Wetlands/Waters Delineation Report for

West Linn Solar Highway Project

ODOT Key Number: N/A

September 23, 2009

Prepared by
Vigil-Agrimis, Inc.
819 SE Morrison Street Suite 310
Portland, OR 97214

WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

This form must be included with any wetland delineation report submitted to the Department of State Lands for review and approval. A wetland delineation report submittal is not "complete" unless the fully completed and signed report cover form and the required fee are submitted. Attach the form to the front of an unbound report and submit to: **Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279**

Mail a copy of the completed form with payment of the required report review fee to: **Oregon Department of State Lands, P.O. Box 4395, Unit 18, Portland, OR 97208-4395.**

For new credit card payment option, see DSL web site.

☐ Applicant ☒ Owner Name, Firm and Address: **Oregon Department of Transportation, Region 1** **123 NW Flanders** **Portland, Oregon 97209**	Business phone # **503.731.4663** Mobile phone # (optional) FAX # **503-731-8259** E-mail: **lynn.averbeck@odot.state.or.us**
☐ Authorized Legal Agent, Name and Address:	Business phone # FAX # Mobile phone # E-mail:

I either own the property described below or I have legal authority to allow access to the property. I authorize the Department to access the property for the purpose of confirming the information in the report, after prior notification to the primary contact.

Typed/Printed Name: **Lynn Averbeck** Signature: Lynn Averbeck

Date: **15 July 2009** Special instructions regarding site access: **Contact ODOT Region 1 Right of Way office Matt Gossett 503.731.8425**

Project and Site Information (for latitude & longitude, use centroid of site or start & end points of linear project)

Project Name: **West Linn Solar Highway**	Latitude: **46° 20'59.12"N** Longitude: **122° 38'28.53"W**
Proposed Use: **Solar Power Facility**	Tax Map # **West Linn 2 1E 35DA and 36CB**
Project Street Address (or other descriptive location): **North side of I-205 at Milepost 6.9**	Township **2S** Range **1E** Section **35** QQ Tax Lot (s) **all within State Right-of-Way**
City: **West Linn** County: **Clackamas**	Waterway: **Willamette River** River Mile: **27** NWI Quad(s): **Canby**

Wetland Delineation Information

Wetland Consultant Name, Firm and Address: **Vigil-Agrimis, Inc.** **819 SE Morrison St., Suite 310** **Portland, OR 97214**	Phone # **503.274.2010** Mobile phone # FAX # **503.274.2024** E-mail: **pagrimis@vigil-agrimis.com**

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

Consultant Signature: Paul Agrimis Date: **15 July 2009**

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

Wetland/Waters Present? ☒ Yes ☐ No	Study Area size: **29 Ac** Total Wetland Acreage: **0.88 Ac**

Check Box Below if Applicable:	**Fees:**
☐ R-F permit application submitted	☐ Fee payment submitted $ _____
☐ Mitigation bank site	☐ Fee ($100) for resubmittal of rejected report
☐ Wetland restoration/enhancement project (not mitigation)	Name of Payor:
☐ Industrial Land Certification Program Site	

Other Information:	Y	N	
Has previous delineation/application been made on parcel?	☐	☒	If known, previous DSL #
Does LWI, if any, show wetland or waters on parcel?	☐	☒	

For Office Use Only

DSL Reviewer: _____	Fee Paid Date: ____/____/____	DSL WD # _____
Date Delineation Received: ____/____/____	DSL Project # _____	DSL Site # _____
Scanned: ☐ Final Scan: ☐	DSL WN # _____	DSL App. # _____

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A Landscape Setting and Land Use

A.1 Landscape Setting

Vigil-Agrimis, Inc. was contracted by Oregon Department of Transportation (ODOT) to delineate wetlands within a specified area of potential impact at the Highway Solar Project site at milepost 6.9 on Interstate 205 in West Linn, Clackamas County, Oregon. Figure 1 shows the project vicinity. All figures are located in Appendix A. A series of terraces were excavated during the construction of Interstate 205 in 1969. The project area is located on two of these terraces above Intestate 205. The Willamette River lies approximately 250 vertical feet below the project site and approximately ¼ mile south of the study area. Tanner Creek, a perennial stream flows southward, approximately ¼ miles east of the project study area, and a small unnamed drainage lies to the west of the study area. The project site is approximately one mile northeast of the Tualatin River's confluence with the Willamette River. Upslope of the project site terraces, the land is occupied by residential and commercial development of West Linn as seen in Figure 2 Aerial Photo. The lower terrace of the project site is currently partially occupied by an ODOT storage yard.

An area in the southwestern portion of the project site has been identified to contain one or more wetlands. Investigation revealed this to be one spring fed, emergent wetland dominated by watercress (*Rorippa nasturtium aquaticum*), cattail (*Typha latifolia*) and common velvet grass (*Holcus lanatus*), and includes a disturbed area overgrown by Armenian blackberry (*Rubus armeniacus*). This area lies at the base of a cut-slope, and just west of the ODOT storage yard as seen in Figures 6a Wetland Delineation Overview Map and 6b Wetland Delineation Enlargement Map 1. Five additional roadside wetlands were identified along the north side of I-205. These wetlands are shown in Figure 6a and Figure 6c Wetland Delineation Enlargement Map 2.

The field work at the Solar Highway site was performed by Paul Agrimis and Hunter White on May 27, 2009 and June 19, 2009. The field team surveyed the entire delineation study area, focusing the field effort on the previously identified wetland located in the southwestern portion of the study area and the roadside ditch containing wetlands. A total of 12 plots were conducted to delineate the boundary of the wetland, Wetland A. An additional 10 plots were conducted on June 19 to delineate the boundaries of Wetlands B-F.

The study area for this project extends approximately 2,700 feet, east to west, along the north side of Interstate 205, and extends approximately 600 feet from north to south, starting at the edge of the interstate. The eastern portion of the study area is restricted to an 800 ft x 100 ft strip along the interstate to capture the roadside ditch wetlands.

A.2 Previous Land Use

West Linn is across the river from Oregon City, the final destination for many early settlers making their way on the Oregon Trail. West Linn politically rivaled Oregon City, until a series of setbacks in the late 1850s-1860s ended the pioneer settlement. It was redeveloped decades later and eventually merged with the nearby communities including Willamette and Sunset City. The Canby 7.5 minute USGS Topographical Quad (1954) shows significant residential development in the areas around the project site, but the immediate project study area was an apparently undeveloped, concave hill sloping down towards a wastewater treatment plant on the

Willamette River. As previously mentioned the hill slope was cut into terraces during the construction of Interstate 205 in 1969.

A.3 Current Land Use

The area around the project site currently exists as suburban development including residential and commercial uses adjacent to Interstate 205. The terraces created during construction of the interstate have remained largely unused, and have started to develop stands of young Douglas fir (*Pseudotsuga menziesii*), and big-leaf maple (*Acer macrophyllum*). They also include large areas of Scotch Broom (*Cytisus scoparius*) and various pasture grasses. A portion of the lower terrace is currently used by ODOT as a storage yard, including an access road entering from the interstate at milepost 7.2. The project study area is completely within state Right-of-Way as shown in Figure 3, Taxlot Map.

ODOT, in partnership with a private developer, proposes to install a series of solar panels on the southward facing terraces. The proposed project will generate approximately 3 megawatts of power.

B Site Alterations

The 1969 construction of Interstate 205 represents the most significant site alteration associated with the study area. The concave hill slope seen on the 1954 USGS topo map was conspicuously cut into a series of flat terraces. This excavation had a major influence on the current hydrology of the site. The Clackamas County Soil Survey (1985) identifies the area of having deep or moderately deep, well drained soils suitable for Douglas fir forest, with depth to bedrock ranging from 20-40 inches. Due to the clear alteration of the site, the soils on the site are now much shallower. Soil test pits dug during the field investigation were typically met with rock refusal at 6-8 inches below the surface. In the area of the identified wetland, the excavation apparently intercepted a groundwater aquifer, allowing a spring to flow from the base of the cut-slope in one or more locations.

The construction of I-205 disrupted pre-existing drainage patterns. The main result was disruption of surface water and shallow groundwater flows from the hillsides on the north that were intercepted by the roadway embankment. The wetland on the project site has developed since the interstate construction, within the last 40 years.

Prior to the construction of I-205, several other development projects have impacted the natural drainage patterns and soils of the project vicinity. The construction of Willamette Falls Drive and the wastewater treatment plant along the Willamette River intercepted drainage paths, including Tanner Creek, before they drain into the Willamette River. Residential and commercial development, and the associated network of roadways, also had major impacts on the natural function of the surrounding areas.

C Precipitation Data and Analysis

The climate in this area is characterized by mild, wet winters, and cool, dry summers. Precipitation in the Willamette valley can vary depending on aspect and elevation. Site-specific weather data are not readily available. There was no precipitation the day before the May 27

field visit. There was approximately 0.16 inches of rainfall on the morning of the June 19 fieldwork.

Historic precipitation information was available from the WETS Station at Portland International Airport that is located 17 miles north of the study area (Appendix B). Based on this station record (1971-2000) the growing season is nearly year around.

The general weather pattern that most observers would use to characterize the growing season in the study area for the May 27 and June 19 delineation would be moderately wet and warming; No data was available at the Highway Solar Project location but year-to-date precipitation at Portland International Airport (NWS 2009) prior to the delineation site visit was within the normal range. Overall rainfall for the three months prior to the May 27 delineation was just 0.48 inches above average as shown in Table 1. Since the May site visit followed the normal wet season and because the months preceding the site visit were within the range of normal precipitation, the observed hydrology is likely an accurate primary hydrology indicator. Furthermore, because the primary source of hydrology for Wetland A is groundwater discharge, the hydrology would likely be an accurate hydrology indicator for most of the year. Overall rainfall for the three months prior to the June 19 delineation fieldwork was 0.02 inches below normal. Including rainfall later in the day, overall rainfall was slightly above normal. Table 1 summarizes the precipitation at the time of the delineation.

Table 1. Summary of Precipitation Three Months Prior to the Delineations: Portland, Oregon

Category	Recorded Precipitation Prior to Delineation	WETS Station Data Average Precipitation
March	3.45 inches	3.71 inches
April	2.55 inches	2.64 inches
May	3.21 inches	2.38 inches
Total prior May 27 fieldwork	**9.21 inches**	**8.73 inches**
April	2.55 inches	2.64 inches
May	3.34 inches	2.38 inches
June	0.70 inches	1.59 inches
Total prior to June 19 fieldwork	**6.59 inches**	**6.61 inches**

(NWS 2009) and WETS Station Data (Appendix B)

D Methods

Wetlands areas were delineated using the "triple parameter" method described in the *US Army Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987), and the *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Engineer Research and Development Center, 2008) . Wetlands are required to have a prevalence of wetland hydrology, hydric soils, and hydrophytic vegetation. Jurisdictional wetlands are determined when positive indicators of all of these three criteria are present. The wetland boundaries and classifications described herein represent best professional opinion based on the site conditions observed. Final boundaries may vary after

review and acceptance by the Oregon Department of State Lands (DSL) and the U.S. Army Corps of Engineers (Corps).

The typical wetland delineation methodology was employed. Due to the very shallow soils, soil test pits were typically only 6-8 inches deep, rather than the typical 16-inch minimum depth. Specifics of the delineation included:

- Site visit dates: May 27, 2009 and June 19, 2009.
- Twelve sample plots (six pairs of plots) were taken to describe Wetland A. An additional 10 sample plots were taken to describe the roadside wetlands B-F (one pair per wetland). These were primarily paired plots on wetland boundaries. Paired plots were typically 4 to 10 feet apart. There were several different vegetation boundary conditions in Wetland A, necessitating additional pairs of plots. Paired plots were located in areas of representative wetland and upland. Wetlands B-F were relatively small and simple wetlands requiring only one pair of plots per wetland.
- On the eastern edge of Wetland A, there was evidence of disturbance, including remnant tire ruts and a prevalence of invasive vegetation including Armenian blackberry. On this heavily disturbed wetland edge, the wetland vegetation has been completely suppressed by the blackberry. In this location (Paired Plots 11 & 12), soils and hydrology were primarily used to delineate the boundary. Surprisingly, wetland Plot 12 contained 100 percent Armenian blackberry.

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The process for locating wetland boundaries was based on identifying where slope break and saturated conditions occurred together with the presence of hydrophytic plants and hydric soils. The northern edge of Wetland A is closely correlated with the toe of the terrace cut slope. This toe of slope is where groundwater discharges in one or more locations. With the exception of the eastern blackberry edge of the wetland, the difference between wetland and upland vegetation species was often distinct, providing a good vegetative indicator of the boundary location. Once rough boundaries of wetlands were identified based on vegetation, pits were dug to refine the boundaries and to develop descriptive plots. Wetlands B through F were located within distinct drainage paths.

D.1 Soils

Soils at each representative wetland sample point were typically inspected to a depth of 6-8 inches, rather than the minimum depth of 16 inches, to determine the presence or absence of hydric soils (wetland conditions). In all 22 soil test pits, rock refusal was met before digging the minimum 16 inches. At each sample location, the soil matrix color, soil texture, and presence of redoximorphic features or gleying were recorded. Soil hue, value, and chroma were determined using Munsell Soil Color Charts (Munsell Color Services 2000).

Soils in the study area are illustrated in Figure 4, Soils Map. The four soils present in the study area are 48C-Kinton silt loams, 8 to 15 percent slopes, 48D-Kinton silt loam, 15 to 30 percent slopes, 64C-Nekia silty clay loam, 8 to 15 percent slopes, and 89D-Witzel very stony silt loam, 3 to 40 percent slopes. These soils are listed and described in Table 2.

Table 2. Soils Mapped by NRCS within the Study Area		
Soil Phase (Map Unit)	**Hydric / Hydric Inclusions***	**Location of Mapped Occurrence**
Kinton silt loam, 8 to 15 percent slopes (48C)	No/Yes, Delena depressions, 2B3	Kinton silt loam, 8 to 15 percent slopes is the primary soil unit on the eastern end of the study area, also occurring in the north central portion of the site. No wetlands were identified within soil map unit 48C.
Kinton silt loam, 15 to 30 percent slopes (48D)	No/Yes, Delena depressions, 2B3	Kinton silt loam, 15 to 30 percent slopes occurs in the study area as a large band in the upper terrace. No wetlands were identified within soil map unit 48D.
Nekia silty clay loam, 8 to 15 percent slopes (64C)	No/No	Nekia silty clay loam,8 to 15 percent slopes occurs only in a small area in the northwest corner of the study area. No wetlands were identified in soil map unit 64C.
Witzel very stony silt loam, 3 to 40 percent slopes (89D)	No/No	Witzel very stony silt loam, 3 to 40 percent slopes is the most prevalent soil unit in the southwestern quadrant of the study area. Soil map unit 89D includes the only wetland within the study area.

*As determined by the US Department of Agriculture, Natural Resource Conservation Service (http://www.or.nrcs.usda.gov/pnw_soil/or_data.html accessed August 13, 2008)

Soils in the study area have been significantly altered from the state described in the Soil Survey. During the 1969 Interstate construction, large terraces were excavated and the majority of the topsoil was removed from the study area. While soil conditions mapped in the Soil Survey are no longer accurate, soils in study area were very stony silt loam as described in the Witzel soil unit 89D.

D.2 Hydrology

The presence of wetland hydrology was determined by the presence of inundation, saturation, high water table, and algal mats/crust. Secondary indicators such as drainage patterns (B10) and shallow aquitard (D3) were observed but were not used to make hydrologic calls. The fieldwork was conducted on May 27 and June 19, and hydrologic conditions were within the range of normal precipitation. Wetland A is a spring-fed wetland. Groundwater discharges in one or more location on the north wide of Wetland A as shown in Figure 6B – Wetland Delineation Enlargement Map. Because Wetland A's primary source of hydrology is a spring, hydrology may be consistent throughout the year. Wetlands B through F were located in the roadside ditch or in the drainage on the west end of the study area. Wetland hydrology was observed in all delineated wetlands.

D.3 Vegetation

At each sample point, the percent cover for each dominant species in the plot area was visually estimated and recorded. Each sample point has a 1.5-m (5-ft) radius for herbs and a 9-m (30-ft) radius for saplings, shrubs, trees and woody vines.

The USFWS National List of Plant Species that Occur in Wetlands: Northwest Region 9 was the reference used to determine the indicator status of the vegetation. There were some mosses that were not able to be identified.

Upland native vegetation in the study area typically included Douglas fir (*Pseudotsuga menziesii*), big-leaf maple (*Acer macrophyllum*), California brome (*Bromus carinatus*), and fireweed (*Epilobium angustifolium*). Upland non-native vegetation included tall oatgrass (*Arrhenatherum elatius*), Scotch broom (*Cytisus scoparius*), Canada thistle (*Cirsium arvense*), oxeye daisy (*Chrysanthemum leucanthemum*), perennial ryegrass (*Lomium perenne*), hedgehog dogtail (*Cynosurus echinatus*), Armenian blackberry (*rubus armeniacus*).

Wetland native vegetation in the study area included black cottonwood (*Populus balsamifera*), Watson's willow-herb (*Epilobium watsonii*), small-flowered forget-me-not (*Myosotis laxa*), broad-leaf cattail (*Typha latifolia*), few-seeded bittercress (*Cardamine oligosperma*), soft rush (*juncus effusus*), dagger-leaf rush (*juncus ensifolius*), sawbeak sedge (*carex* stipata), meadow barley (*hordeum* brachyantherum), red fescue (*festuca rubra*), and American vetch (*Vicia americana*). Wetland non-native vegetation included watercress (*Rorippa nasturtium aquaticum*), common velvetgrass (*Holcus lanatus*), and prickly sow-thistle (*Sonchus asper*).

E Description of All Wetlands and Other Non-Wetland Waters

Figure 5a – NWI Map shows a number of wetlands within a mile of the project site. Wetlands to the east of the study area are associated with Tanner Creek. Wetlands to the south of the project site are associated with the Willamette River and the wastewater treatment plant along the river. area short section of a tributary to Bernert Creek crosses the study area on the western end. Five palustrine emergent (PEM) wetlands and one palustrine forested (PFO) wetland were found within the study area. Figure 5b shows Local Wetland Inventory wetlands identified in the area. An overview of the wetlands and non-wetland waters in the study area vicinity is shown in Figure 6a – Wetland Delineation Overview Map. Figures 6b and 6c – Wetland Delineation Enlargement Maps show a more detailed view of the delineated wetlands including the approximate seep location and flow paths through the wetlands.

E.1 Wetlands

Data from the twenty two plots (Appendix C) were analyzed and led to identification of six wetlands (Figures 6a and 6b). Color photographs of the wetlands and the plot locations are included in Appendix D.

E.1.1 Wetland A – PEM/Slope

Wetland A (Figures 6a and 6b) is a spring-fed, Palustrine Emergent (PEM) wetland that is 0.542 acres. Groundwater discharges at the toe of a cut-slope providing hydrology to wetland A. Water flows through the wetland on the lower terrace in two main, meandering flow paths before falling down slope towards I-205. Because the spring water likely eventually flows to the Willamette River, the Corps would likely consider this wetland Jurisdictional. It would also be jurisdictional under Oregon Department of State Lands (DSL) Removal-Fill Law. With the exception of the eastern blackberry edge of the wetland, the difference between wetland and upland vegetation species was often distinct, providing a good vegetative indicator of the boundary location. Once rough boundaries of wetlands were identified based on vegetation, pits were dug to refine the boundaries and to develop descriptive plots.

Dominant vegetation within Wetland A included watercress, Watson's willow-herb, broad-leaf cattail, watercress, small flowered forget-me-not, and common velvetgrass. The wetland boundary typically included a distinct break in vegetation of common velvetgrass and Watson's willow-herb to tall oatgrass and California brome in the adjacent upland. The wettest areas were occupied by watercress, often creating a meandering path of watercress following the main flow paths through the wetland. The wetland also included an area primarily covered with broad-leaf cattail. The eastern side of the wetland has been more disturbed, as evidenced by remnant tire ruts, and has grown over with Armenian blackberry. Upon further investigation within the blackberry patch, the field investigators found distinct flow paths beneath the blackberries, with wetland extending outward from the flow paths.

Soils in Wetland A are predominantly 10YR 3/1 with up to 20 percent redoximorphic concentrations or depletions. The most common hydric soil indicator in the wetland was Redox Dark Surface (F6), though Depleted Dark Surface (F7) and Depleted Matrix (F3) were also observed. Soil depths within the wetland were typically only 6-8 inches. Shovel refusal occurred at between six and 10 inches in the test pits. The soils are gravelly silt loam as is consistent with the Clackamas County Soil Survey description of Soil Map Unit 89D – Witzel very stony silt loam, 3 to 40 percent slopes.

The source of hydrology for Wetland A is primarily groundwater being discharged at the seep locations shown on Figure 6b. Wetland A also receives runoff from adjacent uplands. The hummocky topography also provides for detention/retention of direct precipitation. Water that flows through Wetland A likely eventually flows into the Willamette River.

Wetland A was assigned a HGM classification of Slope Discharge Terrace (SDT). Wetland A's primary source of hydrology is groundwater that is discharged at the toe of a terrace cut-slope at the north end of the wetland. Wetland A also receives overland flow and runoff from adjacent uplands, and direct precipitation. An apparent groundwater discharge point was observed at the northeast portion of the wetland.

E.1.2 Wetland B – PEM/RFT

Wetland B (Figures 6a and 6c) is Palustrine Emergent (PEM) wetland that is 0.073 acres. A shallow stream enters the wetland from outside of the study area providing hydrology to Wetland B. Water flows through the wetland in a roadside ditch before draining into a culvert at the access road entrance to the project site. Because the water likely eventually flows to the Willamette River, the Corps would likely consider this wetland Jurisdictional. It would also be jurisdictional under Oregon Department of State Lands (DSL) Removal-Fill Law. The break in vegetation was not well defined in many locations along the boundary. Soils and hydrology were used to locate the boundary. Changes in soil and hydrology were closely related to topographic position.

Dominant vegetation within Wetland B included broad-leaf cattail, tall fescue, soft rush, Watson's willowherb, dagger-leaf rush, and common velvetgrass. Black cottonwood dominates as a shrub at the east end of the site and in the canopy of this wetland outside of the study area. While the interior of the wetland contained obvious hydrophytic vegetation, some facultative plant species were also present just outside of the delineated boundary.

Soils in Wetland B are predominantly 10YR 3/2 with five percent redoximorphic concentrations in the matrix and on pore linings. The hydric soil indicator in the wetland was Redox Dark

Surface (F6). Soil depths within the wetland were typically only 6-8 inches. Shovel refusal occurred at 8 inches in the test pits. The soils are gravelly silt loam as is consistent with the Clackamas County Soil Survey description of Soil Map Unit 89D – Witzel very stony silt loam, 3 to 40 percent slopes, although Wetland B lies within the soil map unit 48C.

The source of hydrology for Wetland B is primarily surface water flow entering the wetland from outside of the study area. Wetland B also receives runoff from adjacent uplands, direct precipitation, and groundwater inputs. Water that flows through Wetland B eventually flows into the Willamette River.

Wetland B was assigned a HGM classification of Riverine Flow-Through (RFT). Wetland B's primary source of hydrology is surface water flowing into Wetland B from upstream. Wetland B also receives overland flow and runoff from adjacent uplands, and direct precipitation. Wetland B extends outside of the study area to the northeast, as shown in Figure 6c. Wetland B drains into a culvert at the western end of the wetland.

E.1.3 Wetland C – PEM/DO

Wetland C (Figures 6a and 6c) is Palustrine Emergent (PEM) wetland that is 0.205 acres. There is a crushed CMP culvert located at the upstream/eastern end of Wetland C. It is unclear whether or not this culvert is connected to Wetland B. Water flows through the wetland in a roadside ditch before draining into a grated inlet at the downstream/western end of Wetland C. Because the water likely eventually flows to the Willamette River, the Corps would likely consider this wetland Jurisdictional. It would also be jurisdictional under Oregon Department of State Lands (DSL) Removal-Fill Law. Changes in vegetation, soils, and hydrology were closely related to local topographic position. The wetland was generally confined to the ditch feature.

Dominant vegetation within Wetland C included American brooklime, tall fescue, reed canarygrass, Watson's willowherb, soft rush, and common velvetgrass. While the interior of the wetland contained obvious hydrophytic vegetation, some facultative plant species, such as colonial bentgrass, were also present just outside of the delineated boundary.

Soils in Wetland C are predominantly GLEY1 2.5/10Y with up to 20 percent redoximorphic concentrations in the matrix and on pore linings. The hydric soil indicator identified in the wetland was Loamy Gleyed Matrix (F2), though other indicators may be present. Soil depths within the wetland were typically only 6-8 inches. Shovel refusal occurred at 8 inches in the test pits. The soils are gravelly silt loam as is consistent with the Clackamas County Soil Survey description of Soil Map Unit 89D – Witzel very stony silt loam, 3 to 40 percent slopes, although Wetland C lies within the soil map unit 48C.

The source of hydrology for Wetland C is groundwater intercepted at the base of the terrace slope. Wetland C also receives runoff from adjacent uplands, direct precipitation and may receive surface water inflow from the crushed culvert at the eastern end of the wetland. Water that flows through Wetland C eventually flows into the Willamette River.

Wetland C was assigned a HGM classification of Depressional Outflow (DO). Wetland C's primary source of hydrology is groundwater intercepted at the base of the terrace slope. Wetland C also receives overland flow and runoff from adjacent uplands and direct precipitation. Wetland C drains into a grated inlet at the western end of the wetland.

E.1.4 Wetland D – PEM/DO

Wetland D (Figures 6a and 6c) is a Palustrine Emergent (PEM) wetland that is 0.045 acres. Wetland D is hydrologically connected Wetlands C and F via the roadside ditch. Water flows through the wetland in a roadside ditch. Because the water likely eventually flows to the Willamette River, the Corps would likely consider this wetland Jurisdictional. It would also be jurisdictional under Oregon Department of State Lands (DSL) Removal-Fill Law. Changes in vegetation, soils, and hydrology were closely related to local topographic position. The wetland was generally confined to the ditch feature.

Dominant vegetation within Wetland D included sawbeak sedge, meadow barley, tall fescue, soft rush, slender rush, and common velvetgrass. There was a distinct change in plant community at the edges of Wetland D, driven by the change in elevation.

Soils in Wetland D are predominantly 10YR 2/2 with up to 30 percent redoximorphic concentrations in the matrix and on pore linings. The hydric soil indicator identified in the wetland was Redox Dark Surface (F6). Soil depths within the wetland were typically only 6-8 inches. Shovel refusal occurred at 8 inches in the test pits. The soils are gravelly silt loam as is consistent with the Clackamas County Soil Survey description of Soil Map Unit 89D – Witzel very stony silt loam, 3 to 40 percent slopes.

The source of hydrology for Wetland D is primarily surface water flow entering the wetland in the ditch from upstream. Wetland D also receives runoff from adjacent uplands, direct precipitation and surface flow from the upstream ditch. Water that flows through Wetland D eventually flows into the Willamette River.

Wetland D was assigned a hydrogeomorphic (HGM) classification of Depressional Outflow (DO). Wetland D's primary source of hydrology is groundwater intercepted at the base of the terrace slope. Wetland D also receives overland flow and runoff from adjacent uplands, direct precipitation, and surface flow from the upstream ditch. Water exits Wetland D in the roadside ditch to the west.

E.1.5 Wetland E – PFO/RFT

Wetland E (Figures 6a and 6c) is a Palustrine Forested (PFO) wetland that is 0.011 acres. Water flows through the wetland in a defined stream channel. Because the water likely eventually flows to the Willamette River, the Corps would likely consider this wetland Jurisdictional. It would also be jurisdictional under Oregon Department of State Lands (DSL) Removal-Fill Law. Changes in vegetation, soils, and hydrology were closely related to local topographic position. The wetland extends outward from the center of the stream channel. Wetland F extends upstream of the study area boundary as shown on Figure 6c.

Dominant vegetation within Wetland E includes black cottonwood, common horsetail, Watson's willowherb, perennial ryegrass, and common velvetgrass. There was a distinct change in plant community at the edges of Wetland E, driven by the change in elevation. Armenian blackberry and sword fern are present outside of the wetland boundary.

Soils in Wetland E are predominantly 10YR 2/2 with up to 10 percent redoximorphic concentrations in the matrix. The hydric soil indicator identified in the wetland was Redox Dark Surface (F6). Soil depths within the wetland were typically only 6-8 inches. Shovel refusal

occurred at 8 inches in the test pits. The soils are gravelly sandy loam. The soils here are sandier that the rest of the site likely because it is within the stream channel.

The source of hydrology for Wetland E is primarily surface water flow entering the wetland in the stream channel from upstream. Wetland E also receives runoff from adjacent uplands, direct precipitation and some groundwater input. Water that flows through Wetland E eventually flows into the Willamette River.

Wetland E was assigned a hydrogeomorphic (HGM) classification of Riverine Flow-Through (RFT). Wetland E's primary source of hydrology is surface water flowing into Wetland E in the stream channel from upstream. Wetland E also receives overland flow and runoff from adjacent uplands, direct precipitation, and groundwater input. Water exits Wetland E in a large culvert under I-205.

E.1.6 Wetland F – PEM/DO

Wetland F (Figures 6a and 6c) is a small Palustrine Emergent (PEM) wetland that is 0.003 acres. Wetland F is hydrologically connected Wetlands D and C via the roadside ditch. Water flows through the wetland in a roadside ditch. Because the water likely eventually flows to the Willamette River, the Corps would likely consider this wetland Jurisdictional. It would also be jurisdictional under Oregon Department of State Lands (DSL) Removal-Fill Law. Changes in vegetation, soils, and hydrology were closely related to local topographic position. The wetland was generally confined to the ditch feature.

Dominant vegetation within Wetland F included Watson's willowherb, colonial bentgrass, perennial ryegrass, toad rush, and common velvet grass. There was a distinct change in plant community at the edges of Wetland F, driven by the change in elevation.

Soils in Wetland F are predominantly 10YR 3/2 with up to 10 percent redoximorphic concentrations and depletions in the matrix. The hydric soil indicator identified in the wetland was Redox Dark Surface (F6). Soil depths within the wetland were typically only 6-8 inches. Shovel refusal occurred at 8 inches in the test pits. The soils are gravelly silt loam as is consistent with the Clackamas County Soil Survey description of Soil Map Unit 89D – Witzel very stony silt loam, 3 to 40 percent slopes.

The source of hydrology for Wetland F is primarily groundwater intercepted at the base of the terrace slope. Wetland D also receives runoff from adjacent uplands, direct precipitation and some surface flow from the upstream drainage ditch. Water that flows through Wetland F eventually flows into the Willamette River.

Wetland F was assigned a hydrogeomorphic (HGM) classification of Depressional Outflow (DO). Wetland F's primary source of hydrology is groundwater intercepted at the base of the terrace slope. Wetland F also receives overland flow and runoff from adjacent uplands, direct precipitation, and surface flow from the upstream drainage ditch. Water exits Wetland F in the roadside ditch to the west.

E.2 Non-Wetland Waters

There are a number of waterways in the vicinity of the project area as seen in Figure 1 – Vicinity Map, most of which are associated with the wetlands described above. All of these waterways

including the Willamette River, Tanner Creek and an unnamed drainage to the west of the project site are outside of the study area.

E.2.1 Willamette River

The Willamette River is the 13th largest river by volume in the Unites States. The main stem is approximately 187 miles long and has an average flow of approximately 32,000 cubic feet per second (cfs) at the confluence with the Columbia River. Including its tributaries, the Willamette River drains approximately 11,500 square miles. The Willamette River enters the Columbia River which flows into the Pacific Ocean. The Willamette River flows from Eugene to Portland through the Willamette Valley, a region of the state containing over 70 percent of Oregon's population. Historically the watershed was made up of open prairies, oak conifer woodlands, and old growth forests in the foothills of the Cascade and Coast Range mountains. Today the land is mostly agricultural, with only small portions of the riparian forests that previously existed. Flows have been significantly altered by the construction of 13 dams, built to control flooding and generate hydropower. One such dam was constructed at Willamette Falls, less than one mile from the study area.

E.2.2 Tanner Creek

Tanner Creek, a tributary of the Willamette River, lies approximately 1,500 feet northeast of the study area. Flowing in a southerly direction, it drains into the Willamette River 0.5 miles upstream of Willamette Falls. The main stem of Tanner Creek is approximately 9000 feet long, and has a watershed area of over 1,000 acres. The Tanner Creek watershed is primarily composed of residential development of West Linn. Tanner Creek is piped beneath Interstate-205 before emerging near its confluence with the Willamette River.

E.2.3 Bernert Creek

Bernert Creek, a tributary of the Willamette River, lies approximately 3,000 feet west (or 500 feet south) of the study area. Bernert Creek flows in a southerly direction along Tannler Drive crossing I-205 just west of the Exit 6 interchange. South of I-205, it turns to the east and flows through the wastewater treatment plan before draining into the Willamette River 1 mile upstream of Willamette Falls. The main stem of Bernert Creek is approximately 8,000 feet long, and has a watershed area of approximately 500 acres. The Bernert Creek watershed is primarily composed of residential and commercial development of West Linn.

E.2.4 Intermittent Stream to the East

An intermittent stream is located on the eastern end of the study area. Wetland B is within this stream channel which widens at the downstream end. The intermittent stream flows into a culvert at the western end of Wetland B as shown on Figure 6c, and eventually drains into the Willamette River. The intermittent stream flows for approximately 700 feet upstream of the I-205 culvert and an additional 1,500 feet downstream of the culvert. Based on available topography data, this stream drains approximately 10 acres of land primarily within the ODOT rest area site. Some residential areas up slope may also contribute to this watershed.

E.2.5 Intermittent Stream to the West

Another intermittent stream is located on the western end of the study area. Wetland E is within this stream channel. The intermittent stream flows into a culvert at the southern end of Wetland

E as shown on Figure 6c, and drains into Bernert Creek eventually reaching the Willamette River. The intermittent stream flows for approximately 700 feet upstream of the I-205 culvert and an additional 600 feet downstream of the culvert. Upstream of the culvert, the stream has a steep gradient of approximately 20 percent. Based on available topography data, this stream drains approximately five acres of undeveloped land. Some residential areas up slope may also contribute to this watershed.

F Deviation from NWI and other sources

Figure 5a shows wetland polygons mapped by the National Wetlands Inventory (NWI). The NWI indicates there are no mapped wetlands within the wetland delineation study area. One wetland is identified in the Tanner Creek drainage. The Willamette River is included on the NWI mapping as well as several wetlands associated with the wastewater treatment plant along the Willamette River. These wetlands are outside the study area.

West Linn's Goal 5 Local Wetland Inventory was approved by the Oregon Division of State Lands (DSL) in January 2005 and adopted by West Linn City Council in 2007. No wetlands are mapped within the delineation study area. Figure 5b shows wetlands indicated by West Linn's Goal 5 Local Wetlands Mapping.

G Mapping Method

Wetland data plots and wetland boundaries were recorded using a 2005 Trimble GeoXT Global Positioning Systems (GPS). This unit has an inherent horizontal positional accuracy of +/- 3 feet. During data collection, point features had a minimum horizontal accuracy of +/- 3.0 feet and line features had a minimum horizontal accuracy of +/- 3.0 feet. Positions comprising point features that deviated from the 3.0 foot standard of precision were discarded. The site was generally free of tree canopy allowing a high level of accuracy.

Mapping Figures were developed in ArcGIS using Metro RLIS GIS data. Utilized shapefiles include freeways, arterial roads, streets, 5-ft contours, city boundaries, NRCS soil map unit boundaries, NWI mapped wetlands, stream routes, and rivers.

H Additional Information

No additional information is provided.

I Results and Conclusions

I.1 Wetlands

Section 404 of the Clean Water Act gives the Corps jurisdiction over fresh water wetlands above the ordinary high water (OHW) line of streams. To be jurisdictional, these wetlands must be connected to waters of the U.S. either by wetlands, surface drainages, or culverts. Spring water flows through Wetland A, southward out of the study area and eventually drains to the Willamette River. The Corps would likely take jurisdiction over Wetland A as a water of the U.S.

Oregon Department of State Lands has jurisdiction over all Waters of the State including all tidal and non-tidal bays, intermittent streams, constantly flowing streams, lakes, wetlands, and other

bodies of water as defined in the Oregon Removal-Fill Law (ORS 196.800-196.990). DSL asserts jurisdiction over wetlands regardless of their adjacency to other Waters of the State. DSL considers whether a wetland is natural or artificially created in determining jurisdiction.

Wetland A is a Slope wetland that is fed primarily by a groundwater seep emerging at the base of a terrace cut-slope. The wetland also receives overland flow from adjacent uplands as a source of hydrology. Wetlands B and E are intermittent streams classified as Riverine Flow Through wetlands. Wetlands C, D, and F are Depressional Outflow wetlands.

I.2 Waters of the State/U.S.

Navigable waters of the United States are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the water body, and is not extinguished by later actions or events which impede or destroy navigable capacity.

By this definition, all waters which eventually connect to the Willamette River are considered Waters of the U.S. The intermittent streams on the east and west ends of the study area may be considered Waters of the U.S. because of their apparent connection to the Willamette River. Tanner Creek to the east of the study area and Bernert Creek south of the study area are likely Waters of the U.S., but are outside of the study area. These drainage features are shown in Figures in Appendix A.

I.3 Conclusions

Six wetlands were identified and delineated within the study area as shown in Figures 6a, 6b, and 6c and in Table 3.

Table 3. Jurisdictional Wetlands within the Highway Solar Project Study Area

Wetland ID	Dominant Cowardin Class	Acres Within Project area	Sample Plot(s)	HGM Classification
A	PEM	0.542	P1 thru P12	SDiT
B	PEM	0.073	P13, P14	RFT
C	PEM	0.205	P15, P16	DO
D	PEM	0.045	P17, P18	DO
E	PFO	0.011	P19, P20	RFT
F	PEM	0.003	P21, P22	DO
TOTAL	-	**0.88**	-	-

1. Cowardin Wetland Classification: PEM = Palustrine Emergent Wetland, PSS = Palustrine Scrub-Shrub; PFO = Palustrine Forested

2. Adamus: Oregon Statewide Hydrogeomorphic Classification: D = Depressional, R = Riverine, S = Slope
Subclass: FT = Flow-through, OF= Out Flow, CNP= Closed, Non-Permanent, H=Headwaters, Di = Discharge, T = terrace

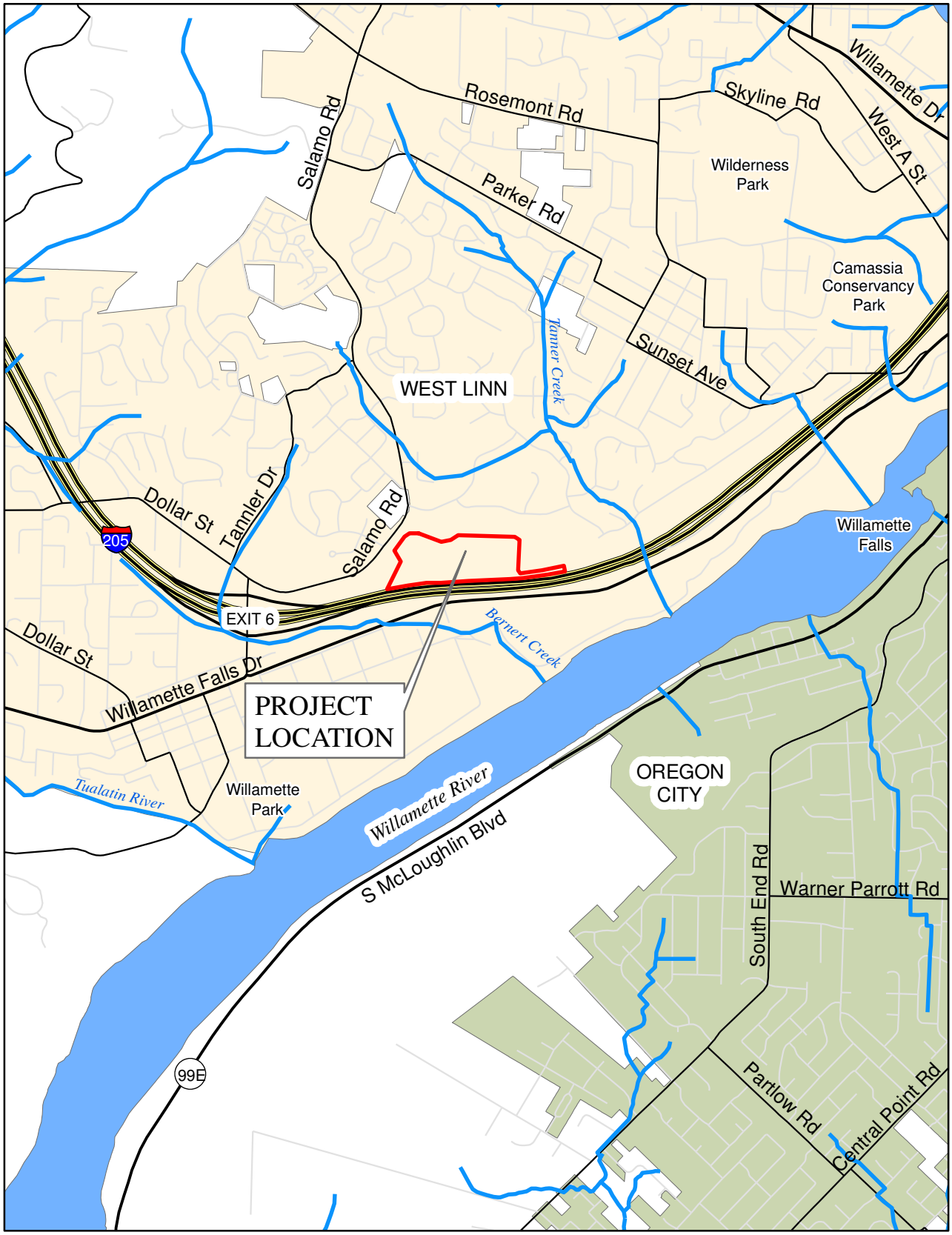
J Disclaimer

This report documents the investigation, best professional judgment, and conclusions of the investigators. It should be considered a Preliminary Jurisdictional Determination and used at

your own risk until it has been approved in writing by the Oregon Department of State Lands and the Corps of Engineers.

Appendices

Appendix A: Maps



Source: Roads & stream GIS data from METRO RLIS data

2,000 1,000 0 2,000 Feet

N

Legend

Wetland delineation study area

FIGURE 1.
Vicinity Map

VIGIL AGRIMIS
design professionals

Source: Roads & stream GIS data from METRO RLIS data
Aerial Imagery (Summer 2005): http://www.oregonexplorer.info/imagery/

2,000 1,000 0 2,000 Feet

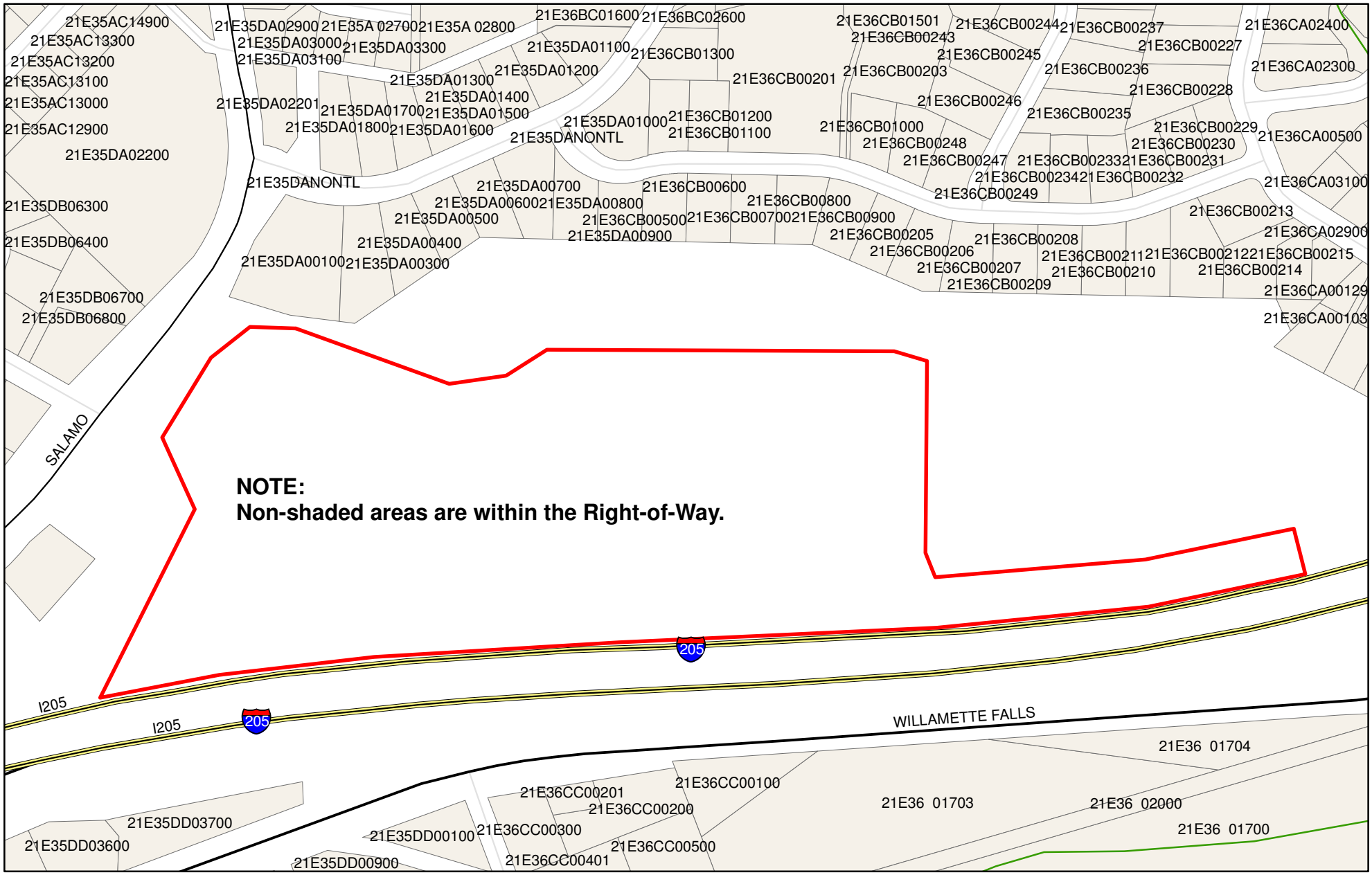
N

Legend

Wetland delineation study area

FIGURE 2.
Aerial Photo

VIGIL AGRIMIS
design professionals



Source: Taxlot data from METRO RLIS data, 2009.

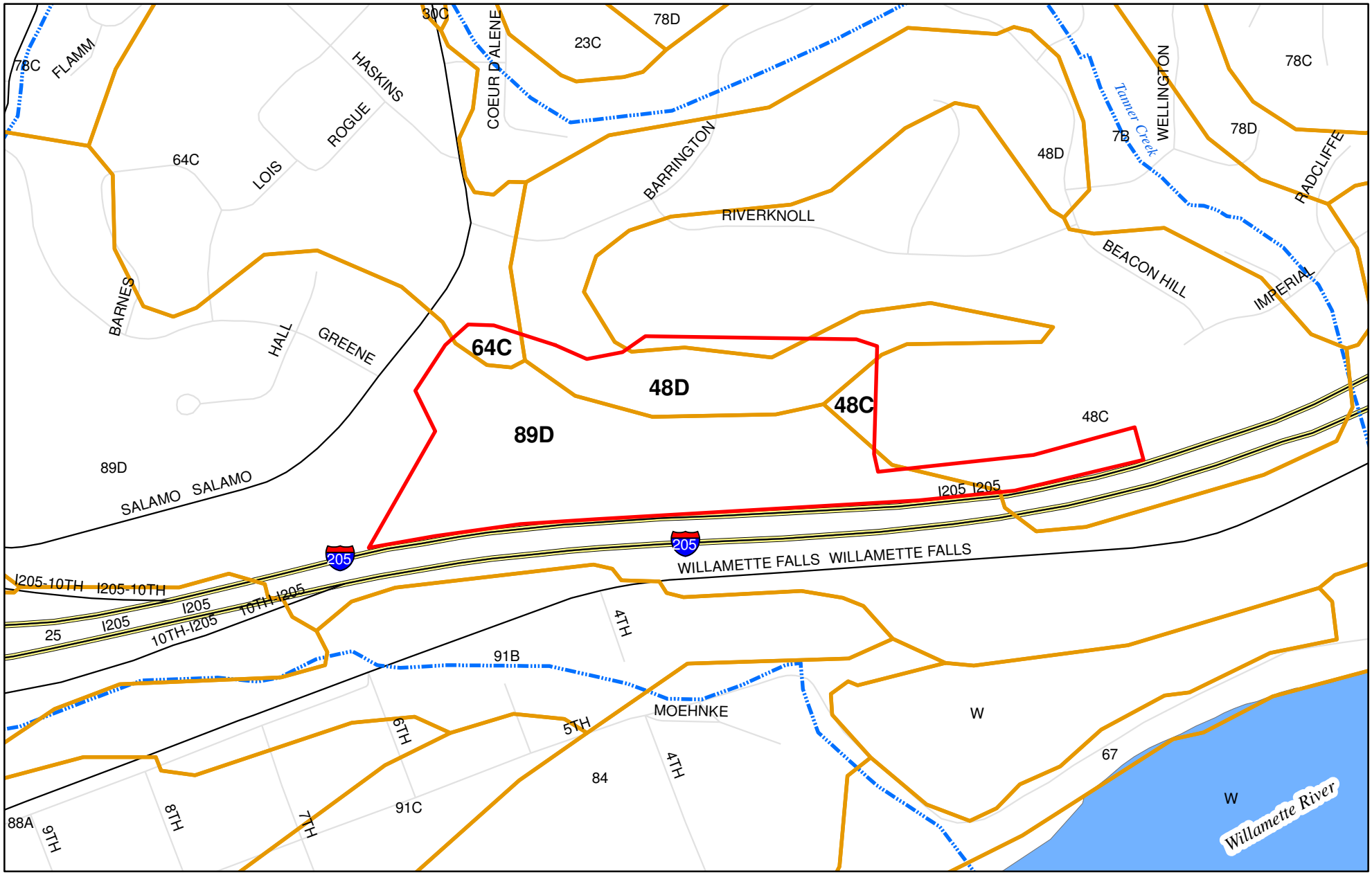
300 150 0 300 Feet

Legend

Wetland delineation study area

FIGURE 3.
Taxlot Map

VIGIL AGRIMIS
design professionals



Source: NWI data from METRO RLIS data, 2009, confirmed with USDA, NRCS Web Soil Survey 2.2.

500 250 0 500 Feet

Legend

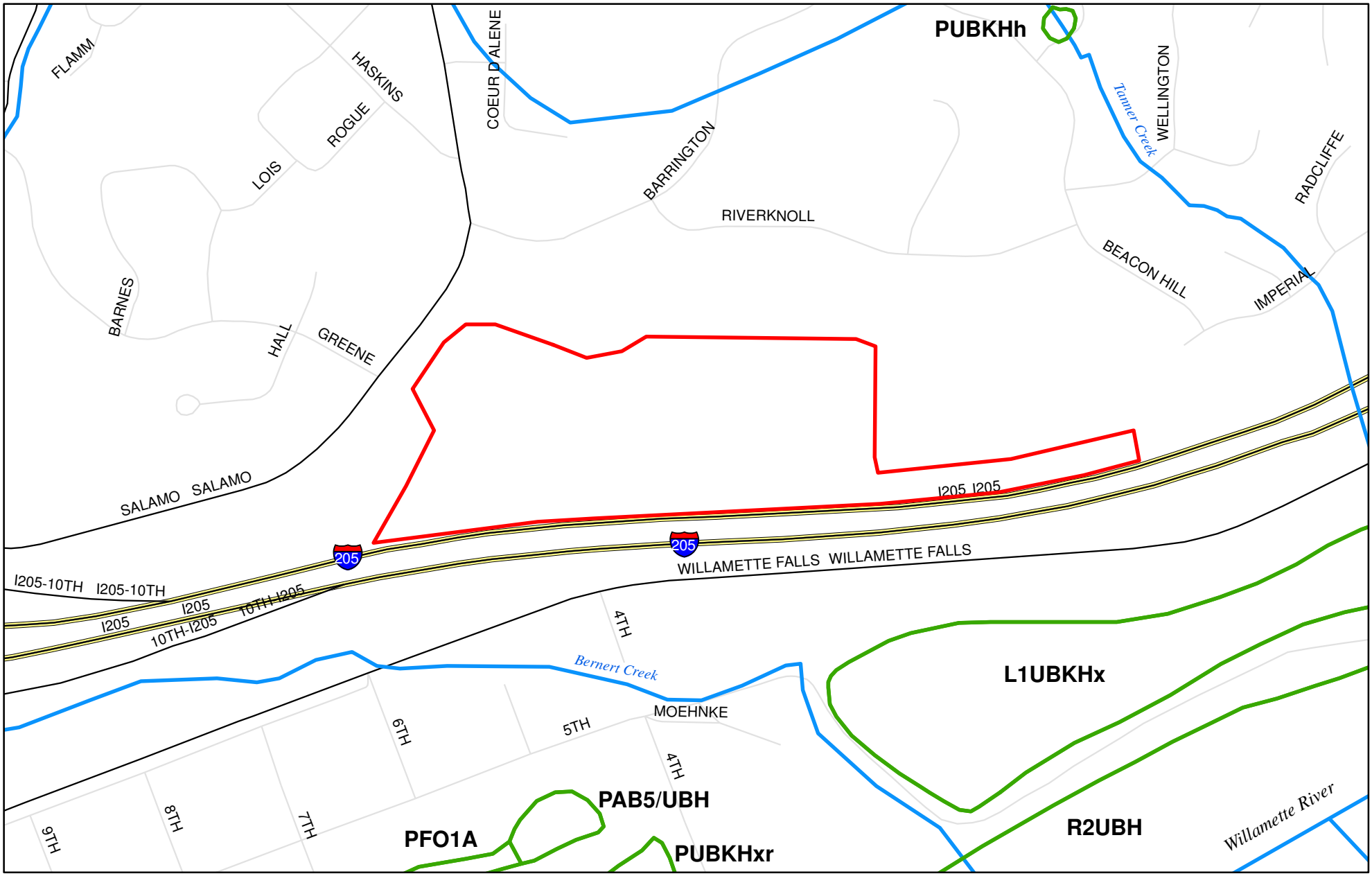
- Wetland delineation study area
- Soil Units

SOIL UNITS WITHIN THE STUDY AREA:

48C - Kinton silt loam, 8 to 15 percent slopes
48D - Kinton silt loam, 15 to 30 percent slopes
64C - Nekia silty clay loam, 8 to 15 percent slopes
89D - Witzel very stony silt loam, 3 to 40 percent slopes

FIGURE 4.
Soils Map

VIGIL AGRIMIS
design professionals



Source: NWI data from METRO RLIS data, 2009, confirmed with USFWS Wetlands Mapper.

Legend

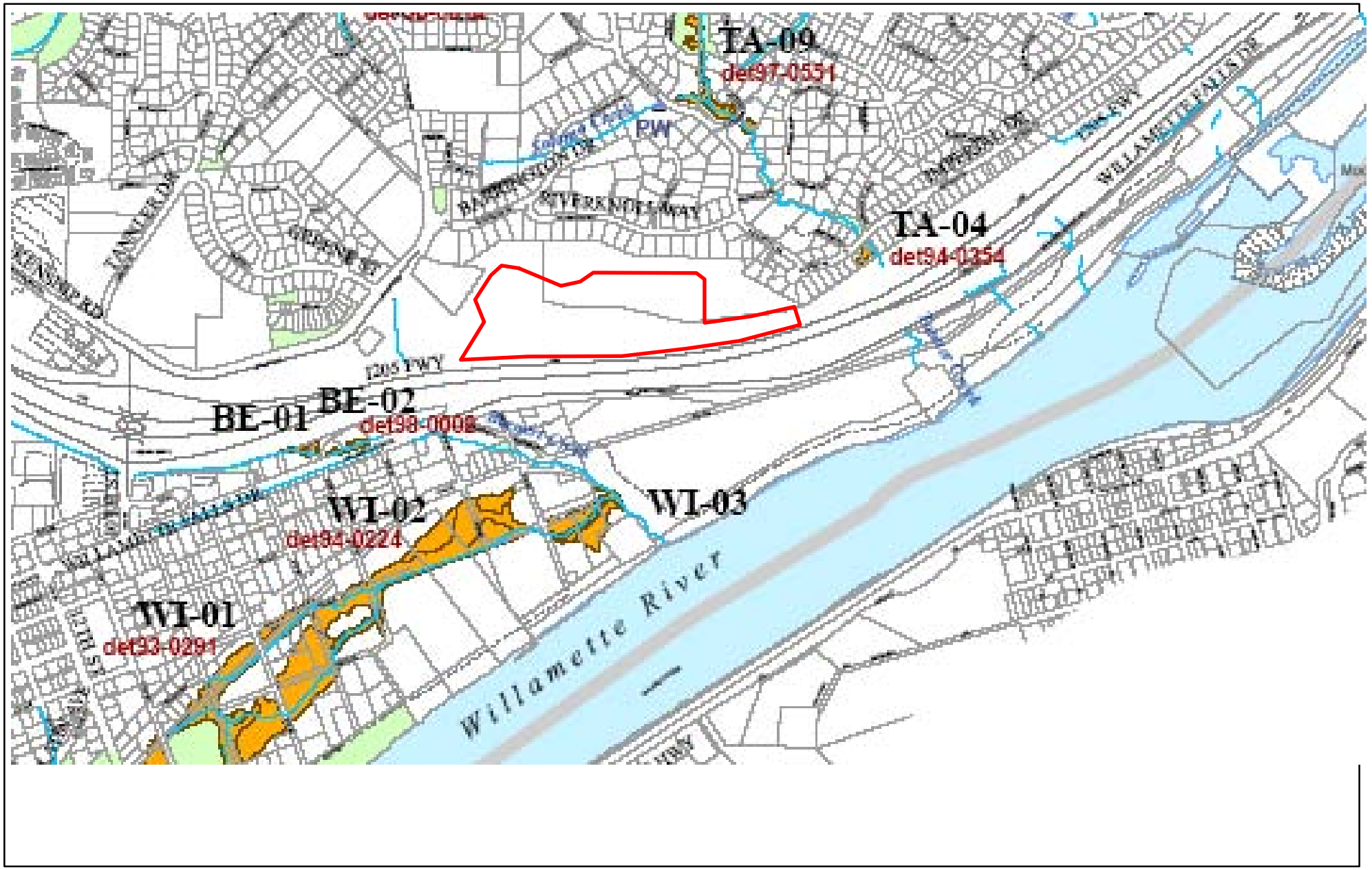
- Wetland delineation study area
- NWI Wetlands

490 245 0 490 Feet

N

FIGURE 5a.
National Wetlands Inventory (NWI) Map

VIGIL AGRIMIS
design professionals



Source: LWI data from West Linn's Goal 5 Wetland Inventory Map, 2005.

Legend

- Wetland delineation study area
- Locally Significant Wetlands, DSL 2005
- Other Wetlands, DSL 2005
- PW Possible Wetlands,DSL 2005

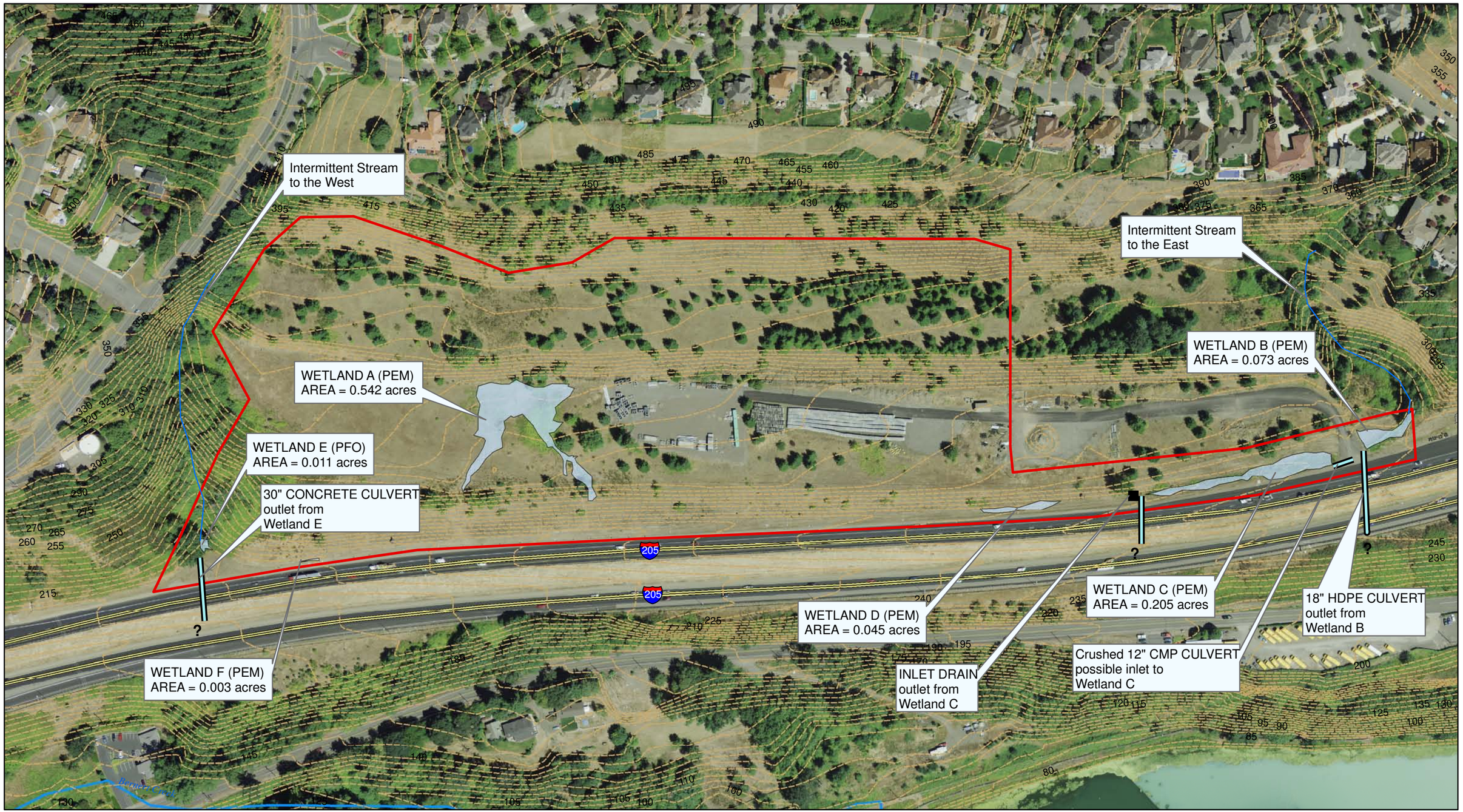
BE-01 Wetland ID code

det98-0002 DSL Delineation Numbers

940 470 0 940 Feet

FIGURE 5b.
Goal 5 Local Wetlands Mapping

VIGIL AGRIMIS
design professionals



Source: Roads & contours GIS data from METRO RLIS data
Aerial Imagery (2007) ODOT Provided

Legend

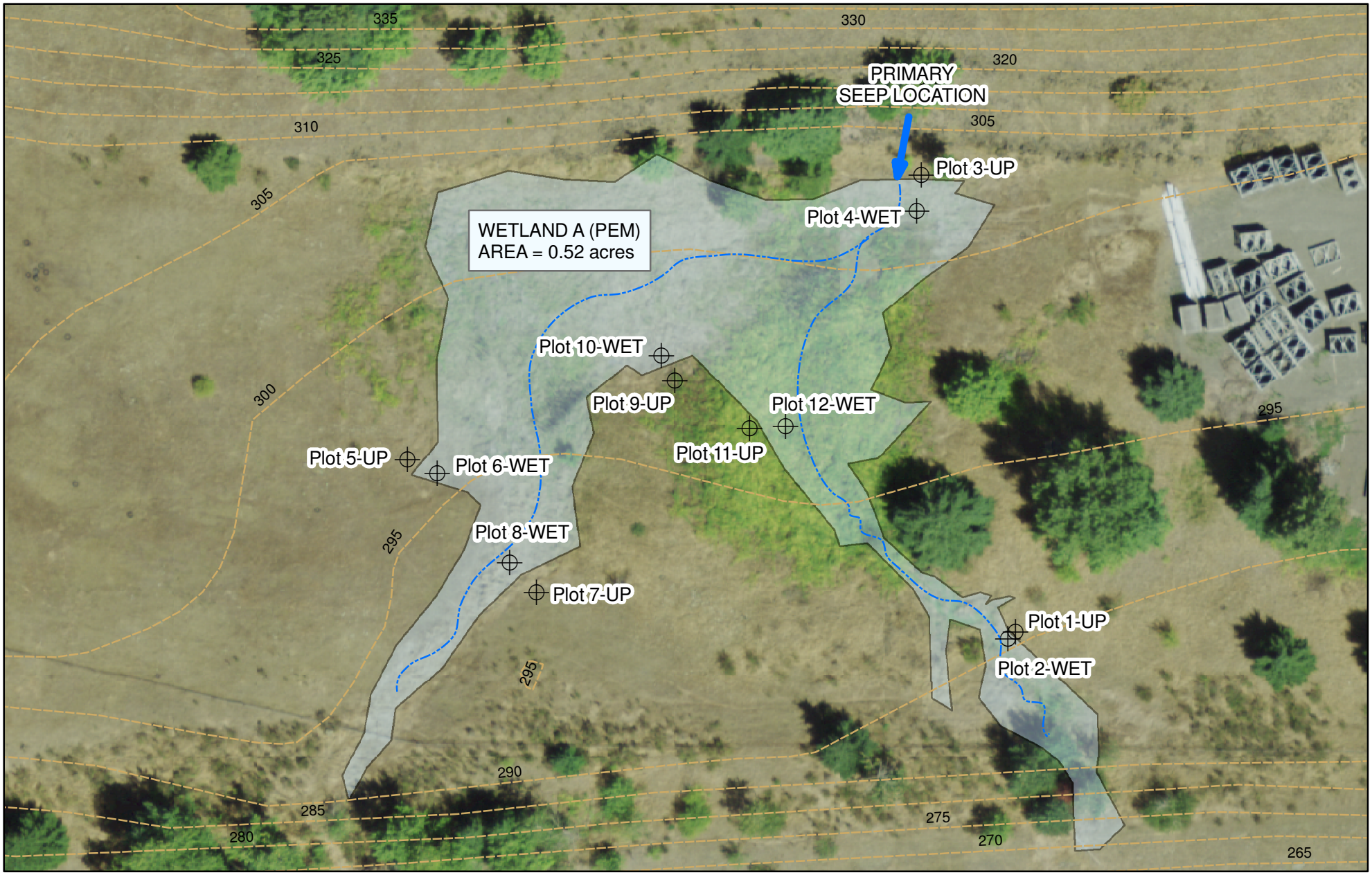
- Wetland delineation study area
- Wetland

200 100 0 200 Feet

N

FIGURE 6a.
Wetland Delineation Overview Map

VIGIL AGRIMIS
design professionals



Source: Roads & contours GIS data from METRO RLIS data
Aerial Imagery (2007) ODOT Provided

Legend

- Wetland delineation study area
- Wetland (Transparent to show aerial photo)
- Wetland Plot Location
- Approximate Flow Path

50 25 0 50 Feet

N

FIGURE 6b.
Wetland Delineation Enlargement Map

VIGIL AGRIMIS
design professionals