation or sheet flow.
c. Groundwater, including seeps and springs.

Rationale

Wetlands bordering a perennial or intermittent stream or lake are areas into which floodwaters spread during periods of high runoff, enabling the wetlands to remove pollutants.

Notes

a.

Question 2

Is there evidence of flooding or ponding during a portion of the growing season?

a. Yes.
b. Unable to determine or not applicable.
c. No.

Directions

See question 37 in the Wetland Characterization.

Rationale

Water level fluctuation in the wetland indicates the ability to retain water. Impounded or standing water acts as a sediment trap because it greatly slows the flow of the incoming water, allowing suspended solids to settle out. Additionally, the slower velocity increases the contact time of the water with vegetation, resulting in uptake of nutrients by the vegetation. These actions function to reduce pollutant loads.

Notes

a.

Question 3

What is the degree of wetland vegetation cover?

a. High (greater than 60%).
b. Moderate (approximately 60%).
c. Low (less than 60%).

Directions

See question 21 in the Wetland Characterization. Add the lower end of the ranges for forest, scrub-shrub and emergent vegetation to get the result. If the result is 60% or more, answer "high." If the result is 60%, answer "moderate." Answer "low" for other results.

Rationale

The more dense the vegetation, the greater the wetland's ability to take up nutrients. A dense stand of persistent emergent plants (such as cattail and rush) along with floating and submerged aquatics would tend to provide maximum nutrient uptake during the growing season. Wooded and scrub-shrub wetlands remove nutrients mainly through settling of suspended solids in runoff and flood waters.

a.

Question 4

What is the wetland's area in acres?

Directions

See questions 17 and 27 in the Wetland Characterization.

a. More than 5 acres.
b. Between 0.5 acres and 5 acres; or wetland area is less than 0.5 acres, and the wetland is connected to other wetlands within a 3-mile radius by a perennial or intermittent stream, irrigation or drainage ditch, canal or lake.
c. Less than 0.5 acres, and the wetland is not connected to other wetlands within a 3-mile radius by a perennial or intermittent stream, irrigation or drainage ditch, canal or lake.

Rationale

The larger the wetland, the greater its capacity and ability to filter pollutants. Small wetlands connected by surface water act as a series of filters and thus function similarly to a larger wetland.

Notes

b.

Question 5

What is the dominant, existing land use within 500 feet of the wetland's edge?

Directions

Refer to the directions for question 8 of the wildlife habitat assessment questions.

a. Developed uses.
b. Agriculture.
c. Exclusive Forest Use or Open Space.

Rationale

Urbanized areas have more impervious surface areas and concentrate pollution sources. Wetlands in urban areas are important for filtering the runoff water before it enters a stream.

a.

Question 6

What is the water quality condition of stream reaches in the watershed upstream of the wetland or adjacent to the wetland?

Directions

See questions 7 and 8 in the Wetland Characterization. If both "a" and "b" apply, choose "a."

a. One or more upstream or adjacent reaches are listed as *water quality limited* or in *severe* water quality condition for nonpoint source pollutants.

b. One or more upstream or adjacent reaches are listed in *moderate* water quality condition for nonpoint source pollutants.

c. No upstream or adjacent reaches are listed as *water quality limited,* and all upstream or adjacent reaches are listed as *no problem* (or no data available) for nonpoint source pollutants.

Rationale

A watershed with upstream pollutant loading sources needs wetlands to reduce pollutant levels in water before it is delivered downstream.

Water quality: assessment criteria

A wetland's water-quality function is intact if:	Question 1 is answered "a" or "b," questions 2 and 3 are answered "a," and any other question is answered "a" or "b."
A wetland's water-quality function is impacted or degraded if:	Answers do not satisfy the above- or below-listed criteria.
A wetland's water-quality function is lost or not present if:	Four out of six questions are answered "c."

Notes

b.

Water Quality is intact.

Hydrologic control
(flood control & water supply)

Wetlands function as natural water-storage areas during periods of high runoff and stream flooding. At times they act as flood regulators by holding floodwater then slowly releasing it downstream. This temporary storage reduces the amount of water downstream during floods, thereby reducing peak flows. Through this flood storage mechanism, wetlands associated with tributaries of streams or rivers can prevent water from all tributaries reaching the stream or river at the same time (this is called desynchronization). Wetlands can also act as floodwater "brakes." For example, water flowing through riverine wetlands during floods is slowed by trees, shrubs, reeds, rushes and other wetland vegetation. Wetlands acting as brakes can reduce flood peaks and thereby reduce flood damage, bank and bed erosion, and other adverse effects caused by fast moving water.

Wetlands also have long-term water holding abilities. Wetlands may store water for longer periods, sometimes for months. The slow draining of these wetlands to surface water or ground water as the water level in the wetland recedes may contribute to maintenance of baseflows in streams hydrologically connected to the wetland. The ability of this long-term water storage to maintain stream flows is called "flow conservation."

Notes

Assessment questions

Question 1

Is all or part of the wetland located within the 100-year floodplain or within an enclosed basin?

a. Yes.
b. No.

b.

Directions

See question 19 in the Wetland Characterization.

Rationale

Wetlands located within a floodplain or enclosed basin have a greater opportunity to receive and store water from surface flows and to release it slowly downstream or into the groundwater.

Question 2

Is there evidence of flooding or ponding during a portion of the growing season?

Directions

See question 37 in the Wetland Characterization.

a. Yes.
b. Unable to determine or not applicable.
c. No.

Notes

a.

Rationale

Water marks are valid indicators of seasonal and episodic stage fluctuations in wetlands and, as such, are strong indicators of storage function.

Question 3

What is the wetland's area in acres?

Directions

See question 17 in the Wetland Characterization.

a. More than 5 acres.
b. Between .5 acres and 5 acres.
c. Less than .5 acres.

c.

Rationale

Generally, the larger the wetland, the greater its ability to store and attenuate flood flows.

Question 4

Is waterflow out of the wetland restricted (e.g., beaver dam, concrete structure, undersized culvert)?

Directions

See question 38 in the Wetland Characterization.

a. Yes, the outlet is restricted or the wetland has no outlet.
b. Minor restrictions slow down the water (i.e., undersized culvert.)
c. No, the outlet has unrestricted flow.

b.

Rationale

Wetlands with no outlets or with restricted or controlled outlets generally will store greater amounts of water than wetlands with unrestricted flow outlets. Also, the wetland can store water for slower release into the water system.

Question 5

What is the dominant wetland vegetation cover type?

a. Woody vegetation.
b. Emergent vegetation and ponding, or open water only.
c. Emergent vegetation or wet meadow.

Directions

See question 23 in the Wetland Characterization.

Rationale

Densely vegetated wetlands with vegetation greater than 6 feet tall are better able to control flood flows than wetlands dominated by open water or low growing vegetation, which generally offers little resistance.

Notes

a.

Question 6

What is the dominant existing land use, within 500 feet of the wetland on the downstream or down-slope edge of the wetland?

a. Developed uses.
b. Agriculture.
c. Exclusive Forest Use and Open Space.

Directions

See question 16 in the Wetland Characterization.

Rationale

If the wetland is upstream from developed areas, its ability to control floods becomes more important.

a.

Question 7

What is the dominant land use in the watershed upstream from the assessment area?

a. Urban or urbanizing.
b. Agriculture.
c. Forested or natural area.

Directions

See question 6 in the Wetland Characterization.

Rationale

Runoff volume is directly related to the level of development in the watershed: The more development, the more runoff. The opportunity for the wetland to provide flood control and flow conservation to a community is greater where runoff is greater.

a.

Hydrologic control: assessment criteria

A wetland's hydrologic control function is intact if:	Four or more questions are answered "a."
A wetland's hydrologic control function is is impacted or degraded if:	Answers do not satisify the above- or below-listed criteria.
A wetland's hydrologic control function is lost or not present if:	Four or more questions are answered "c."

Notes

Hydrologic Control is intact.