Appendix D

Wetland Delineation

October 2018
West Hills Land Development: Frog Pond Meadows Residential Development

Wetland Delineation Report

Prepared for West Hills Land Development

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ABBREVIATIONS

2010 Regional Supplement	*Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region*
Cowardin classification system	*Classification of Wetlands and Deepwater Habitats of the United States*
bgs	below ground surface
DP	Data Plot
DSL	Oregon Department of State Lands
FAC	Facultative
FACU	facultative upland
FACW	facultative wetland
HGM	Hydrogeomorphic
LWI	Local Wetlands Inventory
NGVD	National Geodetic Vertical Datum
NOL	not on list
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OAR	Oregon Administrative Rule
OBL	Obligate
Oregon HGM classification system	*Guidebook for Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Sites: Statewide Classification and Profiles*
PEM	palustrine emergent
PFO	palustrine forested
PHS	Pacific Habitat Services, Inc.
PSS	palustrine scrub-shrub
R5UBH	perennial riverine unconsolidated bottom, permanently flooded
UGB	urban growth boundary
UPL	upland
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
WETS	Natural Resources Conservation Service Climate Analysis for Wetlands

1 Introduction

Anchor QEA, LLC, was retained by West Hills Land Development to perform a routine-level wetland delineation for a proposed residential development site known as the Frog Pond Meadows Residential Development within the urban growth boundary of the City of Wilsonville, Clackamas County, Oregon (Figures 1 and 2). The study area consists of a 15.64-acre site that includes six properties—two West Linn/Wilsonville School District properties, two Eaton properties, the Community of Hope Church property, and the Kreilkamp property—located just outside the City limits but inside the Metro urban growth boundary (UGB) in the 181-acre Frog Pond West Neighborhood planning area (Figure 3). The Frog Pond West Neighborhood is part of the larger Frog Pond Area, a 500-acre planning area that includes future development areas that are both within the UGB and outside of the UGB in the urban reserve. These parcels are located in what is referred to as Area L in the July 2013 City of Wilsonville Community Plan Area (City of Wilsonville 2013), which is now part of the 181-acre Frog Pond West Neighborhood planning area described in the July 2017 *Frog Pond West Master Plan* (City of Wilsonville 2017).

Specific location information for the study area is as follows:

City/County/State:	Wilsonville, Clackamas County, Oregon
General Location:	Northwest of the intersection of SW Boeckman Road and SW Wilsonville/SW Stafford Road
Tax Lots:	31W12D01800 and portion of 31W12D02200 (West Linn/Wilsonville School District Properties)
	31W12D01902 and 31W12D01903 (Eaton Properties)
	Portion of 31W12D02000 (Community of Hope Church Property)
	Portion of 31W12D002201 (Kreilkamp Property)
Latitude/Longitude[1]:	45.320179° North/-122.745995° West
Public Land Survey System:	SE 1/4 of Section 12, Township 3 South, Range 1 West, Willamette Meridian
Street Address:	27657 SW Stafford Road (tax lot 31W12D01800)
	7035 SW Boeckman Road (tax lot 31W12D02200)
	27687 SW Stafford Road Stafford Road (tax lot 31W12D01902)
	27767 SW Stafford Road Stafford Road (tax lot 31W12D01903)
	27817 SW Stafford Road Stafford Road (tax lot 31W12D02000)
	6875 SW Boeckman Road (tax lot 31W12D002201)

Approximate Area:	10 acres (tax lot 31W12D01800)
	1.5 acres (tax lot 31W12D02200)
	0.94 acre (tax lot 31W12D01902)
	1.88 acres (tax lot 1W12D01903)
	0.68 acre (tax lot 31W12D02000)
	0.64 acre (tax lot 31W12D002201)
	Total Area: 15.64 acres
Zoning:	Tax lot 31W12D01800: Residential, medium lot single family (R-7), and small lot single family (R-5)
	Eastern portion of tax lot 31W12D02000: R-7
	Tax lots 31W12D01902 and 31W12D01903: R-5
	Eastern portion of tax lot 31W12D02000: Civic subdistrict (housing in Civic subdistrict is subject to the R-7 regulations)
	Portion of tax lot 31W12D002201: R-7
Waterways:	None on study area but Willow Creek, a tributary to the Willamette River, is adjacent to the site

Note:

1. Latitude and longitude shown are for the approximate centroid of the study area.

This wetland delineation report presents the results of wetland delineation field work performed for the study area on May 14, 15, and 16, 2018, with a follow up site visit on September 20. This report describes existing site conditions observed at the time of the field work, presents the methods used to complete the delineation, and describes each of the wetlands and other waters identified within the study area. Supporting information is provided in the attached figures (Figure 1 through 10 and 11a through 11d) and the following appendices:

- Appendix A: Plant Species Observed in the Frog Pond Meadows Study Area
- Appendix B: Historical Aerial Photographs
- Appendix C: Precipitation Data
- Appendix D: Site Photographs
- Appendix E: Wetland Determination Data Forms

2 Project Description

The study area is the proposed location of the Frog Pond Meadows residential development project, a 68-lot single-family detached home and four-lot duplex home residential development. The proposed development will include residential building lots, streets, pedestrian connections, utilities, landscaping, open space, and water quality facilities. The project has been designed to be consistent with the recently adopted *Frog Pond West Master Plan* (City of Wilsonville 2017). Access to the proposed development site would be provided from SW Stafford Road to the east and from future residential roadways to the north and south.

3 Study Area Description

3.1 Landscape Setting

The study area is situated in the Prairie Terraces subregion of the Willamette Valley ecoregion (Thorson et al. 2003). This subregion is characterized by level to undulating topography drained by low gradient, meandering streams and rivers; poorly drained soils derived from fluvial geologic deposits from the Missoula floods; and a mild climate with cool, wet winters, warm, dry summers, and a mean annual precipitation of 40 to 50 inches (Watershed Professionals Network 1999). Hydrologically, the study area is located in the Coffee Lake Creek watershed (hydrologic unit code 170900070402) of the Willamette River basin (USGS 2017a).

3.2 Study Area Location

The 15.64-acre study area is located on tax lots 31W12D01800 (1800), 31W12D01902 (1902), and 31W12D01903 (1903) and portions of tax lots 31W12D02200 (2200), 31W12D02000 (2000), and 31W12D002201 (2201) in Wilsonville, Clackamas County, Oregon (Figures 1 and 2). The study area is in the Frog Pond West Neighborhood of the Frog Pond West Master planning area, a 181-acre area added to the UGB in 2002, located west of SW Stafford Road and north of SW Boeckman Road in East Wilsonville (Figure 3).

3.3 Study Area Conditions and Land Use

The current conditions of the study area are depicted in the 2017 aerial photograph provided in Figure 4. The predominant land use and existing structures for each of the properties and parcels contained within the study area are briefly described in the following sections:

- **West Linn/Wilsonville School District Property (tax lot 1800)** – This property consists of an agricultural field with narrow bands of scrub-shrub vegetation along the western, eastern, and southern boundaries and a small tree grove along the northeastern boundary that extends off site to the north. In the southeast portion of the tax lot, a small shed and gravel road are present and surrounded by primarily non-native tree, scrub-shrub, and herbaceous vegetation. At the time of the May 2018 site visits, the agricultural field was being used to grow hay; at the time of the September site visit, the field had been recently cut and baled. Based on observations of clay tile shards found on the soil surface in this field, drainage tile is likely present throughout much of this property.
- **West Linn/Wilsonville School District Property (eastern portion of tax lot 2200)** – This parcel consists of a 1.5-acre area on the eastern end of tax lot 2200. It is undeveloped and dominated by forested, scrub-shrub, and herbaceous vegetation. The western portion of the

parcel includes a riparian corridor associated with a linear section of Willow Creek that flows from north to south across the off-site portion of tax lot 2200. At the time of the May 2018 site visits, the riparian corridor contained a dense mixture of predominantly herbaceous and scrub-shrub vegetation interspersed with forested components. Vegetation in the eastern portion of the parcel was predominantly forested with a more open understory. At the time of the September 2018 site visit, the majority of the understory throughout the parcel had been cleared to remove nuisance scrub-shrub vegetation to facilitate a tree survey, leaving behind only herbaceous vegetation and woody species with a 6-inch-or-greater diameter at breast height. This clearing work was approved by the City of Wilsonville on August 23, 2018 (Rappold 2018).

- **Eaton Property (tax lot 1902)** – This property contains a rural residence and associated landscaping with scattered trees and shrubs. The majority of the property is dominated by herbaceous vegetation.
- **Eaton Property (tax lot 1903)** – This property contains a rural residence and associated landscaping with scattered trees and shrubs. The majority of the property is dominated by herbaceous vegetation.
- **Community of Hope Church Property (portion of tax lot 2000)** – This parcel consists of a 0.68-acre portion of tax lot 2000. It contains two buildings and a gravel road/driveway that connects to the adjacent parking lot of the Community of Hope Church to the east. Vegetation on this parcel includes a mix of herbaceous, scrub-shrub, and forested vegetation.
- **Kreilkamp Property (portion of tax lot 2201)** – This parcel consists of a 0.64-acre portion of tax lot 2201 that was previously included in the study area for the adjacent Stafford Meadows residential development site, which is currently under construction[1]. It includes a gravel driveway that previously provided access to the former Kreilkamp residence. At the time of the May 2018 site visit, vegetation in this area included a mix of trees, scattered shrubs, and herbaceous vegetation. By the September 2018 site visit, nearly all of this vegetation had been cleared as part of the Stafford Meadows construction work.

Access to each of these properties is currently provided by two private driveways and an unimproved gravel road off SW Stafford Road.

3.4 Topography and On-Site Drainage

Topography in the study area predominantly slopes gently to the southwest toward Willow Creek (Figure 5). According to the U.S. Geological Survey's (USGS's) 7.5-minute series (topographic) quadrangle maps for Canby and Sherwood, Oregon, general elevations in the study area range from

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[1] The entire Kreilkamp Property (tax lot 2201) was previously delineated during the Stafford Meadows project and is addressed in the March 2018 *Wetland Delineation Report*: *West Hills Land Development Stafford Meadows Residential Development* (Anchor QEA 2018), which was approved by the Oregon Department of State Lands (DSL) on May 9, 2018 (WD No. 2018-01206).

approximately 240 feet National Geodetic Vertical Datum (NGVD) in the northern portion of tax lot 1800 to approximately 220 feet NGVD in the southwest portion of tax lot 2200 (Figure 5; USGS 2017b). The far eastern portion of the site slopes gently to the southeast toward a roadside ditch along SW Stafford Road. Elevations in that portion of the site range from approximately 235 feet NGVD to approximately 230 feet NGVD. Surrounding topography is also generally flat, with elevations gradually sloping from northeast to southwest. A more detailed topographic survey with a 2-foot contour interval was conducted by Otak, Inc., and is shown in Figure 10 and Figures 11a through 11d. That survey shows the lowest elevation as being around 218 feet NGVD in the southwest portion of the study area adjacent to off-site Willow Creek. The highest elevation on the site is 240 feet NGVD along the northern boundary of tax lot 1800.

The majority of the study area drains to Willow Creek, which flows from north to south across tax lots 1500, 2200, and 2202 (Figure 2), crosses under SW Boeckman Road through a pair of 18-inch diameter culverts and discharges to an unnamed tributary to Meridian Creek that eventually drains to the Willamette River approximately 1.3 miles south of the study area. A portion of tax lots 1800, 1902, and 1903 drain toward an off-site roadside ditch that runs within the western right-of-way of SW Stafford Road. That ditch flows toward the south and eventually discharges to a different unnamed tributary to Meridian Creek on the south side of SW Boeckman/SW Advance Road that also eventually drains into the Willamette River.

3.5 Vegetation

The study area contains a mix of forested, scrub-shrub, and herbaceous vegetation including a variety of native, introduced, and invasive species. Most of the study area properties are dominated by herbaceous vegetation in the form of agricultural fields or maintained lawns; a few forested areas are also present. A summary of the plant species observed in the study area during the site visits is provided in Appendix A, including their individual wetland indicator status according to the *National Wetland Plant List: 2016 Wetland Ratings* (Lichvar et al. 2016) and native status determined using the U.S. Department of Agriculture online PLANTS database (USDA 2018). Invasive status is also listed as determined using the Clackamas County Weed List from Clackamas Soil and Water Conservation District (Clackamas SWCD 2018). The following sections provide a brief description of the common vegetation observed on each of the site properties at the time of the site visits.

3.5.1 Common Vegetation on Tax Lot 1800

At the time of the May 2018 site visits, the dominant vegetation in the agricultural field included various species of fescue (*Festuca* spp.), bentgrass (*Agrostis* spp.), and bluegrass (*Poa* spp.), along with meadow foxtail (*Alopecurus pratensis*), common velvetgrass (*Holcus lanatus*), sweet vernal grass (*Anthoxanthum odoratum*), toad rush (*Juncus bufonius*), black medick (*Medicago lupulina*), and field clover (*Trifolium campestre*). The narrow bands of scrub-shrub vegetation along the property boundaries were dominated by wild rose (*Rosa* spp.), Douglas' spirea (*Spiraea douglasii*), Himalayan blackberry (*Rubus armeniacus*), and common hawthorn (*Crataegus monogyna*). The forested patch along the northeastern boundary was dominated by Oregon white oak (*Quercus garryana*) with some Himalayan blackberry and other various herbaceous vegetation in the understory. Common vegetation in the southeastern portion of the property included a Scots pine (*Pinus sylvestris*), a Colorado blue spruce (*Picea pungens*), a few linden trees (*Tilia* spp.), cultivated apple trees (*Malus* spp.), Himalayan blackberry, and various herbaceous vegetation. At the time of the September 2018 site visit, the agricultural field had been cut and bailed and regrowth of many of the species observed during the May 2018 visits was occurring.

3.5.2 Common Vegetation on Eastern Portion of Tax Lot 2200

At the time of the May 2018 site visits, common herbaceous vegetation present in the eastern riparian area of off-site Willow Creek includes coastal hedge-nettle (*Stachys chamissonis* var. *cooleyae*), small-fruited bulrush (*Scirpus microcarpus*), slough sedge (*Carex obnupta*), Dewey sedge (*Carex deweyana*), fringed willowherb (*Epilobium ciliatum*), and various grasses. Common shrubs, saplings, and trees in the riparian zone included wild rose, Douglas' spirea, Himalayan blackberry, willow species (*Salix* spp.), cultivated apple trees, western red cedar (*Thuja plicata*), and Oregon white oak. The forested patch was dominated by Douglas fir (*Pseudotsuga menziesii*), along with ponderosa pine (*Pinus ponderosa*), Norway spruce (*Picea abies*), and bitter cherry (*Prunus emarginata*) in the tree layer, with a sparse scrub-shrub understory dominated by beaked hazelnut (*Corylus cornuta*), Pacific rhododendron (*Rhododendron macrophyllum*), Himalayan blackberry, trailing blackberry (*Rubus ursinus*), and Pacific poison oak (*Toxicodendron diversilobum*). At the time of the September 2018 site visit, herbaceous vegetation and only woody species with 6 inches or greater diameter at breast height were observed following the understory clearing work authorized by the City of Wilsonville in August 2018 (Rappold 2018).

3.5.3 Common Vegetation on Tax Lot 1902

At the time of the May 2018 site visits, the dominant herbaceous vegetation included various species of fescue, bentgrass, and bluegrass, along with meadow foxtail, common velvetgrass, sweet vernal grass, toad rush, creeping buttercup (*Ranunculus repens*), black medick, hairy cat's ear (*Hypochaeris radicata*), and other various grasses and forbs. Beaked hazelnut, common hawthorn, wild rose, Himalayan blackberry, and red pine (*Pinus resinosa*) were present in the shrub and tree layers.

3.5.4 Common Vegetation on Tax Lot 1903

At the time of the May 2018 site visits, the dominant herbaceous vegetation included various species of fescue, bentgrass, and bluegrass, along with meadow foxtail, common velvetgrass, sweet vernal grass, toad rush, creeping buttercup, black medick, hairy cat's ear, and other various grasses and forbs. Common hawthorn, wild rose, Himalayan blackberry, red pine, and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) were present in the shrub and tree layers.

3.5.5 Common Vegetation on Eastern Portion of Tax Lot 2000

At the time of the May 2018 site visits, the dominant herbaceous vegetation included various species of fescue, bentgrass, and bluegrass, along with meadow foxtail, common velvetgrass, sweet vernal grass, English plantain (*Plantago lanceolata*), common dandelion (*Taraxacum officinale*), hairy cat's ear, and other various grasses and forbs. Himalayan blackberry, black cottonwood, and Douglas fir were present in the shrub and tree layers.

3.5.6 Common Vegetation on Western and Northern Portion of Tax Lot 2201

Although tax lot 2201 was vegetated at the time of the May 2018 sites visit, by the time of the September 2018 site visit, construction of the Stafford Meadows residential development project had commenced and most of the existing vegetation had been removed.

4 Existing Data Review

Potential wetlands and other non-wetland waters were identified in the study area prior to field work using the following sources:

- *US Topo 7.5-Minute Maps for Canby and Sherwood Quadrangles, Clackamas County, Oregon* (USGS 2017b; Figure 5)
- *National Wetlands Inventory (NWI) Wetlands Mapper* (USFWS 2017; Figure 6)
- *City of Wilsonville Local Wetlands and Riparian Corridor Inventory* (FES 1999; Figure 7)[2]
- *Wetland Inventory Results – Natural Resources Inventory for Frog Pond and Advance Road Urban Growth Areas in Wilsonville* (PHS 2014; Figure 8)
- *Web Soil Survey* (NRCS 2018a; Figure 9)
- Historical aerial photographs from the U.S. Army Corps of Engineers (USACE) and Google Earth Pro's Satellite Imagery's Timeline Function (Appendix B)

4.1 Existing Data Review

4.1.1 U.S. Geological Survey Canby and Sherwood Quadrangles

The USGS 7.5-minute geological quadrangle maps for Canby and Sherwood, Oregon (Figure 5), show a stream adjacent to the study area's western boundary and topography generally sloping from

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[2] The study area is not included in any currently approved or pending local wetlands inventories.

northeast to southwest across the western half of the study area and from north to south across the eastern half of the study area.

4.1.2 National Wetlands Inventory

The U.S. Fish and Wildlife Service's online NWI Wetlands Mapper indicates one mapped NWI wetland off site but adjacent to the western boundary of the study area. This wetland consists of an unnamed perennial riverine unconsolidated bottom, permanently flooded water (R5UBH) wetland (Figure 6). The location of the R5UBH wetland coincides with the location of the Willow Creek channel.

4.1.3 Local Wetlands Inventory

The study area was not included in the survey area for the 1999 Local Wetland Inventory (LWI) that was prepared for the City of Wilsonville by Fishman Environmental Services (FES 1999); however, off site to the south of the study area, Willow Creek is shown on the LWI but is identified as a tributary to Meridian Creek (Figure 7). That stream segment receives water from the study area and is identified as "R2.15," which is described in the LWI as a relatively narrow, shallow intermittent stream that is bordered by upland vegetation.

4.1.4 Pacific Habitat Services Wetland Inventory

Potential wetlands and other waters were inventoried in the Frog Pond Area by Pacific Habitat Services, Inc. (PHS), in April 2014 as part of a natural resources inventory for the Frog Pond and Advance Road Urban Growth Areas (PHS 2014). The PHS study was based on a combination of off- and on-site wetland determination methods and did not involve formal wetland delineation of any properties on the study area (i.e., no wetland boundaries were established, and no formal wetland delineation data was collected in the field). On-site determinations were only conducted on sites where property access permission had been granted and where property owner contact information had been provided. Wetland mapping was completed by drawing the approximated wetland boundaries on an aerial photograph of the inventory area using GIS.

Wetland and other waters mapped on the study area by PHS include a narrow strip of wetland along off-site Willow Creek that is shown as connecting to a much larger, mostly agricultural wetland that extends across tax lot 1800 and a portion of tax lot 1902 (Wetland 5; Figure 8). That wetland also extends onto portions of tax lots 1500, 1700, and 2201. Collectively, those areas and the off-site wetland are estimated to be approximately 13.22 acres in size.

4.1.5 Soil Survey Information

The Natural Resources Conservation Service (NRCS) online Web Soil Survey maps four soil types within the study area (Figure 9): Aloha silt loam, 0% to 3% slopes; Aloha silt loam, 3% to 6% slopes; Concord silt loam; and Huberly silt loam (NRCS 2018a). Table 1 summarizes the soil mapping information for the study area. Of these soil types, Concord silt loam and Huberly silt loam are classified as hydric soils. The remaining soil types in the study area are considered non-hydric but are known to contain potential inclusions of hydric soils in low areas and swales.

Table 1
Soils Mapped on the Study Area by Natural Resources Conservation Service Web Soil Survey

Map Unit	Soil Type Name	Drainage Class	Hydrologic Soil Group[1]	Hydric Rating	Hydric Inclusions[2]	Acres
1A	Aloha silt loam, 0 to 3% slopes	Somewhat poorly drained	C/D	5	Yes	12.54
1B	Aloha silt loam, 3 to 6% slopes	Somewhat poorly drained	C/D	5	Yes	0.13
21	Concord silt loam	Poorly drained	C/D	93	Yes	2.15
41	Huberly silt loam	Poorly drained	C/D	92	Yes	0.82

Notes:

1. Hydrologic soil groups are based on runoff potential according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.
    i. Group C soils have slow infiltration rates when thoroughly wet, caused by either an underlying layer that impedes the downward movement of water or soils of moderately fine or fine texture.
    ii. Group D soils have a very slow infiltration rate (high runoff potential) when thoroughly wet and include soils consisting of clays with high shrink-swell potential, soils that have a high water table, soils that have a clay or claypan layer at or near the surface, and soils that are shallow over nearly impervious material.
2. Non-hydric soils may have inclusions of hydric soil (Huberly and Dayton) in the lower positions on the landform.

4.1.6 Historical Aerial Photographs

A series of historical aerial photographs (Appendix B) obtained from USACE Portland District (1936, 1953, 1976, 1983, and 1996) and Google Earth Pro (2004, 2008, 2012, and 2016) were examined to determine previous land use and site alterations in the study area. These images were also examined for evidence of wetlands and other waters in the study area and on adjacent properties. The information obtained from these photographs is described as part of the site alterations discussion presented in the following section.

5 Site Alterations

According to the 1851 Historic Oregon Land Use and Land Cover data provided on the Oregon Explorer – Map Viewer (OSU 2018a), the study area was historically occupied by oak woodlands dominated by Oregon white oak that may have also included ponderosa pine, California black oak (*Quercus kelloggii*), Douglas fir, and canyon live oak (*Quercus chrysolepis*), with a relatively open understory of shrubs, grasses, and wildflowers. The Oregon Statewide Composite Historical Vegetation map (OSU 2018b) shows the study area historically located within an oak-conifer savanna. The majority of this cover type was cleared in the late 1800s to early 1900s and replaced by agricultural uses, including row crops, pastures, orchards, and other types of farms. Drainage tile was often installed in many fields to remove excess soil moisture.

Historical aerial photographs indicate that by 1936, most of the study area and much of the surrounding lands had been cleared and were being used for agricultural purposes (e.g., row crops, pasture, or orchards) and rural residences (Appendix B, Photograph B1). In 1936, tax lots 1902, 1903, 2000, 2200, 2201, and off-site tax lots 2001, 2100, and 2202 to the south, all appear to be part of one larger farm with the farmhouse located near the center of current tax lots 1902 and 1903 and a collection of barns and outbuildings located in the western portion of current tax lot 2000. Tax lot 1800 is occupied by a separate farm with the home and associated farm buildings located in the eastern portion. Except for a small grove of larger trees located in the northeastern portion of tax lot 1800, the remaining portions of those properties are being used to grow row crops. On-site drainage features visible on the 1936 aerial include Willow Creek in the same location and linear configuration that it is in the present day, and a potential agricultural ditch that extends from northeast to southwest across tax lots 2201 and 2202 and appears to drain to Willow Creek. Given the modified nature of these drainage features, it is likely that drainage tile had also been installed in many of these fields by this time. An off-site drainage pattern that extends from northwest to southeast is also visible in the field on the opposite side of SW Stafford Road from tax lots 1800, 1902, and 1903. Two branches of a larger creek are clearly visible on the south side of SW Boeckman Road/SW Advance Road. The western branch receives flow from Willow Creek; the eastern branch appears to receive flow from the off-site agricultural drainage noted to the east of tax lots 1800, 1902, and 1903.

As shown on the 1953 aerial photograph (Appendix B, Photograph B2), the larger farm has been broken up into multiple fields and orchards have replaced the row crops on tax lots 1902, 1903, and 2000. Land use on the other properties remains much the same as that observed on the 1936 aerial photograph. Willow Creek remains apparent on the 1953 aerial image and an area of darker soil is also visible along the agricultural ditch on tax lot 2201, possibly indicating soil wetness. Off-site drainage patterns in the areas to the east and south remain similar to those shown on the 1936 aerial photograph.

The 1976 aerial photograph (Appendix A, Photograph B3) shows that tax lots 1902, 1903, 2000, 2001, 2100, and 2202 have been divided into separate parcels. Homes have been constructed on the eastern portions of tax lots 1902 and 1903 and on off-site tax lots 2000 and 2100. Orchards remain present on the western portions of tax lots 1902 and 1903, and agricultural land use on the other properties within the study area appears the same as observed on the 1953 aerial photograph. Willow Creek is visible, but the agricultural ditch previously noted on the 1936 and 1953 aerial photographs is not apparent. Off-site drainage patterns remain similar to those shown on the 1936 and 1953 aerial photographs. Surrounding land use shows signs of changes, especially on the south side of SW Boeckman Road where some of the former agricultural lands have been subdivided into smaller rural residential parcels.

By 1983, the current configuration of tax lots in the study area and surrounding areas appears to have become established (Appendix B, Photograph B4). Cultivation on tax lot 2201 has ceased and a home constructed in its north-central portion. Areas of trees, likely planted, have developed along the northern and western boundaries of tax lot 2201 and along the eastern end of tax lot 2200. Land use on the other properties within the study area remains much the same as observed on the 1976 aerial photograph. Willow Creek is again visible, but there are no indications of the former agricultural ditch. Off-site drainage patterns remain similar to those shown on the previous aerial photographs.

The 1996 aerial photograph (Appendix B, Photograph B5) shows additional buildings were constructed on both tax lots 2000 and 2201 between 1983 and 1996. The forested areas along the eastern end of tax lot 2200 and southwestern portion of tax lot 2201 have expanded in extent and become denser. Land use on the other parcels within the study area remains much the same as the previous years. Willow Creek appears the same as on the previous photographs; however, there are no indications of the former agricultural ditch observed on older aerial images. The off-site field to the east of SW Stafford Road appears to have been left fallow. The agricultural drainage patterns previously observed in that field remain present but are not as visible as in past years. The 1996 aerial photograph also shows that by this time, the southern portion of SW Stafford Road had been widened and realigned to its current configuration as SW Wilsonville Road. The road network for a higher density residential development had also been constructed around this new road on the south side of SW Boeckman Road/SW Advance Road.

Between 1996 and 2004, major land use changes in the study area include the demolition of all buildings on tax lot 1800 and the construction of the church, parking lot, and gravel access road on tax lot 2000 (Appendix B, Photograph B6). The orchard on tax lots 1902 and 1903 is pretty much gone aside from a few remnant trees. The forested areas along the eastern end of tax lot 2200 and southwestern portion of tax lot 2201 have expanded and a few areas of woody vegetation have developed within Willow Creek. Off site to the south, most of the previous agricultural land and rural residential areas have been replaced by high-density residential development.

As shown on the aerial photographs from 2008, 2012, and 2016 (Appendix B, Photographs B7, B8, and B9), there have been little to no changes in land use in the study area since 2004. At some point between 2004 and 2008, the outbuilding on tax lot 2201 was torn down, and between 2012 and 2016, an outbuilding on tax lot 2000 was removed. Other notable changes include varying planting configuration with the field on tax lot 1800.

6 Precipitation Data and Analysis

To provide additional information on the hydrologic conditions of the study area, precipitation data were acquired from the National Weather Service's Portland, Oregon, weather station (NWS 2018; Appendix C) for the day of, 1 day prior, and 2 weeks prior to each site visit (Table 2). Table 3 shows the percent of normal rainfall received for the water year (October 1 to September 30) at the Portland, Oregon, weather station during the site visits (NWS 2018). Table 4 provides a determination of whether the precipitation recorded for the 5 months preceding each of the site visits is within the 30th to 70th percentile normal range listed in the NRCS Climate Analysis for Wetlands (WETS) Table for WETS Station N WILLAMETTE EXP STN, weather probability analysis (NRCS 2017b; Appendix C).

Table 2
Precipitation Data for the Study Area Site Visits

Date of Site Visit	Actual Precipitation on Day of Visit (inches)[1]	Actual Precipitation 1 Day Prior to Visit (inches)[1]	Actual Precipitation 2 Weeks Prior to Visit (inches)[1]
5/14/2018	0.00	0.00	0.17
5/15/2018	0.00	0.00	0.15
5/16/2018	0.00	0.00	0.15
9/20/2018	0.00	0.00	3.1

Note:

1. Precipitation data obtained from the National Weather Service's Portland, Oregon, weather station (NWS 2018; Appendix C).

Table 3
Percent of Normal Rainfall for the Water Year for the Study Area Site Visit

Date of Site Visit	Actual Precipitation Since October 1 of Previous Year (inches)[1]	Normal Value for Water Year (inches)[1]	Departure from Normal (inches)	Percent of Normal
5/14/2018	27.31	30.16	-2.85	91
5/15/2018	27.31	30.24	-2.93	90
5/16/2018	27.31	30.31	-3.00	90
9/20/2018	29.99	35.43	-5.44	85

Note:

1. Precipitation data for the water year obtained from the National Weather Service's Portland, Oregon, weather station (NWS 2018; Appendix C).

Table 4
Monthly Percent of Normal Precipitation for the 5 Months Prior to Study Area Site Visit

Month	Actual Monthly Precipitation (inches)[1]	30th to 70th Percentile Normal Range (inches)[2]	Within 30th to 70th Percentile Normal Range
December 2017	3.09	4.09 to 7.76	No, Below Normal
January 2018	5.36	3.97 to 7.11	Yes
February 2018	1.86	3.90 to 6.13	No, Below Normal
March 2018	2.50	3.30 to 4.96	No, Below Normal
April 2018	3.34	2.15 to 3.93	Yes
May 2018	0.15	1.64 to 3.00	No, Below Normal
June 2018	1.03	1.05 to 2.18	No, Slightly Below Normal
July 2018	0.02	0.24 to 0.85	No, Below Normal
August 2018	0.06	0.22 to 0.93	No, Below Normal

Notes:

1. Precipitation data obtained from the National Weather Service's Portland, Oregon, weather station (NWS 2018; Appendix C).
2. Precipitation data obtained from the WETS Table for the Clackamas County, Oregon, WETS Station N WILLAMETTE EXP STN (NRCS 2017b).

At the time of the May and September 2018 site visits, precipitation was slightly below normal for the water year (Table 3). Monthly rainfall recorded during the 5 months preceding the May 2018 site visits was either within or below the 30th to 70th percentile normal range for the area (Table 4). Monthly rainfall recorded during the 5 months preceding the September 2018 site visit was below the normal range.

As indicated, the majority of the wetland delineation site visits occurred during periods of below normal precipitation with only two visits occurring during periods of normal rainfall conditions. Overall, the conditions observed in the field are indicative of a drier year with which Anchor QEA wetland scientists have prior experience. The lack of normal precipitation did not hinder the identification of wetland hydrology indicators during the delineation.

7 Delineation Methods

Anchor QEA wetland scientists performed wetland delineation field work on May 14, 15, and 16, 2018, and September 20, 2018. Field work was conducted according to methods presented in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (2010 Regional Supplement; USACE 2010), *Field Indicators of Hydric Soils in the United States A Guide for Identifying and Delineating Hydric Soils, Version 8.1, 2017* (USDA and NRCS 2016), and Oregon Administrative Rules (OARs) 141-090-0005 to 141-090-0055. Plant indicator status was determined using the 2016 National Wetland Plant List: 2016 Wetland Ratings (Lichvar et al. 2016).

8 Wetlands and Non-Wetland Other Waters

During the delineation, Anchor QEA wetland scientists delineated six wetlands (Wetlands A through F) within the study area and one other water (Willow Creek) just outside of the study area (Figures 10 and 11a through 11d). These areas are summarized in Table 5 and described in more detail in the following subsections. Site photographs showing these features are included in Appendix D. Wetland determination data forms are provided in Appendix E.

Table 5
Potential Wetlands and Non-Wetland Other Waters Delineated within the Study Area

		Classification		On-Site Area	
Wetlands	**Description**	**Cowardin[1]**	**Oregon Hydrogeomorphic[2]**	**Square Feet**	**Acres**
Wetland A	Forested/ herbaceous riparian wetland	PFO/PEM	Slope	3,282	0.075
Wetland B	Herbaceous wetland	PEM	Slope	65	0.002
Wetland C	Herbaceous wetland	PEM	Slope	961	0.022
Wetland D	Herbaceous wetland with minor scrub-shrub component	PSS/PEM	Slope	9,133	0.210
Wetland E	Herbaceous wetland with minor scrub-shrub component	PSS/PEM	Slope	22,328	0.513
Wetland F	Herbaceous wetland	PEM	Slope	996	0.023
			Total Area of Wetlands	**36,765**	**0.845**

Note:

1. Cowardin classification system (Cowardin et al. 1979) wetland codes: palustrine emergent (PEM), palustrine forested (PFO), and palustrine scrub-shrub (PSS)

8.1 Wetlands

8.1.1 Wetland A

Wetland A is a 3,282-square-foot (0.075-acre) riparian wetland located along the western boundary of tax lot 2200 and adjacent to the eastern boundary of off-site Willow Creek (Figures 10 and 11a). Wetland A continues off site to the south and north. Wetland A is classified as a palustrine forested (PFO), palustrine emergent (PEM) wetland under the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin classification system; Cowardin et al. 1979) and as a slope wetland under the *Guidebook for Hydrogeomorphic (HGM)-Based Assessment of Oregon Wetland and Riparian Sites: Statewide Classification and Profiles* (Oregon HGM classification system; Adamus 2001).

The vegetation, soils, and hydrology of Wetland A are described in the following subsections. Wetland determination data forms are included in Appendix E.

8.1.1.1 Vegetation

During the May 2018 delineation field work, Wetland A was dominated by tall fescue (*Schedonorus arundinaceus*; facultative [FAC]), common velvetgrass (FAC), meadow foxtail (FAC), and reed canarygrass (*Phalaris arundinacea*; facultative wetland [FACW]) in the herbaceous layer, with Dewey sedge (FAC), slough sedge (obligate [OBL]), small-fruited bulrush (OBL), fringed willowherb (FACW), and sweet vernal grass (facultative upland [FACU]) also present to a lesser extent. In the shrub layer, Douglas' spirea (FACW), wild rose (upland [UPL] to FAC), common hawthorn (FAC), and Oregon ash (*Fraxinus latifolia*; FACW) saplings were present. In the tree layer, Pacific willow (*Salix lasiandra*; FACW), Scouler's willow (*Salix scouleriana*; FAC), western red cedar (FAC), and Lombardy poplar (*Populus nigra* L.; not on list [NOL]) were present. During the September 2018 site visit, only herbaceous and forested vegetation was present. All other vegetation (mainly shrubs and trees less than 6-inches diameter at breast height) had been cleared from the understory to better facilitate the tree survey.

8.1.1.2 Soils

Soils in Wetland A are mapped as Concord silt loam, a soil type that is classified as hydric (Figure 9). Upon inspection, the predominant texture was confirmed to be silt loam.

8.1.1.2.1 Data Plot 01A

Data Plot 01A (DP-01A) is located along the off-site southwestern boundary of Wetland A (Figures 10 and 11a). Two distinct layers were observed in the soil profile, with the uppermost layer extending to 4 inches below ground surface (bgs) and the second layer extending from 4 to 16 inches bgs. The matrix color observed in the upper layer was 10YR 3/2 (very dark grayish brown) with 2% and 3% 7.5YR 5/6 (strong brown) redoximorphic concentrations along pore linings (i.e., oxidized rhizospheres along living roots) and in the matrix, respectively. The second layer exhibited the same matrix color but had 2% and 10% 7.5YR 5/6 (strong brown) redoximorphic concentrations along pore linings and in the matrix, and 5% 5YR 3/4 (dark reddish brown) redoximorphic concentrations in the matrix. The soil sample met the Depleted Matrix (F3) and Redox Dark Surface (F6) hydric soil indicators, satisfying the hydric soil criteria of the 2010 Regional Supplement and *Field Indicators of Hydric Soils in the United States, Version 8.1, 2017* (USDA and NRCS 2016).

8.1.1.2.2 Data Plot 03A

DP-03A is located along the northeastern boundary of Wetland A (Figures 10 and 11a). Four distinct layers were noted in the soil profile, with the uppermost layer extending to 3 inches bgs, the second layer extending from 3 to 6 inches bgs, the third layer extending from 6 to 12 inches bgs, and the fourth layer extending from 12 to 16 inches bgs. The matrix color observed in the upper layer was 10YR 3/2 (very dark grayish brown) with no evidence of redoximorphic concentrations. The second layer exhibited the same matrix color but had 5% 7.5YR 5/6 (strong brown) redoximorphic concentrations in the matrix. The third layer also had the same color matrix but included 5% 5YR 5/6 (yellowish red) redoximorphic concentrations along pore linings and 10% 7.5YR 5/6 (strong brown) redoximorphic concentrations in the matrix. The fourth layer exhibited a mixed matrix of 30% 10YR 5/1 (gray) and 40% 10YR 4/2 (dark grayish brown) with 30% 7.5YR 5/6 (strong brown) redoximorphic concentrations in the matrix. The DP-03A soil sample met the Redox Dark Surface (F6) hydric soil indicator, satisfying the hydric soil criteria of the 2010 Regional Supplement and *Field Indicators of Hydric Soils in the United States, Version 8.1, 2017* (USDA and NRCS 2016).

8.1.1.3 Hydrology

Within Wetland A, wetland hydrology was confirmed by the presence of oxidized rhizospheres along living roots (Primary Wetland Hydrology Indicator C3), its geomorphic position adjacent to a stream channel (Secondary Wetland Hydrology Indicator D2), and the presence of raised ant mounds (Secondary Wetland Hydrology Indicator D6). The water regime of Wetland A was determined to be seasonally saturated, with overland flow, seasonal high water table, direct precipitation, and overbank flows from Willow Creek during storm events being the primary hydrologic sources.

8.1.1.4 Boundary Determination

The wetland/upland boundary of Wetland A was determined by a slight change in topography and the presence/absence of oxidized rhizospheres along living roots (wetland hydrology indicator).

8.1.2 Wetland B

Wetland B is a 65-square-foot (0.002-acre) herbaceous wetland located in the northwestern portion of the agricultural field on tax lot 1800 (Figures 10 and 11b). It continues off site to the northwest into the adjacent fallow agricultural field and may connect to a larger wetland that is adjacent to the upstream section of Willow Creek. Wetland B is classified as a PEM wetland under the Cowardin classification system (Cowardin et al. 1979) and as a slope wetland under the Oregon HGM classification system (Adamus 2001).

The vegetation, soils, and hydrology of Wetland B are described in the following subsections. Wetland determination data forms are included in Appendix E.

8.1.2.1 Vegetation

Dominant vegetation in Wetland B includes toad rush (FACW), meadow foxtail (FAC), and sweet vernal grass (FACU). Black medick (FACU) was also present but to a lesser degree.

8.1.2.2 Soils

Soils in Wetland B are mapped as Concord silt loam, a soil type that is classified as hydric (Figure 9). Upon inspection, the predominant texture was confirmed to be a layer of silt loam over silty clay loam.

8.1.2.2.1 Data Plot 01B

DP-01B is located within an off-site portion of Wetland B (Figures 10 and 11b). Four distinct layers were noted in the soil profile, with the uppermost layer extending to 2 inches bgs, the second layer extending from 2 to 5 inches bgs, the third layer extending from 5 to 12 inches bgs, and the fourth layer extending from 12 to 16 inches bgs. The matrix color observed in the upper layer was 10YR 3/3 (dark brown) with no evidence of redoximorphic concentrations. The second layer exhibited a matrix color of 10YR 4/2 (dark grayish brown) with 2% 5YR 5/6 (yellowish red) redoximorphic concentrations along pore linings and 10% redoximorphic concentrations of the same color in the matrix. The third layer had the same matrix and redoximorphic concentration colors as the seconds layer but had 5% of the concentrations around pore linings and 15% of the concentrations in the matrix. In the fourth layer, the matrix color changed to 10YR 4/1 (dark gray) with 5% 5YR 5/6 (yellowish red) redoximorphic concentrations along pore linings and 25% redoximorphic concentrations of the same color in the matrix. The DP-01B soil sample met the Depleted Matrix (F3) hydric soil indicator, satisfying the hydric soil criteria of the 2010 Regional Supplement and *Field Indicators of Hydric Soils in the United States, Version 8.1, 2017* (USDA and NRCS 2016).

8.1.2.3 Hydrology

Wetland hydrology was confirmed in Wetland B by the presence of oxidized rhizospheres along living roots (Primary Wetland Hydrology Indicator C3). The water regime of Wetland B was determined to be seasonally saturated, with overland flow, seasonal high water table, and direct precipitation being the primary hydrologic sources. Degraded drainage tile may lie underneath Wetland B, which could be a secondary hydrologic source.

8.1.2.4 Boundary Determination

The wetland/upland boundary of Wetland B was determined by the presence/absence of oxidized rhizospheres along living roots (wetland hydrology indicator).

8.1.3 Wetland C

Wetland C is a 961-square-foot (0.022-acre) herbaceous wetland located in the north-central portion of the agricultural field on tax lot 1800 (Figures 10, 11b, and 11c). It appears to be isolated with no surface connections to any other waterbody. Wetland C is classified as a PEM wetland under the Cowardin classification system (Cowardin et al. 1979) and as a slope wetland under the Oregon HGM classification system (Adamus 2001).

The vegetation, soils, and hydrology of Wetland C are described in the following subsections. Wetland determination data forms are included in Appendix E.

8.1.3.1 Vegetation

Dominant vegetation in Wetland C includes toad rush (FACW), Timothy grass (*Phleum pratense*; FAC), and sweet vernal grass (FACU). Black medick (FACU) was also present but to a lesser degree.

8.1.3.2 Soils

Soils in Wetland C are mapped as Aloha silt loam, 0 to 3% slopes, a soil type that is classified as non-hydric but known to contain hydric inclusions (Figure 9). Upon inspection, the predominant texture was confirmed to be a layer of silt loam.

8.1.3.2.1 Data Plot 01C

DP-01C is located in the southern portion of Wetland C (Figures 10, 11b, and 11c). Four distinct layers were noted in the soil profile, with the uppermost layer extending to 2 inches bgs, the second layer extending from 2 to 6 inches bgs, the third layer extending from 6 to 12 inches bgs, and the fourth layer extending from 12 to 16 inches bgs. The matrix color observed in the upper layer was 10YR 4/2 (dark grayish brown) with no evidence of redoximorphic concentrations. The second layer exhibited a matrix color of 10YR 4/2 (dark grayish brown) with 2% 7.5YR 5/6 (strong brown) redoximorphic concentrations along pore linings and 5% redoximorphic concentrations of the same color in the matrix. The third layer had a gleyed matrix color of N 4/0 (dark gray) with 5% 2.5YR 4/6 (red) redoximorphic concentrations along pore linings and 15% redoximorphic concentrations of the same color in the matrix. In the fourth layer, the matrix color changed to 10YR 4/1 (dark gray) with 10% 7.5YR 5/6 (strong brown) redoximorphic concentrations and 20% 10YR 5/2 (grayish brown) in the matrix. The DP-01C soil sample met the Loamy Gleyed Matrix (F2) and Depleted Matrix (F3) hydric soil indicators, satisfying the hydric soil criteria of the 2010 Regional Supplement and *Field Indicators of Hydric Soils in the United States, Version 8.1, 2017* (USDA and NRCS 2016).

8.1.3.3 Hydrology

Wetland hydrology was confirmed in Wetland C by the presence of oxidized rhizospheres along living roots (Primary Wetland Hydrology Indicator C3). The water regime of Wetland C was determined to be seasonally saturated, with overland flow, seasonal high water table, and direct precipitation being the primary hydrologic sources. Degraded drainage tile may lie underneath Wetland C, which could be a secondary hydrologic source.

8.1.3.4 Boundary Determination

The wetland/upland boundary of Wetland C was determined by the presence/absence of oxidized rhizospheres along living roots (wetland hydrology indicator).

8.1.4 Wetland D

Wetland D is a 9,133-square-foot (0.210-acre) predominantly herbaceous wetland located in the eastern portion of the agricultural field on tax lot 1800 (Figures 10 and 11c). It is adjacent to an off-site roadside ditch that runs within the western right-of-way of SW Stafford Road and includes a narrow scrub-shrub component where it connects to the ditch. Wetland D is classified as a PEM/palustrine scrub-shrub (PSS) wetland under the Cowardin classification system (Cowardin et al. 1979) and as a slope wetland under the Oregon HGM classification system (Adamus 2001).

The vegetation, soils, and hydrology of Wetland D are described in the following subsections. Wetland determination data forms are included in Appendix E.

8.1.4.1 Vegetation

Dominant vegetation in the herbaceous portions of Wetland D includes common velvetgrass (FAC), meadow foxtail (FAC), and sweet vernal grass (FACU). Slough sedge (OBL), northern lady fern (*Athyrium filix-femina*; FAC), white clover (*Trifolium repens*; FAC), bentgrass (UPL to FACW), pineappleweed (*Matricaria discoidea*; FACU), and other herbaceous vegetation were also present but to a lesser degree. In the narrow scrub-shrub component along the roadside ditch, wild rose (UPL to FAC), Douglas spirea (FACW), and Himalayan blackberry (FAC) dominate, with lesser amounts of common hawthorn (FAC) and Oregon ash (FACW) saplings.

8.1.4.2 Soils

Mapped soils in Wetland D include both Concord silt loam and Huberly silt loam, 0 to 3% slopes (Figure 9). Both of these soil types are classified as hydric soils. Upon inspection, the predominant texture was confirmed to be silt loam.

8.1.4.2.1 Data Plot 01D

DP-01D is located in the northern portion of Wetland D (Figures 10 and 11c). Four distinct layers were noted in the soil profile, with the uppermost layer extending to 4 inches bgs, the second layer extending from 4 to 10 inches bgs, the third layer extending from 10 to 12 inches bgs, and the fourth layer extending from 12 to 16 inches bgs. The matrix color observed in the upper layer was 10YR 3/2 (very dark grayish brown) with no evidence of redoximorphic concentrations. The second layer exhibited the same matrix color but had 2% 7.5YR 6/6 (reddish yellow) redoximorphic concentrations along pore linings and 5% 7.5YR 5/4 (brown) redoximorphic concentrations in the matrix. The third layer had a matrix color of 10YR 4/2 (dark grayish brown) with a mix of 5% 2.5YR 4/6 (red) and 15% 7.5YR 4/6 (dark yellowish brown) redoximorphic concentrations in the matrix. In the fourth layer, the matrix color remained the same but the redoximorphic features changed to 15% 7.5YR 4/4 (dark yellowish brown) in the matrix. The DP-01D soil sample met the Redox Dark Surface (F6) hydric soil indicators, satisfying the hydric soil criteria of the 2010 Regional Supplement and *Field Indicators of Hydric Soils in the United States, Version 8.1, 2017* (USDA and NRCS 2016).

8.1.4.3 Hydrology

Wetland hydrology was confirmed in Wetland D by the presence of oxidized rhizospheres along living roots (Primary Wetland Hydrology Indicator C3). The water regime of Wetland D was determined to be seasonally saturated, with overland flow, seasonal high water table, direct precipitation, and overflow from the roadside ditch being the primary hydrologic sources.

8.1.4.4 Boundary Determination

The wetland/upland boundary of Wetland D was determined by slight changes in topography and the presence/absence of oxidized rhizospheres along living roots (wetland hydrology indicator).

8.1.5 Wetland E

Wetland E is a 22,328-square-foot (0.513-acre) predominantly herbaceous wetland located in the south-central portion of the agricultural field on tax lot 1800 and in the eastern portions of tax lots 1902 and 1903 (Figures 10, 11b, 11c, and 11d). Wetland E also previously extended off site onto the northeastern portion of tax lot 2201 but that portion (11,151 square feet [0.256 acre]) was recently filled for the development of the Stafford Meadows residential development project under Oregon Department of State Lands (DSL) Removal-Fill Permit No. 61223-RF and USACE Permit No. NWP-2018-00268. The remaining portion of Wetland E that occurs on the study area has a narrow scrub-shrub component along the fence boundaries of tax lots 1902 and 1903. Wetland E appears to be isolated with no surface connections to any other waterbody. Wetland E is classified as a PEM/PSS wetland under the Cowardin classification system (Cowardin et al. 1979) and as a slope wetland under the Oregon HGM classification system (Adamus 2001).

The vegetation, soils, and hydrology of Wetland E are described in the following subsections. Wetland determination data forms are included in Appendix E.

8.1.5.1 Vegetation

Dominant vegetation in the in the herbaceous portions of Wetland E includes various species of fescue, bentgrass, and bluegrass, along with creeping buttercup (FAC), common velvetgrass (FAC), white clover (FAC), and common dandelion (FACU). In the scrub-shrub components along the fence lines, wild rose (UPL to FAC), common hawthorn (FAC), and Himalayan blackberry (FAC) are present.

8.1.5.2 Soils

Soils in Wetland E are mapped as Aloha silt loam, 0 to 3% slopes, a soil type that is classified as non-hydric but known to contain hydric inclusions (Figure 9). Upon inspection, the predominant texture was typically silt loam occasionally occurring over a layer of silty clay loam.

8.1.5.2.1 Data Plot 01E

DP-01E is located in the southern portion of Wetland E (Figures 10 and 11d). Three distinct layers were observed in the soil profile, with the uppermost layer extending to 7 inches bgs, the second layer extending from 7 to 12 inches bgs, and the third layer extending from 12 to 16 inches bgs. The matrix color observed in the upper layer was 7.5YR 3/2 (dark brown) with 5% 5YR 5/6 (yellowish red) redoximorphic concentrations along pore linings and 5% 5YR 5/6 (yellowish red) redoximorphic concentrations in the matrix. The second layer had a matrix color of 7.5YR 4/2 (brown) with a variety of redoximorphic concentrations occurring in the matrix. Concentration colors included 5% 5YR 4/4 (reddish brown), 5% 5YR 5/6 (yellowish red), and 2% 5YR 3/3 (dark reddish brown). The third layer had a matrix color of 7.5YR 5/2 (brown) with no redoximorphic features present. The DP-01E soil sample met the Depleted Matrix (F3) and Redox Dark Surface (F6) hydric soil indicators, satisfying the hydric soil criteria of the 2010 Regional Supplement and *Field Indicators of Hydric Soils in the United States, Version 8.1, 2017* (USDA and NRCS 2016).

8.1.5.2.2 Data Plot 04E

DP-04E is located in the southernmost portion of Wetland E (Figures 10 and 11d). Three distinct layers were observed in the soil profile, with the uppermost layer extending to 3 inches bgs, the second layer extending from 3 to 7 inches bgs, and the third layer extending from 7 to 16 inches bgs. The matrix color observed in the upper layer was 7.5YR 3/2 (dark brown) with no redoximorphic concentrations present. The second layer had a matrix color of 7.5YR 4/2 (brown) with 5% 5YR 5/6 (yellowish red) redoximorphic concentrations along pore linings and 5% 5YR 5/6 (yellowish red) redoximorphic concentrations in the matrix. The third layer had a matrix color of 7.5YR 5/2 (brown) and both 5% 5YR 3/4 (dark reddish brown) and 20% 7.5YR 5/6 (strong brown) redoximorphic concentrations in the matrix. The DP-04E soil sample met the Depleted Matrix (F3) hydric soil indicator, satisfying the hydric soil criteria of the 2010 Regional Supplement and *Field Indicators of Hydric Soils in the United States, Version 8.1, 2017* (USDA and NRCS 2016).

8.1.5.2.3 Data Plot 07E

DP-07E is located in the western portion of Wetland E (Figures 10, 11b, and 11c). Four distinct layers were observed in the soil profile, with the uppermost layer extending to 2 inches bgs, the second layer extending from 2 to 6 inches bgs, the third layer extending from 6 to 12 inches bgs, and the lowermost layer extending from 12 to 16 bgs. The matrix color observed in the upper layer was 10YR 4/2 (dark grayish brown) with no redoximorphic concentrations present. The second layer had the same matrix color but included 2% 7.5YR 5/6 (strong brown) redoximorphic concentrations along pore linings and 5% 7.5YR 5/6 (strong brown) redoximorphic concentrations in the matrix. The third layer had a matrix color of 10YR 4/1 (dark gray) with 10% 5YR 4/6 (yellowish red) redoximorphic concentrations along pore linings and 5% 2.5YR 3/6 (dark red) concentrations in the matrix. The fourth layer exhibited a mixed matrix of 40% 10YR 4/1 (dark gray) and 40% 10YR 5/1 (gray) with 20% 7.5YR 5/6 (strong brown) redoximorphic concentrations in the matrix. The DP-07E soil sample met the Depleted Matrix (F3) hydric soil indicator, satisfying the hydric soil criteria of the 2010 Regional Supplement and *Field Indicators of Hydric Soils in the United States, Version 8.1, 2017* (USDA and NRCS 2016).

8.1.5.2.4 Data Plot 10E

DP-010E is located in the northern portion of Wetland E (Figures 10 and 11c). Four distinct layers were observed in the soil profile, with the uppermost layer extending to 4 inches bgs, the second layer extending from 4 to 6 inches bgs, the third layer extending from 6 to 10 inches bgs, and the lowermost layer extending from 10 to 16 bgs. The matrix color observed in the upper layer was 10YR 3/2 (very dark grayish brown) with no redoximorphic concentrations present. The second layer had the same matrix color but included 2% 7.5YR 5/6 (strong brown) redoximorphic concentrations in the matrix. The third layer had a matrix color of 10YR 3/1 (very dark gray) with 10% 2.5YR 3/6 (dark red) redoximorphic concentrations in the matrix, 2.5YR 3/6 redoximorphic concentrations along pore linings, and 5% 10YR 4/1 (dark gray) depletions in the matrix. The fourth layer exhibited a matrix color of 10YR 4/1 with 15% 5YR 5/6 (yellowish red) redoximorphic concentrations in the matrix, 1% 5YR 5/6 redoximorphic concentrations along pore linings, and 5% 10YR 5/1 (dark) depletions in the matrix. The DP-011E soil sample met the Redox Dark Surface (F6) hydric soil indicators, satisfying the hydric soil criteria of the 2010 Regional Supplement and *Field Indicators of Hydric Soils in the United States, Version 8.1, 2017* (USDA and NRCS 2016).

8.1.5.2.5 Data Plot 11E

DP-011E is located in the eastern portion of Wetland E (Figures 10, 11c, and 11d). Four distinct layers were observed in the soil profile, with the uppermost layer extending to 4 inches bgs, the second layer extending from 4 to 7 inches bgs, the third layer extending from 7 to 12 inches bgs, and the lowermost layer extending from 12 to 16 bgs. The matrix color observed in the upper layer was 10YR 3/2 (very dark grayish brown) with no redoximorphic concentrations present. The second layer had the same matrix color but included 2% 5YR 5/6 (yellowish red) redoximorphic concentrations along pore linings and 5% 5YR 5/6 (yellowish red) redoximorphic concentrations in the matrix. The third layer had a matrix color of 10YR 4/2 (dark grayish brown) with 10% 5YR 4/4 (reddish brown) redoximorphic concentrations in the matrix. The fourth layer exhibited a matrix color of 10YR 4/1 (dark gray) with a mix of 5% 5YR 5/6 (yellowish red) and 5% 5YR 4/4 (reddish brown) redoximorphic concentrations in the matrix. The DP-011E soil sample met the Depleted Below Dark Surface (A11) and Depleted Matrix (F3) hydric soil indicators, satisfying the hydric soil criteria of the 2010 Regional Supplement and *Field Indicators of Hydric Soils in the United States, Version 8.1, 2017* (USDA and NRCS 2016).

8.1.5.3 Hydrology

Wetland hydrology with in Wetland E was confirmed by the presence of oxidized rhizospheres along living roots (Primary Wetland Hydrology Indicator C3). The water regime of Wetland E was determined to be seasonally saturated, with overland flow, seasonal high water table, direct precipitation, and overflow from the roadside ditch being the primary hydrologic sources. Degraded drainage tile may lie underneath Wetland E, which could be a secondary hydrologic source.

8.1.5.4 Boundary Determination

The wetland/upland boundary of Wetland E was determined by slight changes in topography and the presence/absence of oxidized rhizospheres along living roots (wetland hydrology indicator).

8.1.6 Wetland F

Wetland F is a 996-square-foot (0.023-acre) herbaceous wetland located in the northern portion of the agricultural field on tax lot 1800 (Figure 11). It appears to be isolated with no surface connections to any other waterbody. Wetland F is classified as a PEM wetland under the Cowardin classification system (Cowardin et al. 1979) and as a slope wetland under the Oregon HGM classification system (Adamus 2001).

The vegetation, soils, and hydrology of Wetland F are described in the following subsections. Wetland determination data forms are included in Appendix E.

8.1.6.1 Vegetation

Dominant vegetation in Wetland F includes toad rush (FACW), meadow foxtail (FAC), common velvetgrass (FAC), and sweet vernal grass (FACU). Creeping buttercup (FAC) and bentgrass (UPL to FACW) were also present but to a lesser degree.

8.1.6.2 Soils

Soils in Wetland F are mapped as Aloha silt loam, 0 to 3% slopes, a soil type that is classified as non-hydric but known to contain hydric inclusions (Figure 9). Upon inspection, the predominant texture was confirmed to be a layer of silt loam.

8.1.6.2.1 Data Plot 01F

DP-01F is located in an agricultural field in the middle of Wetland F (Figures 10, 11b, and 11c). Four distinct layers were observed in the soil profile, with the uppermost layer extending to 2 inches bgs, the second layer extending from 2 to 6 inches bgs, the third layer extending from 6 to 12 inches bgs, and the lowermost layer extending from 12 to 16 bgs. The matrix color observed in the upper layer was 10YR 4/2 (dark grayish brown) with no redoximorphic concentrations present. The second layer had the same matrix color but included 2% 7.5YR 5/6 (strong brown) redoximorphic concentrations along pore linings and 5% 7.5YR 5/6 (strong brown) redoximorphic concentrations in the matrix. The third layer had a gleyed matrix of N 4/0 (dark gray) with 5% 2.5YR 4/6 (red) redoximorphic concentrations along pore lining and 15% concentrations of the same color in the matrix. The fourth layer exhibited a matrix color of 10YR 4/1 (dark gray) with a mix of 10% 7.5YR 5/6 (strong brown) and 20% 10YR 5/2 (grayish brown) depletions in the matrix. The DP-01F soil sample met the Loamy Gleyed Matrix (F2) and Depleted Matrix (F3) hydric soil indicators, satisfying the hydric soil criteria of the 2010 Regional Supplement and *Field Indicators of Hydric Soils in the United States, Version 8.1, 2017* (USDA and NRCS 2016).

8.1.6.3 Hydrology

Wetland hydrology with in Wetland F was confirmed by the presence of oxidized rhizospheres along living roots (Primary Wetland Hydrology Indicator C3). The water regime of Wetland F was determined to be seasonally saturated, with overland flow, seasonal high water table, direct precipitation, and overflow from the roadside ditch being the primary hydrologic sources. Degraded drainage tile may lie underneath Wetland F, which could be a secondary hydrologic source.

8.1.6.4 Boundary Determination

The wetland/upland boundary of Wetland E was determined by the presence/absence of oxidized rhizospheres along living roots (wetland hydrology indicator).

8.2 Non-Wetland Other Waters

8.2.1 Off-Site Willow Creek

The section of Willow Creek that occurs adjacent to the study area consists of a linear, intermittent stream channel with an average width of 6 feet that flows from north to south (Figures 10, 11a, and 11b). The channel originates off site to the north and receives surface water from the surrounding pastures and agricultural fields. The stream channel is contained within the on-site and off-site boundaries of Wetland A. It flows onto tax lot 2202, exits that property through twin 18-inch concrete culverts under SW Boeckman Road, and continues southward through a narrow forested/scrub-shrub riparian corridor surrounded by residential development, eventually entering a heavily forested riparian corridor before draining into the Willamette River. The stream channel substrate consists predominantly of fine silts with some medium to coarse sand. Figures 10, 11a, and 11b show the ordinary high water mark for Willow Creek, which was identified in the field by Anchor QEA.

9 Deviation from National Wetlands Inventory, Local Wetlands Inventory, or PHS Wetlands Inventory

The delineated location of Willow Creek and its associated riparian wetland (Wetland A) correspond to the general location of the R5UBH wetland shown on the NWI map (Figure 6). The other wetlands identified in the study area are not shown on the NWI map. As shown in Figure 7, there are no LWI data for the study area so none of the wetlands or other waters identified during the delineation occur on the LWI map. Regarding the PHS wetland inventory, the delineated locations of Willow Creek and Wetland A through F would all appear to occur within the boundary of PHS-mapped

Wetland 5 (Figure 8). Evidence of wetland conditions within the portions of mapped Wetland 5 that do not correspond with these delineated areas was not observed during the wetland delineation site visits.

10 Mapping Method

Wetland boundary and data plot locations were professionally land surveyed by Otak to an approximate accuracy of 0.1 foot. Survey data were plotted on a base map using AutoCAD, which was then pulled into ArcGIS to create the wetland delineation map shown in Figures 10 and 11a through 11d).

11 Additional Information

Anchor QEA wetland scientists checked both the Oregon Explorer website (OSU 2018c) and the StreamNet Online Mapper (StreamNet 2018) for information on fish habitat and presence both within and near the study area. Neither of these sources indicates that any essential salmonid habitat or fish presence occurs within Willow Creek. For the Willamette River, the receiving water for this stream, StreamNet indicates the presence of a number of evolutionarily significant units including fall- and spring-run Chinook salmon (*Oncorhynchus tshawytscha*), summer- and winter-run steelhead (*O. mykiss*), coho salmon (*O. kisutch*), sockeye salmon (*O. nerka*), and white sturgeon (*Acipenser transmontanus*).

12 Results and Conclusions

Anchor QEA wetland scientists delineated six wetlands (Wetlands A, B, C, D, E, and F) within the study area and one off-site other water (Willow Creek) located just outside the study area during site visits on May 14, 15, and 16, 2018, and September 20, 2018 (Figures 10 and 11a through 11d). The total area of on-site wetlands was estimated to be 36,765 square feet (0.845 acre). All of these wetlands (and the off-site section of Willow Creek) will likely be considered jurisdictional by DSL under the Oregon Removal-Fill Law. USACE is also likely to take jurisdiction over Wetlands A, B, and D, and the off-site section of Willow Creek under Section 404 of the Clean Water Act. Due to their apparent isolated conditions Wetlands B, C, E, and F may or may not be regulated by USACE. Note that only DSL and USACE can make an official jurisdictional determination for these areas.

13 Disclaimer

This report documents the investigation, best professional judgment, and conclusions of Anchor QEA. It is correct and complete to the best of Anchor QEA's knowledge. It should be considered a Preliminary Determination of wetlands and other waters and used at one's own risk, unless it has been reviewed and approved in writing by DSL in accordance with OARs 141-090-0005 through 141-090-0055. If impacts to wetlands and other waters within the study area are proposed, this report will need to be reviewed and approved in writing by both DSL and USACE, Portland District, in conjunction with the submittal of a Joint Section 404/Removal-Fill Permit Application.

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Figures

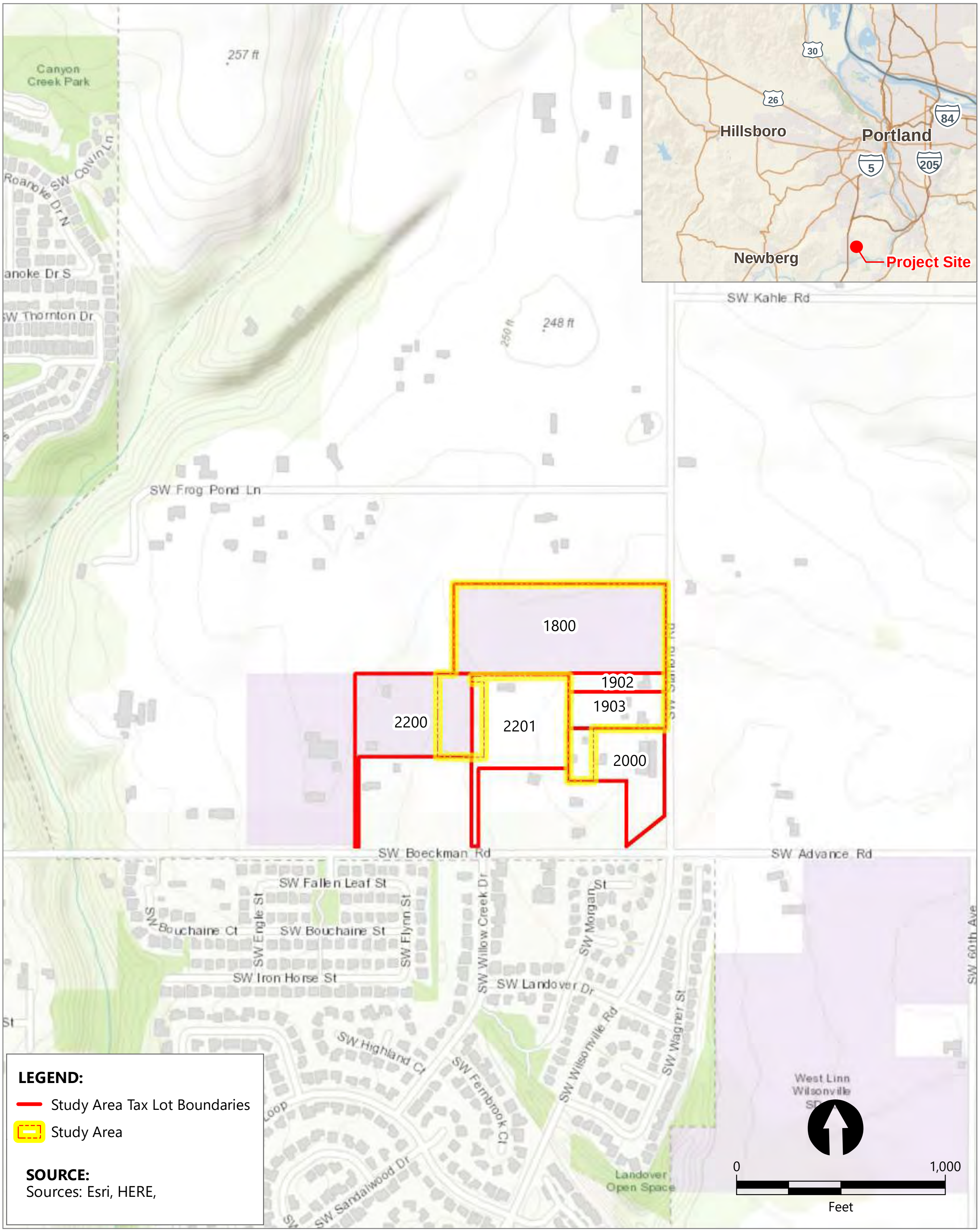

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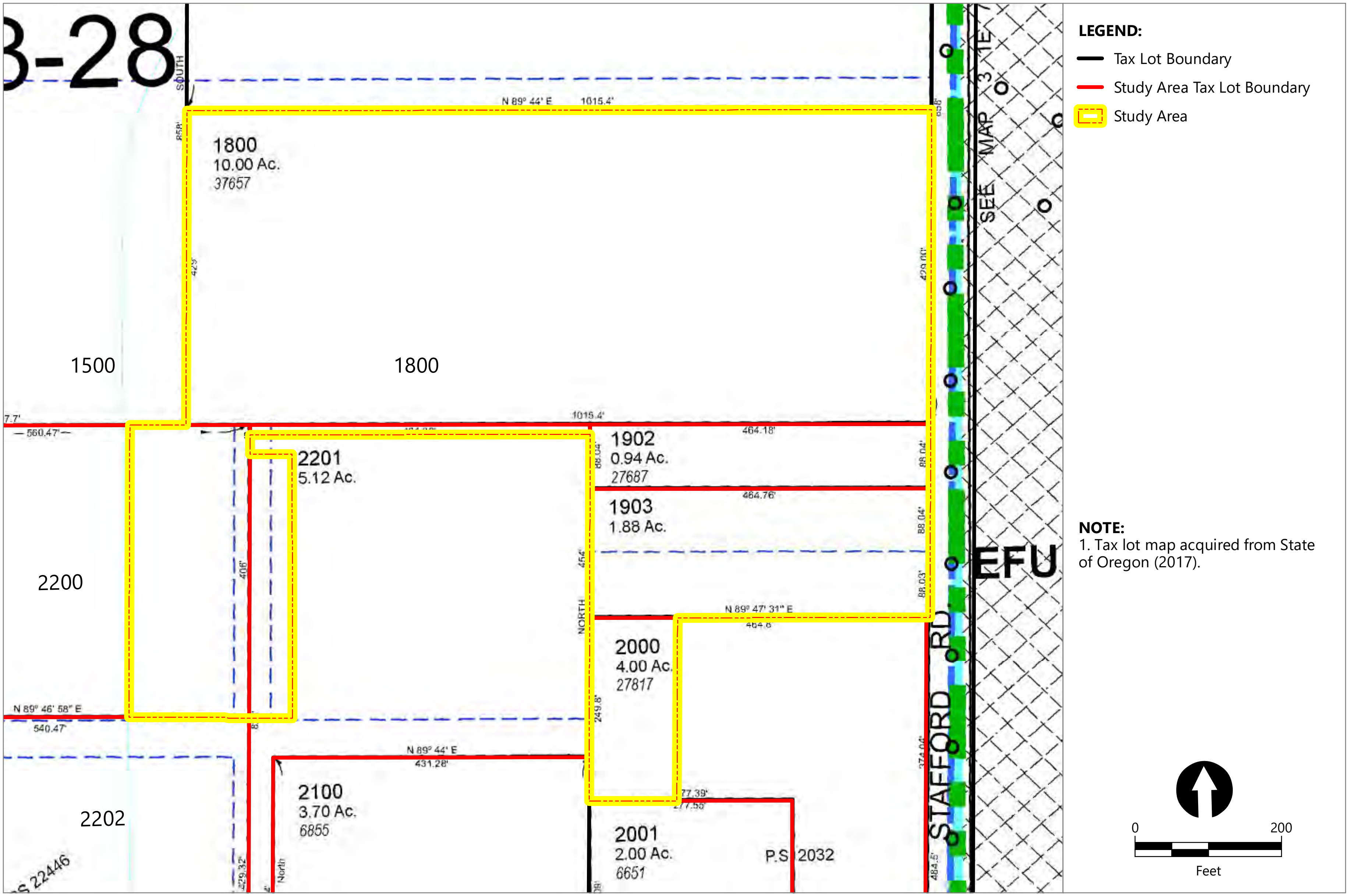
Figure 1
Site Location Map
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



NOTE:
1. Tax lot map acquired from State of Oregon (2017).

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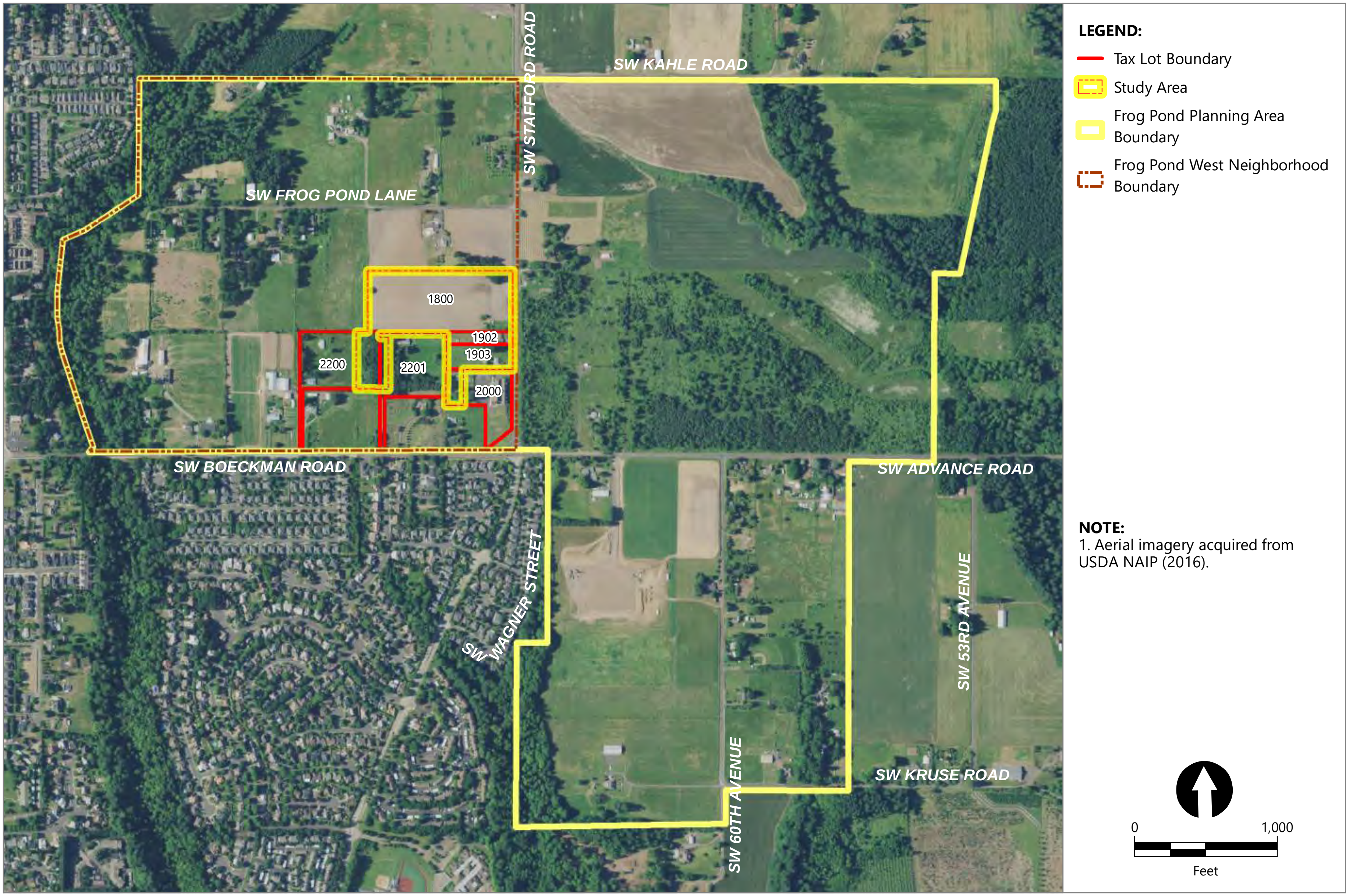
Figure 2
Tax Lot 31W12D Map
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



NOTE:
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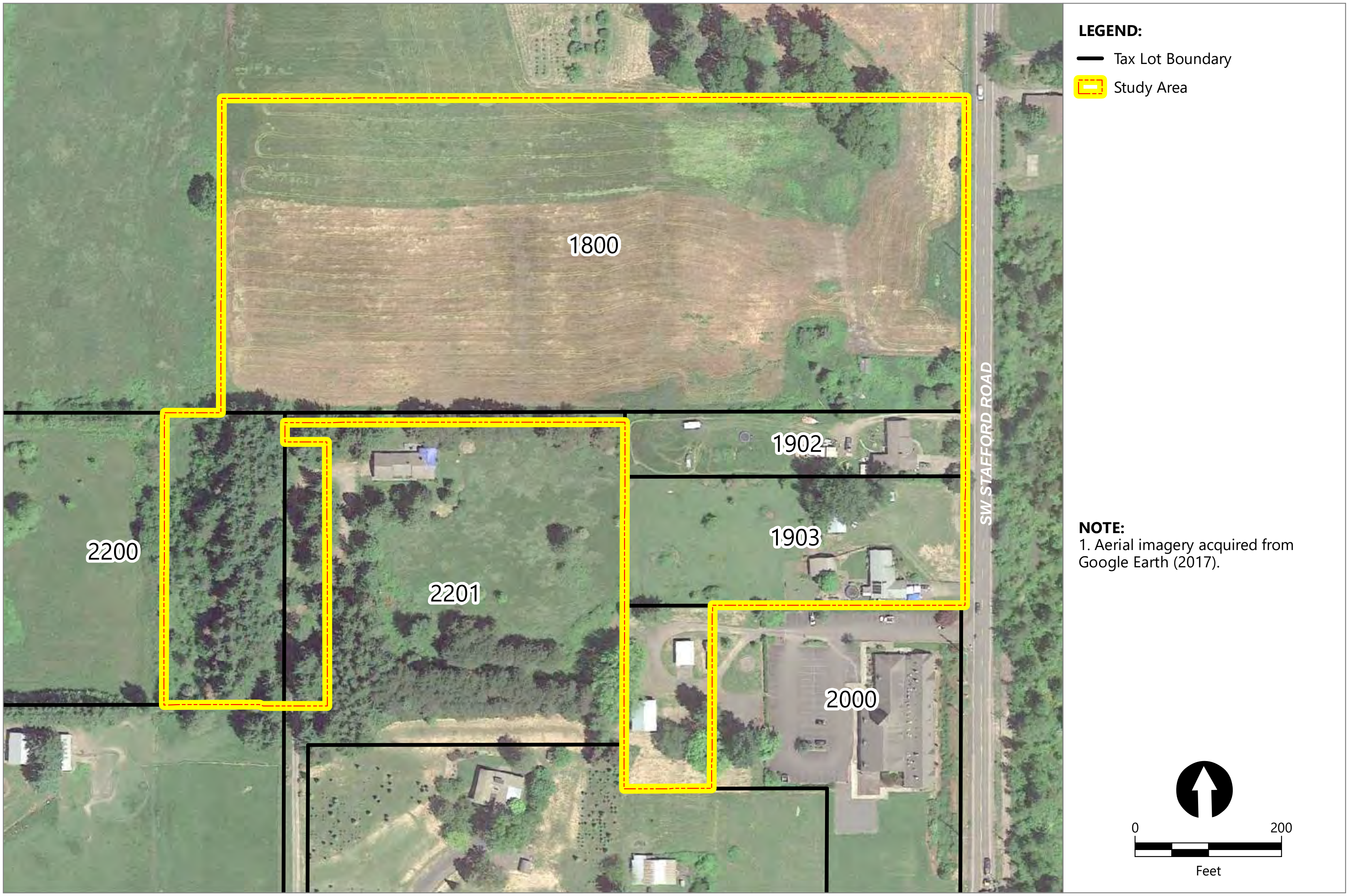
Figure 3
Frog Pond Area and Frog Pond West Neighborhood Planning Area Map
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



NOTE:
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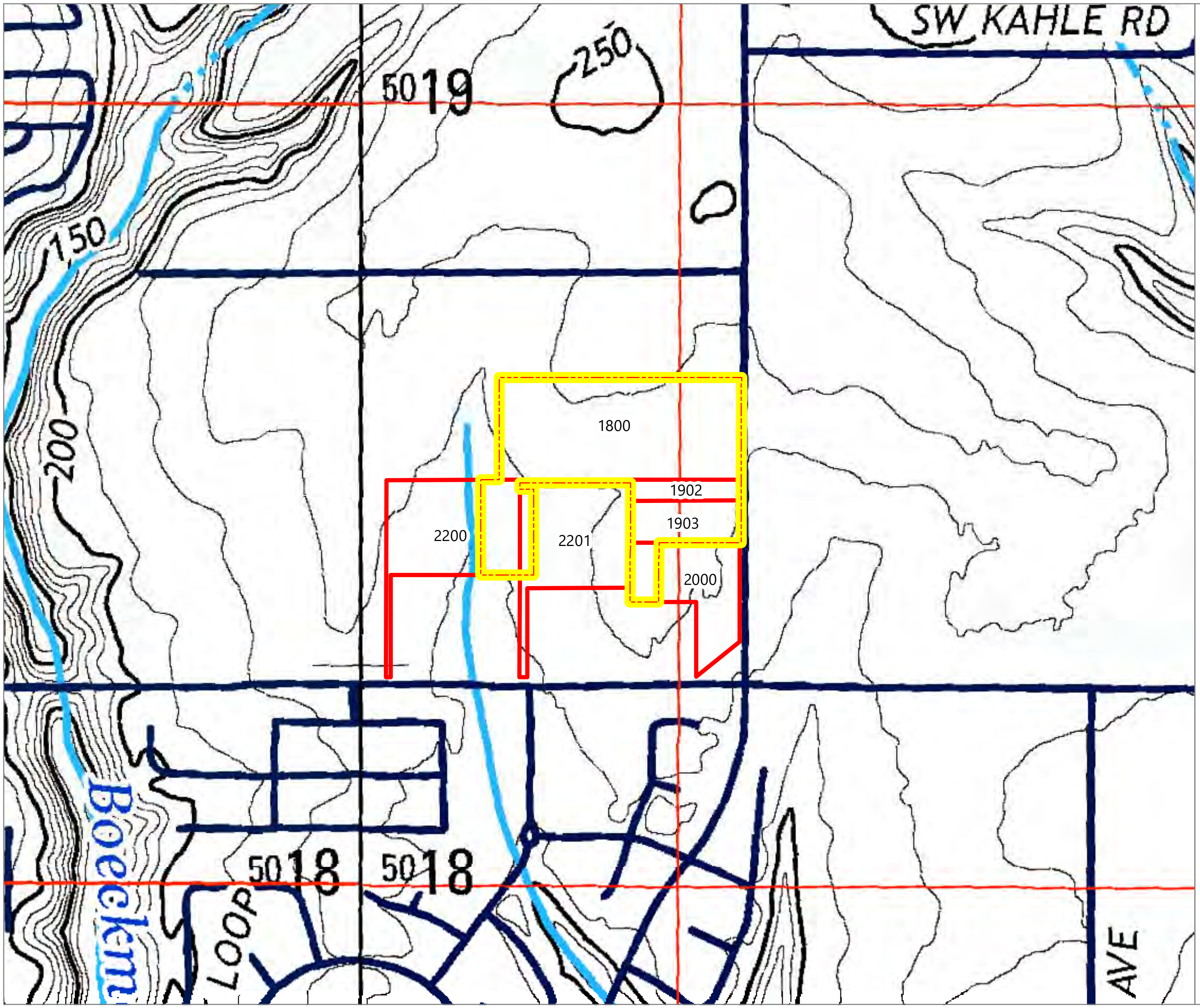
Figure 4
2017 Aerial Overview Map
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



LEGEND:

🟥 Tax Lot Boundary

🟨 Study Area

NOTE:
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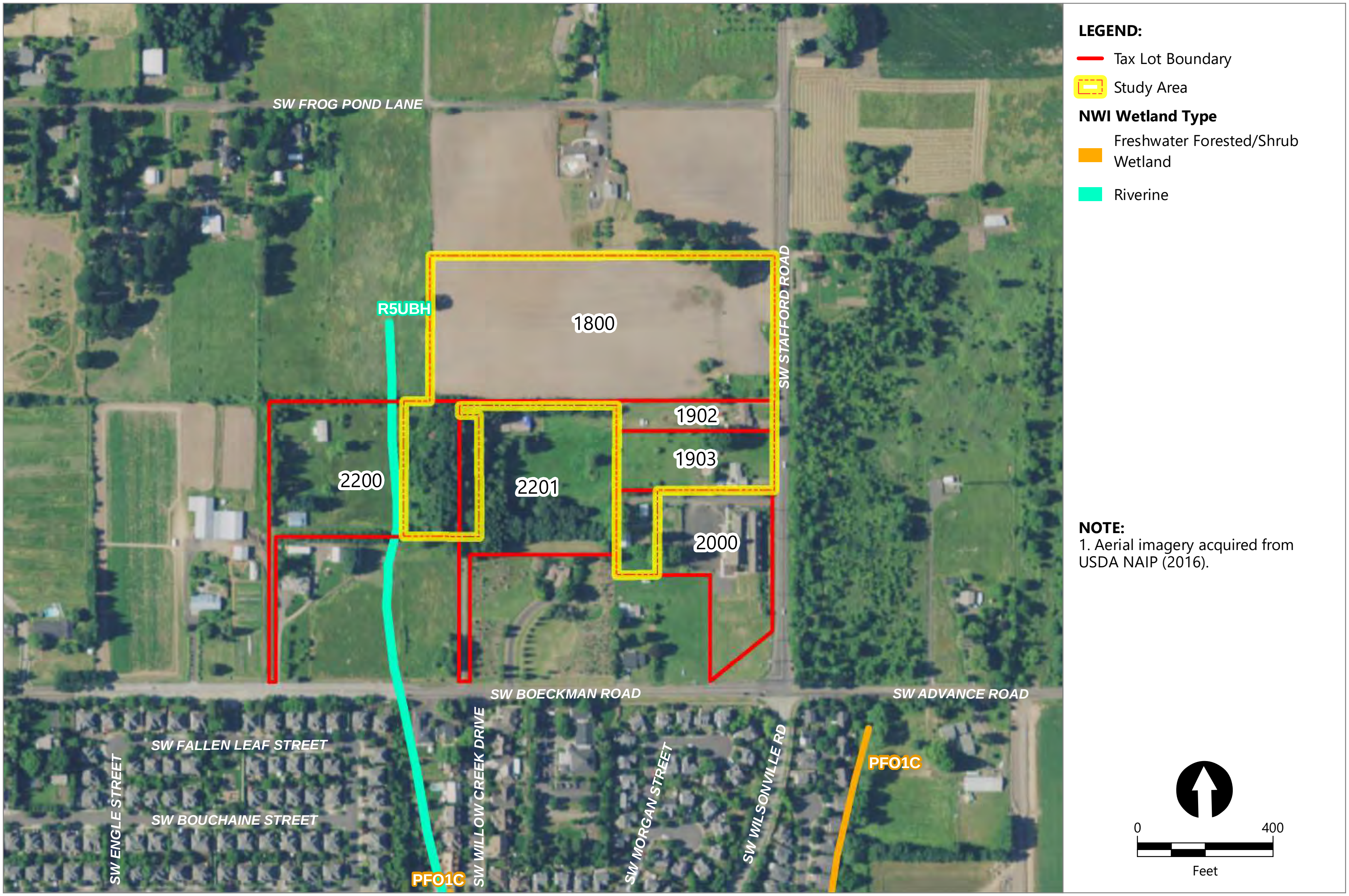
Figure 5
USGS Topographic Map
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



NOTE:
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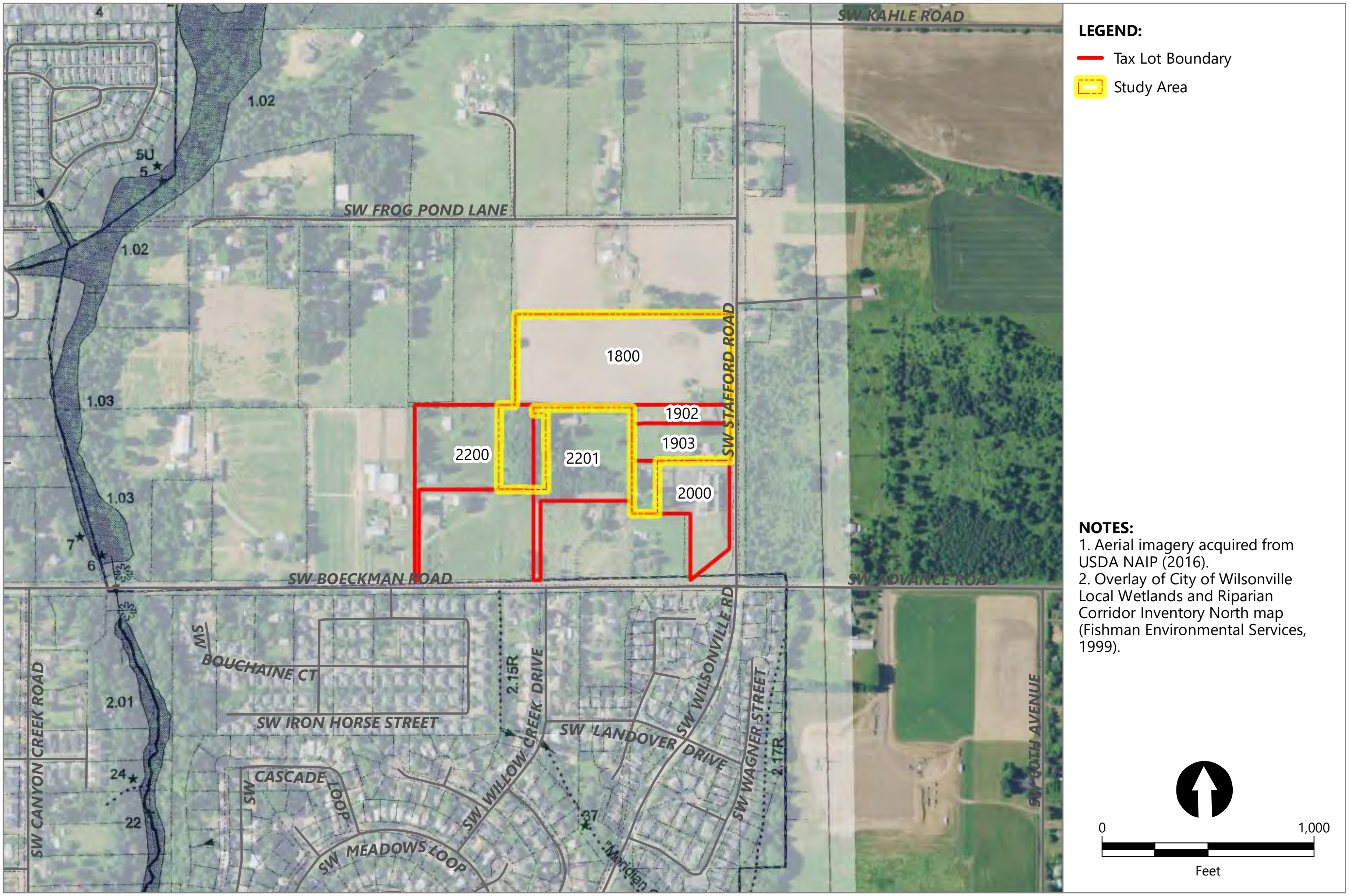
Figure 6
National Wetlands Inventory Map
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



NOTES:

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Figure 7

Local Wetlands Inventory Map

Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development

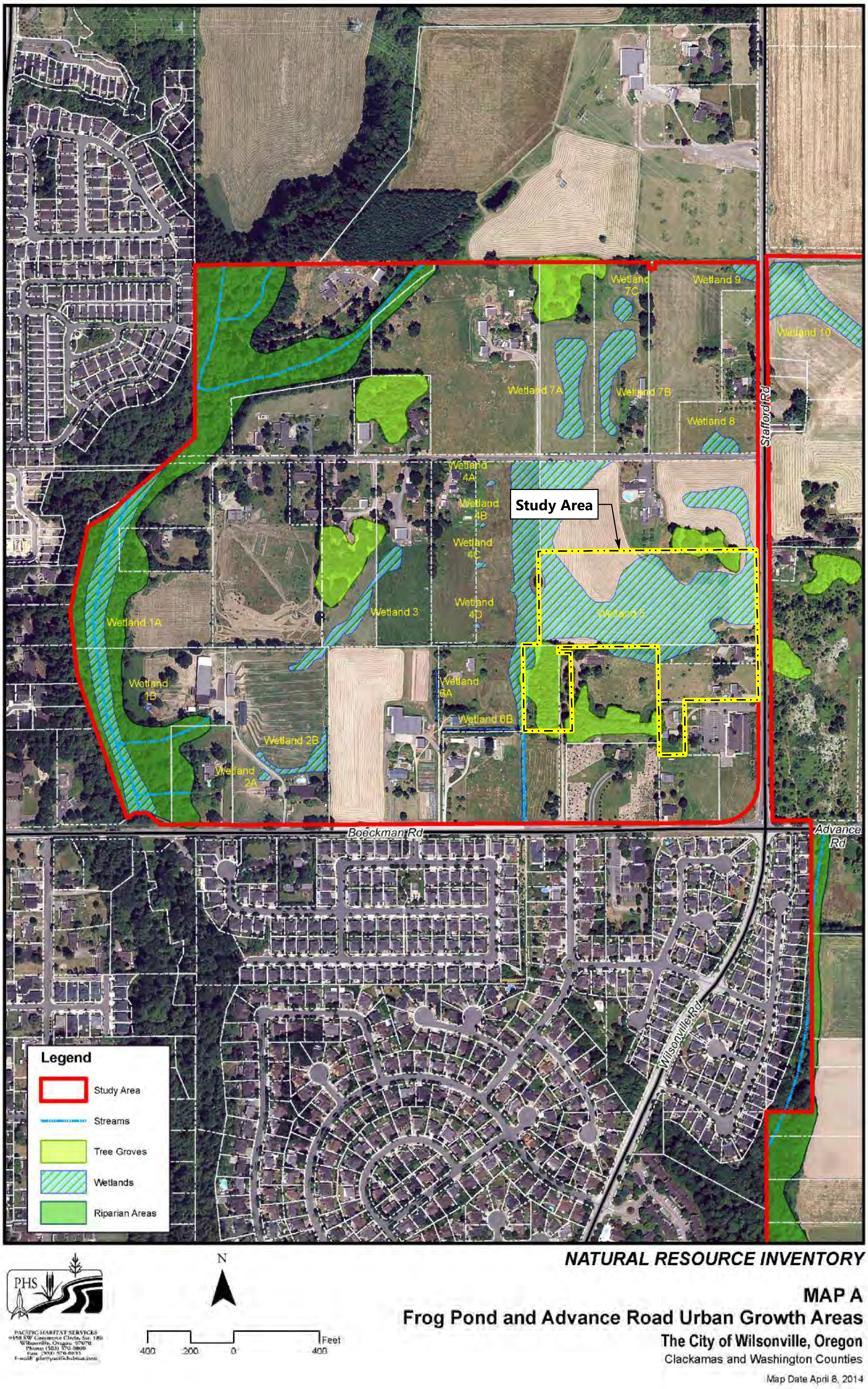

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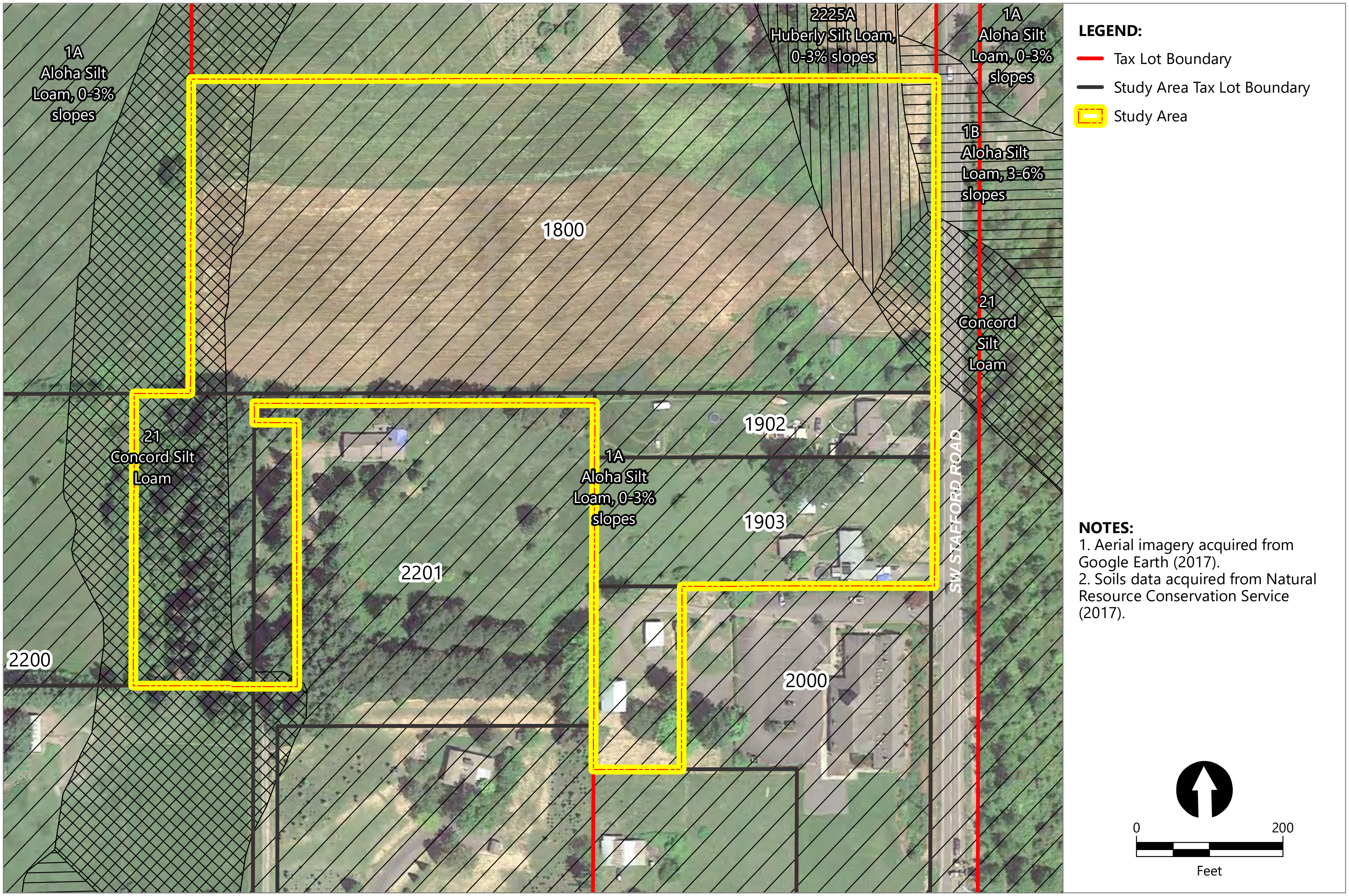
Figure 8
2014 Pacific Habitat Services, Inc. Wetland Inventory Map
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



NOTES:
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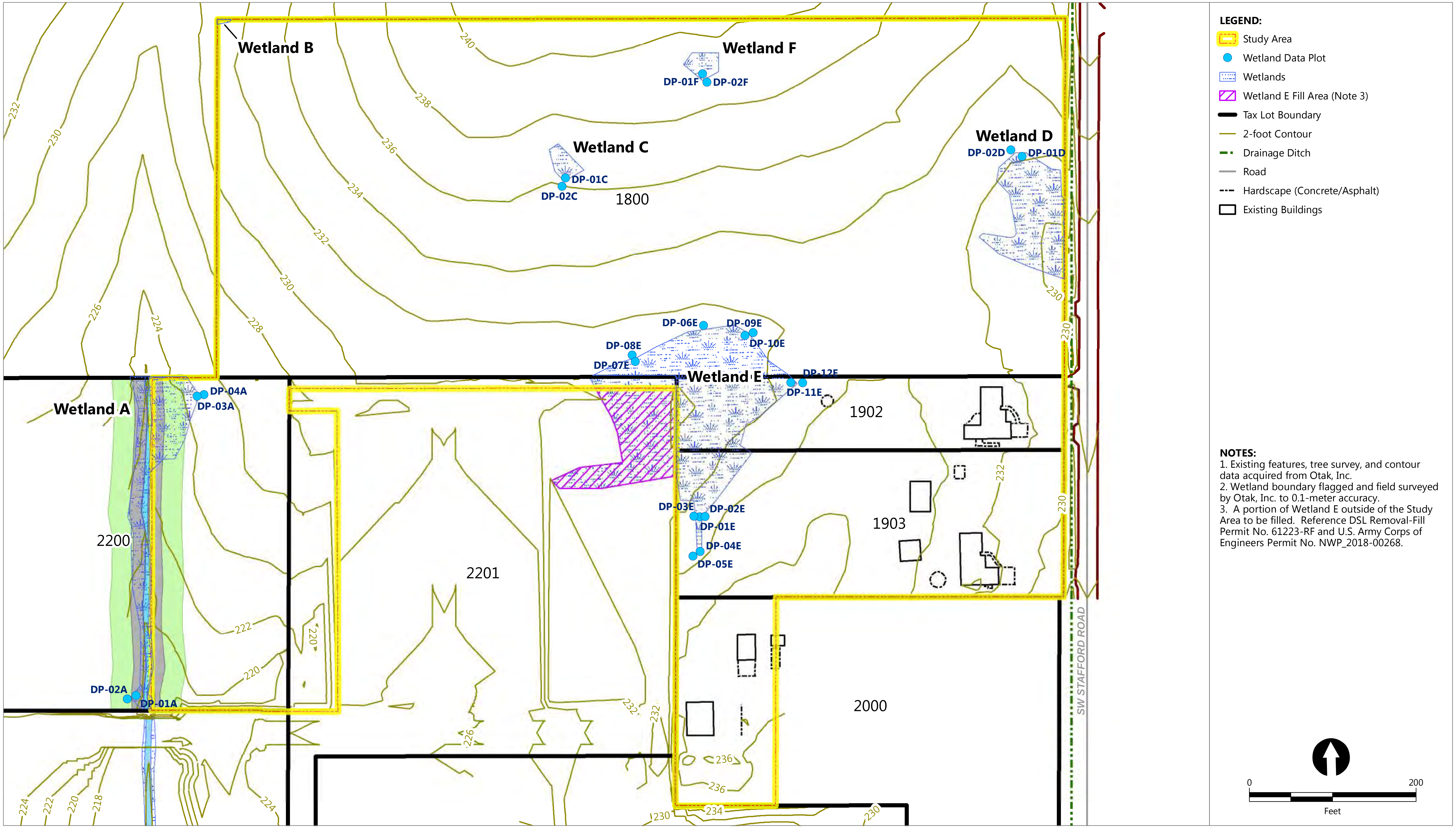
Figure 9
Soils Map
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



NOTES:

1. Existing features, tree survey, and contour data acquired from Otak, Inc.
2. Wetland boundary flagged and field surveyed by Otak, Inc. to 0.1-meter accuracy.
3. A portion of Wetland E outside of the Study Area to be filled. Reference DSL Removal-Fill Permit No. 61223-RF and U.S. Army Corps of Engineers Permit No. NWP_2018-00268.

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Figure 10
Overview Map
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development

LEGEND:

- ▭ Study Area
- ● Wetland Data Plot
- ▦ Wetlands
- ▨ Wetland E Fill Area (Note 3)
- ━ Tax Lot Boundary
- ╍ Drainage Ditch
- ─ 2-foot Contour
- ─ Road
- ⌜⌟ Existing Buildings
- ─ Hardscape (Concrete/Asphalt)

NOTES:

1. Existing features, tree survey, and contour data acquired from Otak, Inc.
2. Wetland boundary flagged and field surveyed by Otak, Inc. to 0.1-meter accuracy.
3. A portion of Wetland E outside of the Study Area to be filled. Reference DSL Removal-Fill Permit No. 61223-RF and U.S. Army Corps of Engineers Permit No. NWP_2018-00268.

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Feet

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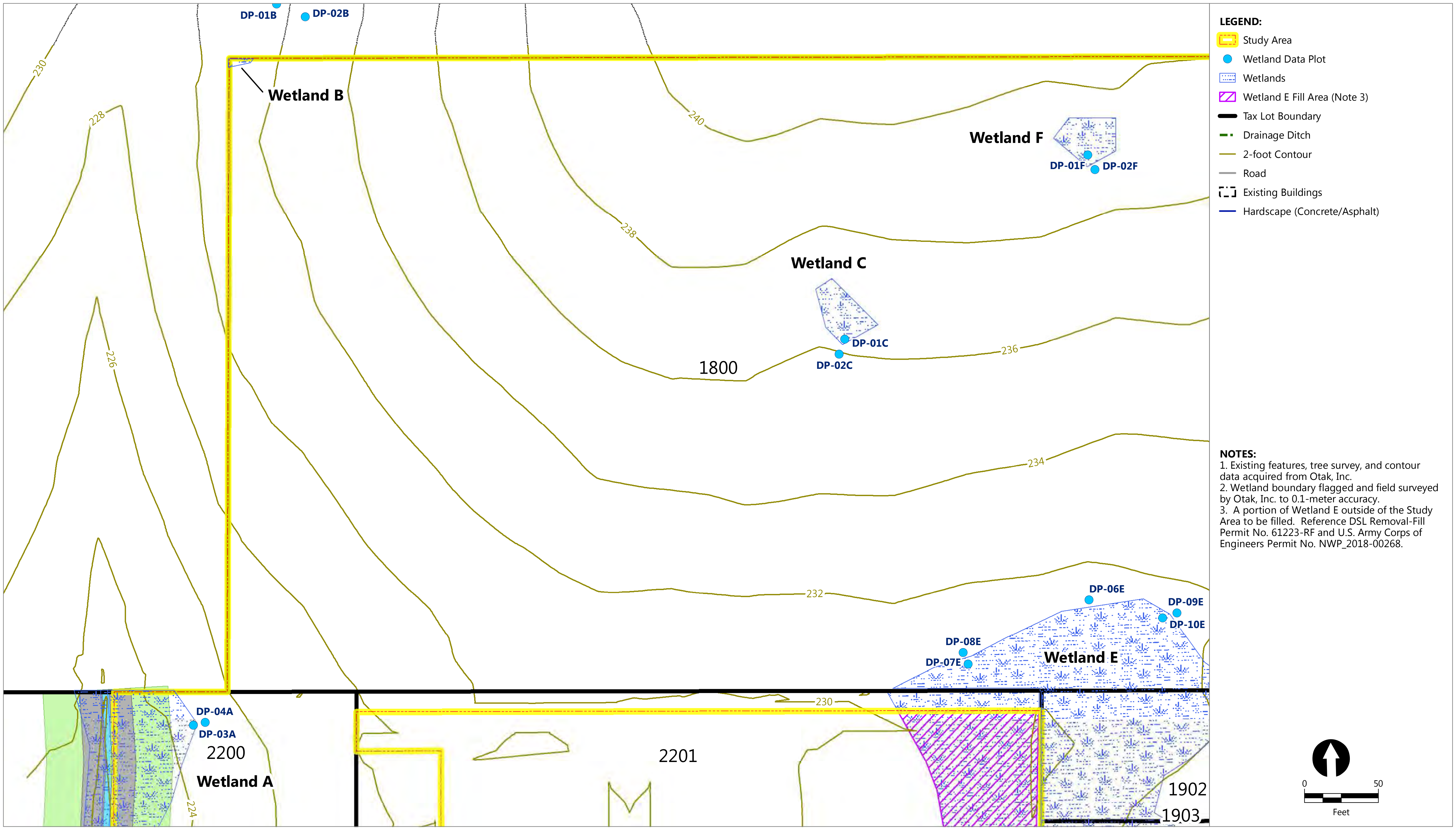
Figure 11a
Wetlands Detail Map
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



NOTES:
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3. A portion of Wetland E outside of the Study Area to be filled. Reference DSL Removal-Fill Permit No. 61223-RF and U.S. Army Corps of Engineers Permit No. NWP_2018-00268.

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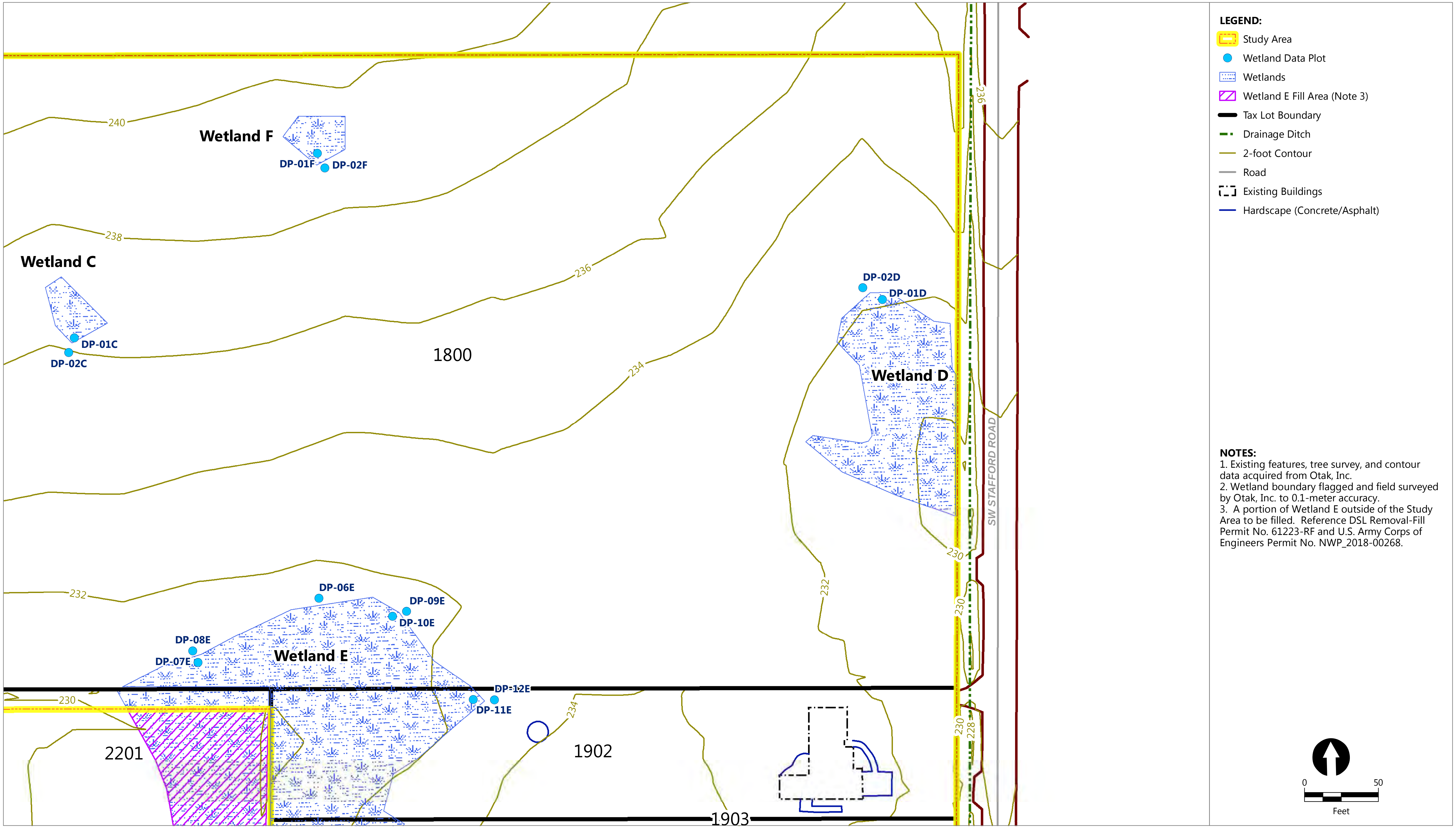
Figure 11b
Wetlands Detail Map
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



NOTES:

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2. Wetland boundary flagged and field surveyed by Otak, Inc. to 0.1-meter accuracy.
3. A portion of Wetland E outside of the Study Area to be filled. Reference DSL Removal-Fill Permit No. 61223-RF and U.S. Army Corps of Engineers Permit No. NWP_2018-00268.

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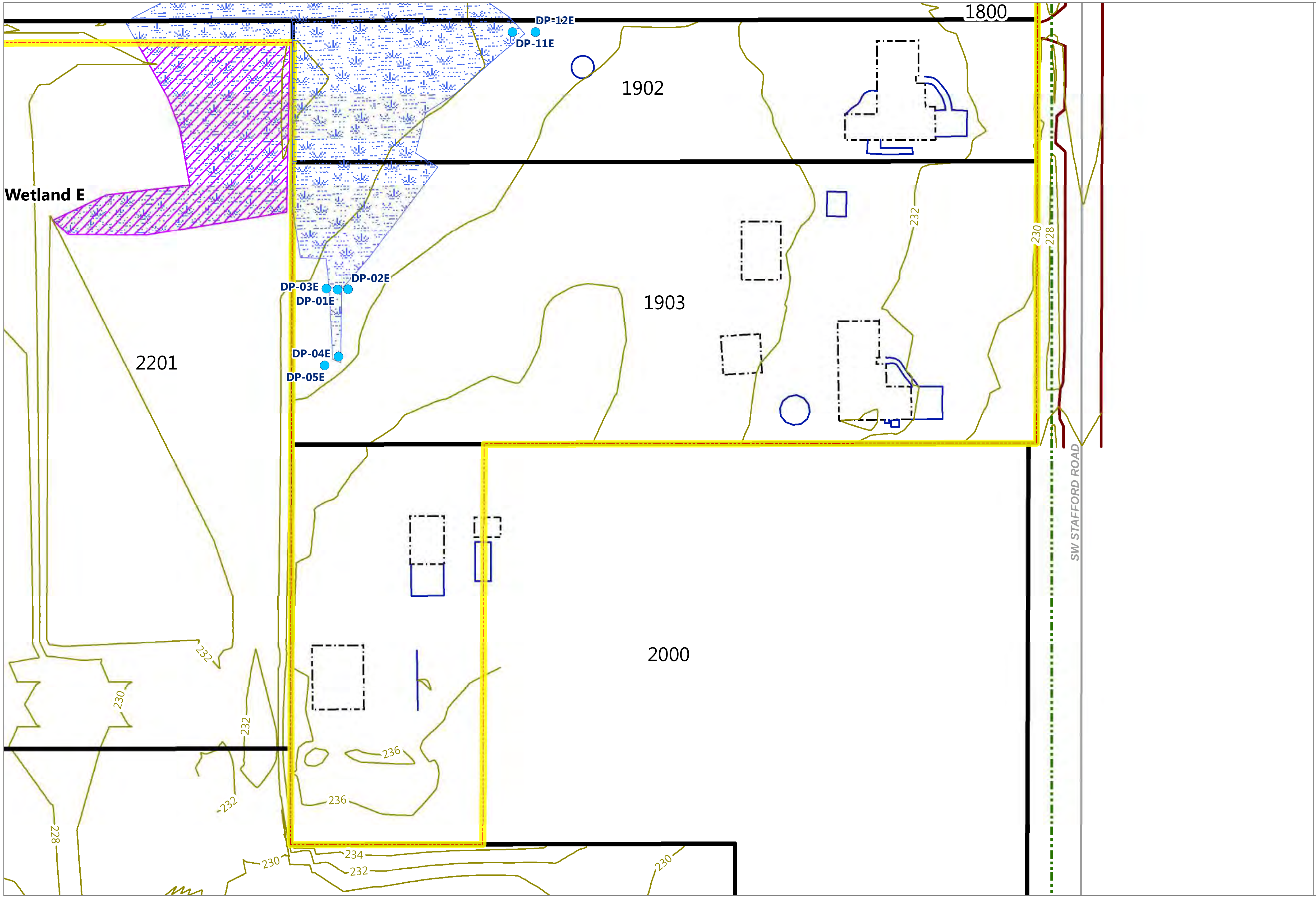
Figure 11c
Wetlands Detail Map
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



LEGEND:

- ▭ Study Area
- ● Wetland Data Plot
- ▨ Wetlands
- ▨ Wetland E Fill Area (Note 3)
- ▬ Tax Lot Boundary
- ▬ Drainage Ditch
- ▬ 2-foot Contour
- ▬ Road
- ▭ Existing Buildings
- ▬ Hardscape (Concrete/Asphalt)

NOTES:
1. Existing features, tree survey, and contour data acquired from Otak, Inc.
2. Wetland boundary flagged and field surveyed by Otak, Inc. to 0.1-meter accuracy.
3. A portion of Wetland E outside of the Study Area to be filled. Reference DSL Removal-Fill Permit No. 61223-RF and U.S. Army Corps of Engineers Permit No. NWP_2018-00268.

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Feet

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ANCHOR QEA

Figure 11d
Wetlands Detail Map
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development

Appendix A

Plant Species Observed in the Frog Pond Meadows Study Area

Table A-1
Plant Species Observed in the Frog Pond Meadows Study Area

Scientific Name	Common Name	Wetland Indicator Status[1]	Native Status[2]	Tax Lot				
				1800	2200	1902	1903	2000
Herbaceous Layer								
Agrostis spp.	Bentgrass species	UPL to FACW	Introduced	X	X	X	X	X
Alopecurus pratensis	Meadow foxtail	FAC	Introduced	X	X	X	X	X
Anthoxanthum odoratum	Sweet vernal grass	FACU	Introduced	X	X	X	X	X
Athyrium filix-femina	Northern lady fern	FAC	Native	X	X			
Carex deweyana	Dewey sedge	FAC	Native		X	X		
Carex obnupta	Slough sedge	OBL	Native	X	X	X		
Centaurium erythraea	European centaury	FAC	Introduced	X				
Cirsium arvense	Canada thistle	FAC	Invasive	X	X	X	X	X
Convolvulus arvensis	Field bindweed	NOL	Invasive	X	X	X		
Daucus carota	Queen Anne's lace	FACU	Invasive	X	X	X	X	X
Epilobium ciliatum	Fringed willowherb	FACW	Native	X	X			
Festuca rubra	Red fescue	FAC	Native	X	X	X	X	X
Geranium dissectum	Cutleaf geranium	NOL	Introduced	X		X	X	
Holcus lanatus	Common velvetgrass	FAC	Introduced	X	X	X	X	X
Hypochaeris radicata	Hairy cat's ear	FACU	Invasive	X	X	X	X	X
Jacobaea vulgaris	Tansy ragwort	FACU	Invasive	X				
Juncus bufonius	Toad rush	FACW	Native	X	X	X	X	
Juncus effusus	Soft rush	FACW	Native	X	X			
Leucanthemum vulgare	Ox-eye daisy	FACU	Introduced	X				
Lupinus spp.	Lupine	FACU to FAC	Native	X		X	X	
Madia glomerata	Mountain tarweed	FACU	Native	X				

Table A-1
Plant Species Observed in the Frog Pond Meadows Study Area

Scientific Name	Common Name	Wetland Indicator Status[1]	Native Status[2]	Tax Lot				
				1800	2200	1902	1903	2000
Matricaria discoidea	Pineappleweed	FACU	Introduced	X	X	X	X	X
Medicago lupulina	Black medick	FACU	Introduced	X	X	X	X	X
Medicago sativa	Alfalfa	UPL	Introduced	X				
Phalaris arundinacea	Reed canarygrass	FACW	Invasive	X	X			
Phleum pratense	Timothy grass	FAC	Introduced	X	X			
Plantago lanceolata	English plantain	FACU	Introduced	X		X	X	X
Plantago major	Common plantain	FAC	Introduced					
Poa spp.	Bluegrass species	FACU to OBL	Native/Introduced	X	X	X	X	X
Polystichum munitum	Western swordfern	FACU	Native		X			
Ranunculus repens	Creeping buttercup	FAC	Introduced	X	X	X	X	
Rumex acetosella	Common sheep's sorrel	FACU	Introduced	X				
Rumex crispus	Curly dock	FAC	Introduced		X	X		
Rumex occidentalis	Western dock	FACW	Native		X			
Schedonorus arundinaceus	Tall fescue	FAC	Introduced	X	X	X	X	X
Scirpus microcarpus	Small-fruited bulrush	OBL	Native		X			
Stachys chamissonis var. *cooleyae*	Coastal hedge-nettle	FACW	Native		X			
Taraxacum officinale	Common dandelion	FACU	Introduced	X	X	X	X	X
Tellima grandiflora	Fringecup	FACU	Native		X			
Trifolium campestre	Field clover	NOL	Introduced	X				
Trifolium pratense	Red clover	FACU	Introduced	X				
Trifolium repens	White clover	FAC	Introduced	X		X	X	
Various genera	Mustard species	--	Introduced	X	X	X	X	X
Vicia americana	American vetch	FAC	Native	X	X	X	X	
Vicia sativa	Common vetch	UPL	Introduced	X				

Table A-1
Plant Species Observed in the Frog Pond Meadows Study Area

Scientific Name	Common Name	Wetland Indicator Status[1]	Native Status[2]	Tax Lot				
				1800	2200	1902	1903	2000
Shrub/Sapling Layer								
Corylus cornuta	Beaked hazelnut	FACU	Native		X	X		
Crataegus monogyna	Common hawthorn	FAC	Invasive	X	X	X	X	
Frangula purshiana	Cascara false buckthorn	FAC	Native		X			
Fraxinus latifolia	Oregon ash	FACW	Native	X	X			
Hedera helix	English ivy	FACU	Introduced		X			
Ilex aquifolium	English holly	FACU	Introduced	X	X			
Malus sp.	Cultivated apple tree	NOL	Introduced	X	X			
Oemleria cerasiformis	Indian plum	FACU	Native		X			
Prunus avens	Bing cherry	NOL	Introduced	X	X			
Prunus emarginatus	Bitter cherry	FACU	Native		X			
Rhododendron macrophyllum	Pacific rhododendron	FACU	Native		X			
Robinia pseudoacacia	Black locust	FACU	Native		X			
Rosa spp.	Wild rose	UPL to FAC	Native/Introduced	X	X	X	X	
Rubus armeniacus	Himalayan blackberry	FAC	Invasive	X	X	X	X	X
Rubus ursinus	Trailing blackberry	FACU	Native		X			
Salix scouleriana	Scouler's willow	FAC	Native		X			
Spiraea douglasii	Douglas' spirea	FACW	Native	X	X			
Symphoricarpos albus	Common snowberry	FACU	Native		X			
Thuja plicata	Western red cedar	FAC	Native	X	X			
Toxicodendron diversilobum	Pacific poison oak	FAC	Native		X			

Table A-1
Plant Species Observed in the Frog Pond Meadows Study Area

Scientific Name	Common Name	Wetland Indicator Status[1]	Native Status[2]	Tax Lot				
				1800	2200	1902	1903	2000
Tree Layer								
Betula papyrifera	Paper birch	FAC	Introduced		X			
Crataegus monogyna	Common hawthorn	FAC	Invasive	X	X	X	X	
Picea abies	Norway spruce	NOL	Introduced		X			
Pinus ponderosa	Ponderosa pine	FACU	Native		X			
Picea pungens	Colorado blue spruce	FAC	Introduced	X				
Pinus resinosa	Red pine	NI	Introduced			X	X	
Pinus sylvestris	Scots pine	NOL	Introduced	X				
Populus balsamifera ssp. *Trichocarpa*	Black cottonwood	FAC	Native				X	X
Populus nigra L.	Lombardy poplar	NOL	Introduced		X			
Pseudotsuga menziesii	Douglas fir	FACU	Native		X			X
Quercus garryana	Oregon white oak	FACU	Native	X				
Robinia pseudoacacia	Black locust	FACU	Native		X			
Salix lasiandra	Pacific willow	FACW	Native		X			
Salix scouleriana	Scouler's willow	FAC	Native		X			
Sequoiadendron giganteum	Giant sequoia	NOL	Introduced		X			
Tilia spp.	Linden tree	--	Introduced	X				

Table A-1
Plant Species Observed in the Frog Pond Meadows Study Area

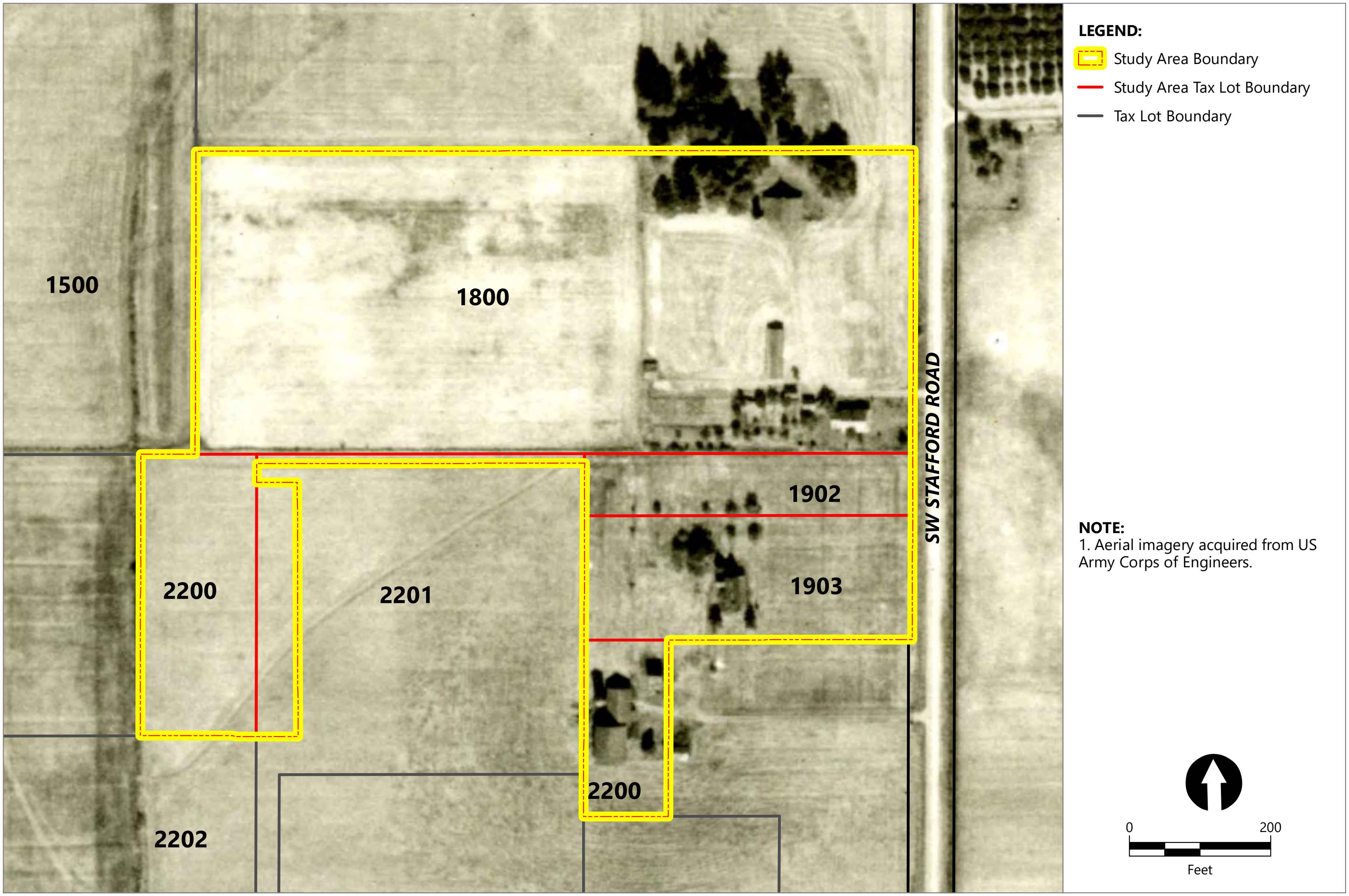
Notes:

1. Wetland indicator status based on the National Wetland Plant List: 2016 Wetland Ratings (Lichvar et al. 2016).
2. Native/introduced status determined using U.S. Department of Agriculture PLANTS database (USDA 2018); invasive status determined using Clackamas County Weed List from Clackamas Soil and Water Conservation District (Clackamas SWCD 2018)

--: not applicable
FAC: facultative
FACU: facultative upland
FACW: facultative wetland
NI: no indicator status
NOL: not on list (species is not listed on the 2016 National Wetland Plant List)
OBL: obligate
UPL: upland

Appendix B

Historical Aerial Photographs

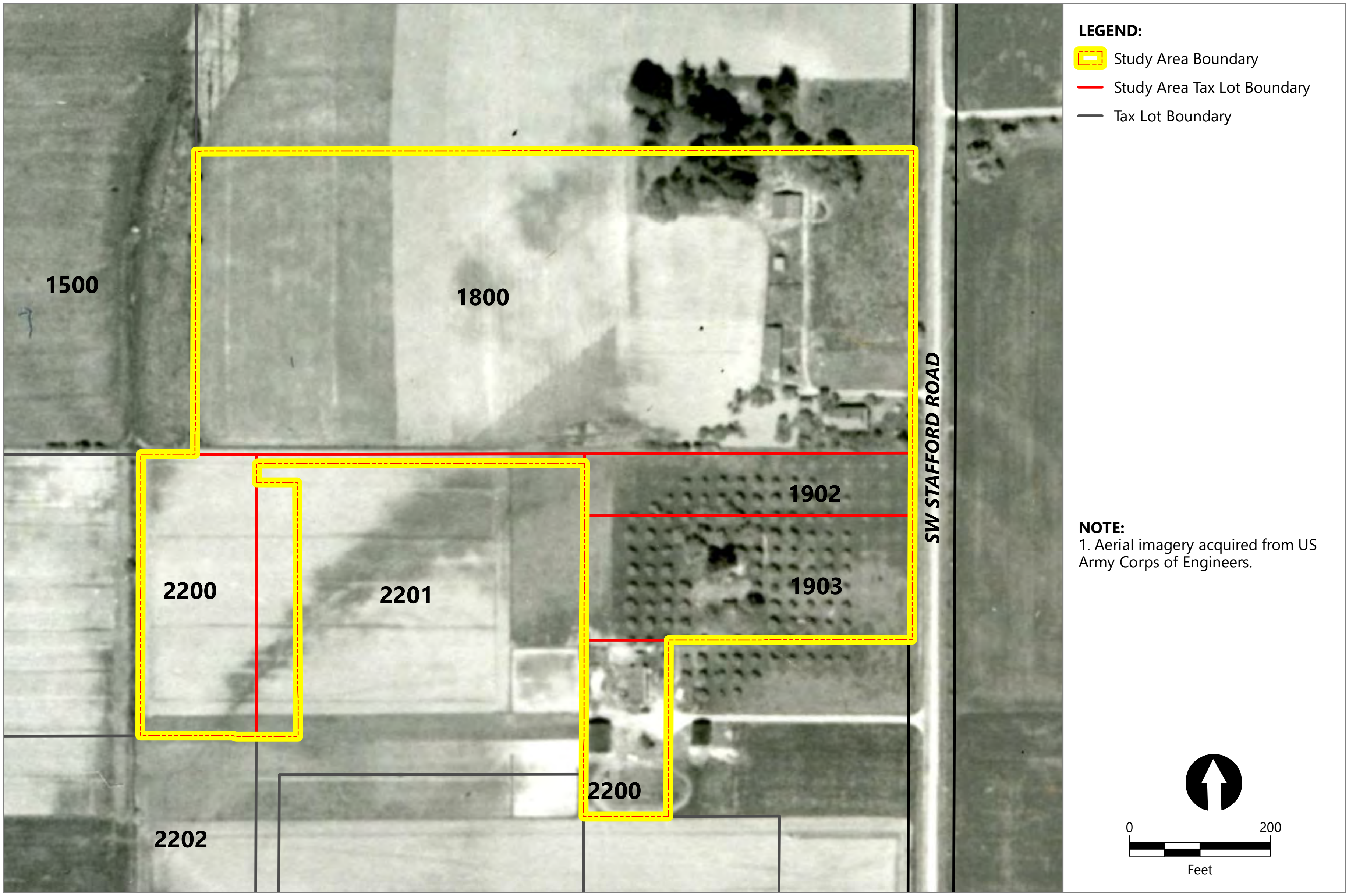


NOTE:
1. Aerial imagery acquired from US Army Corps of Engineers.

Publish Date: 2018/10/19, 11:53 AM | User: epipkin
Filepath: Q:\Jobs\West_Hills_Development_1015\Stafford_Meadows_2and3\Maps\WDR\FrogPondMeadows_WDR_AppxB_HistoricalAerials_DDP.mxd

ANCHOR QEA

Figure B1
Historical Aerial – 1936
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development

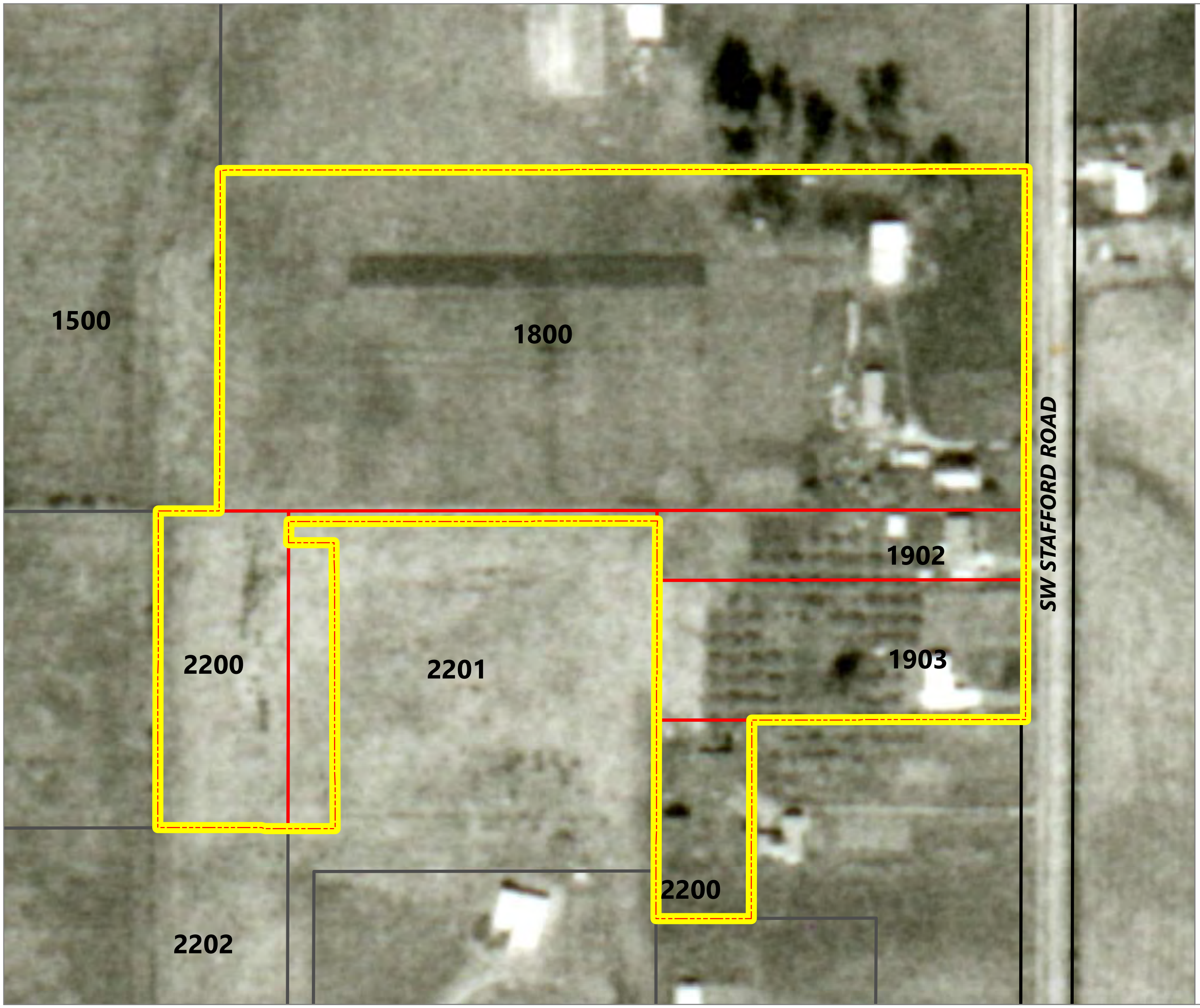


NOTE:
1. Aerial imagery acquired from US Army Corps of Engineers.

Publish Date: 2018/10/19, 11:53 AM | User: epipkin
Filepath: Q:\Jobs\West_Hills_Development_1015\Stafford_Meadows_2and3\Maps\WDR\FrogPondMeadows_WDR_AppxB_HistoricalAerials_DDP.mxd

ANCHOR QEA

Figure B2
Historical Aerial – 1953
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



LEGEND:

🟨 Study Area Boundary
— Study Area Tax Lot Boundary
— Tax Lot Boundary

NOTE:
1. Aerial imagery acquired from US Army Corps of Engineers.

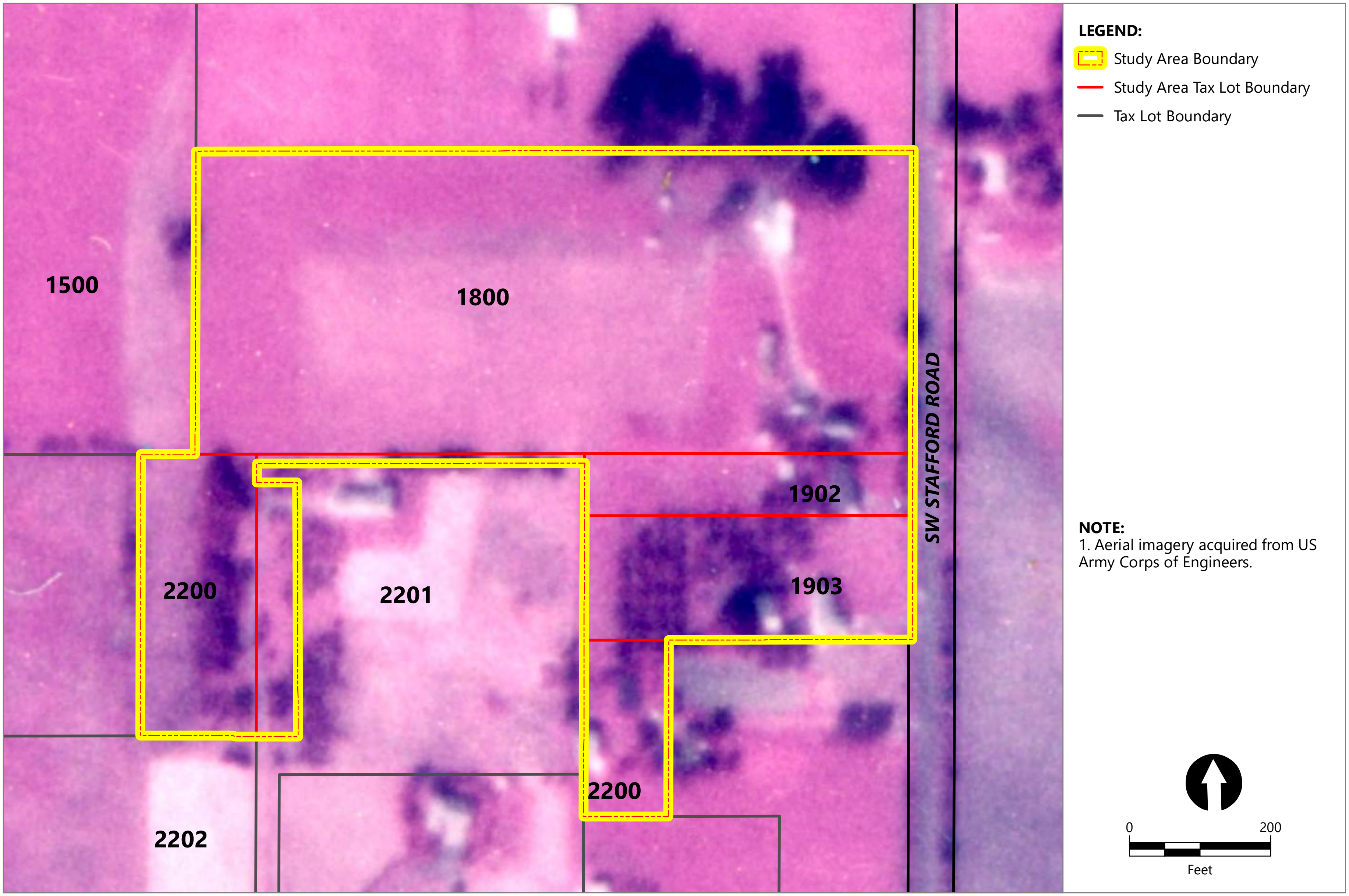
Publish Date: 2018/10/19, 11:53 AM | User: epipkin
Filepath: Q:\Jobs\West_Hills_Development_1015\Stafford_Meadows_2and3\Maps\WDR\FrogPondMeadows_WDR_AppxB_HistoricalAerials_DDP.mxd

ANCHOR QEA

Figure B3

Historical Aerial – 1976

Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development

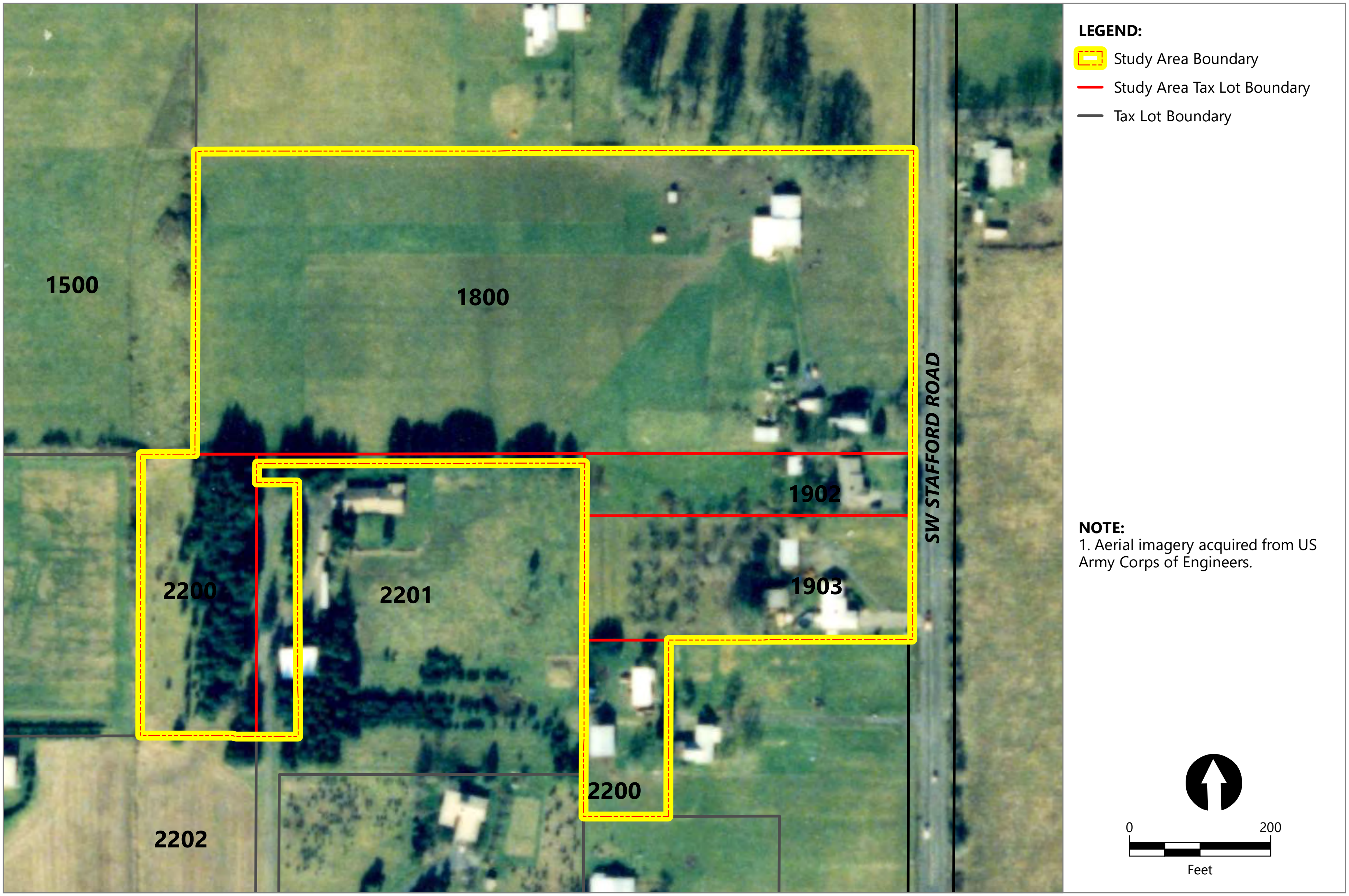


NOTE:
1. Aerial imagery acquired from US Army Corps of Engineers.

Publish Date: 2018/10/19, 11:54 AM | User: epipkin
Filepath: Q:\Jobs\West_Hills_Development_1015\Stafford_Meadows_2and3\Maps\WDR\FrogPondMeadows_WDR_AppxB_HistoricalAerials_DDP.mxd

ANCHOR QEA

Figure B4
Historical Aerial – 1983
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



NOTE:
1. Aerial imagery acquired from US Army Corps of Engineers.

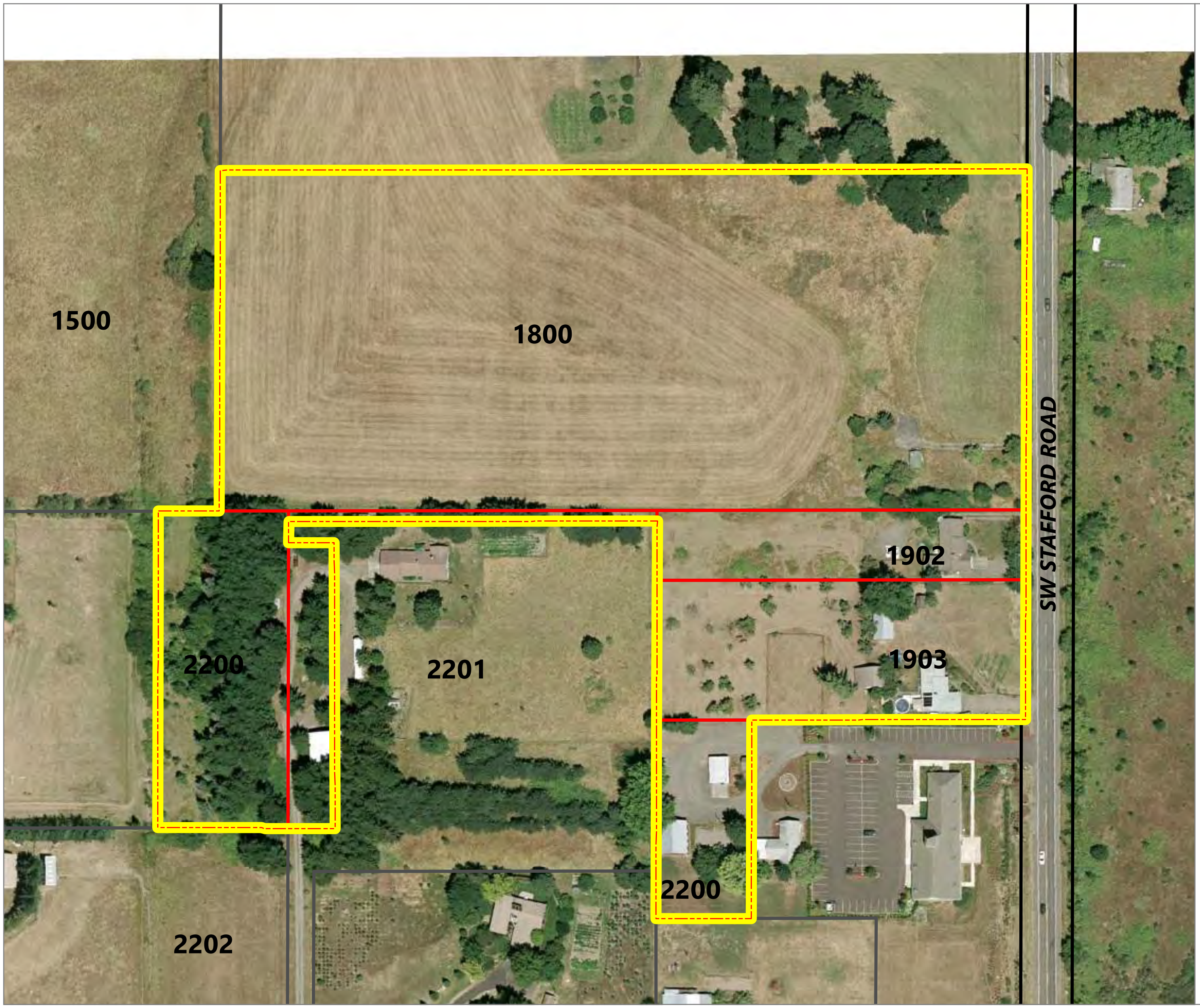
Publish Date: 2018/10/19, 11:54 AM | User: epipkin
Filepath: Q:\Jobs\West_Hills_Development_1015\Stafford_Meadows_2and3\Maps\WDR\FrogPondMeadows_WDR_AppxB_HistoricalAerials_DDP.mxd

ANCHOR QEA

Figure B5

Historical Aerial – 1996

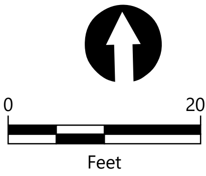
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



LEGEND:

- 🟨 Study Area Boundary
- 🟥 Study Area Tax Lot Boundary
- — Tax Lot Boundary

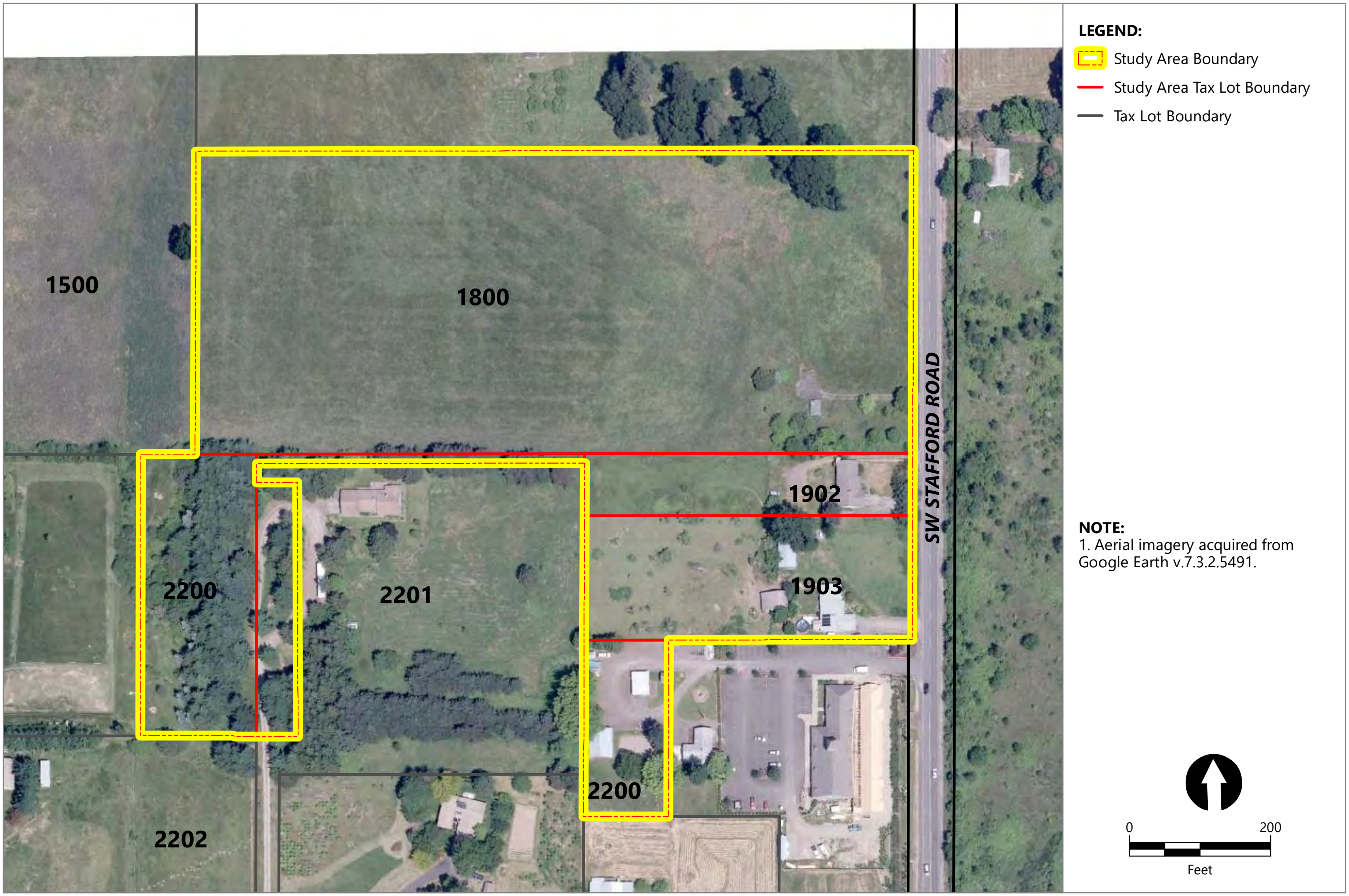
NOTE:
1. Aerial imagery acquired from Google Earth v.7.3.2.5491.



Publish Date: 2018/10/19, 11:58 AM | User: epipkin
Filepath: Q:\Jobs\West_Hills_Development_1015\Stafford_Meadows_2and3\Maps\WDR\FrogPondMeadows_WDR_AppxB_HistoricalAerials_DDP.mxd

ANCHOR QEA

Figure B6
Historical Aerial – 2004
Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



NOTE:
1. Aerial imagery acquired from Google Earth v.7.3.2.5491.

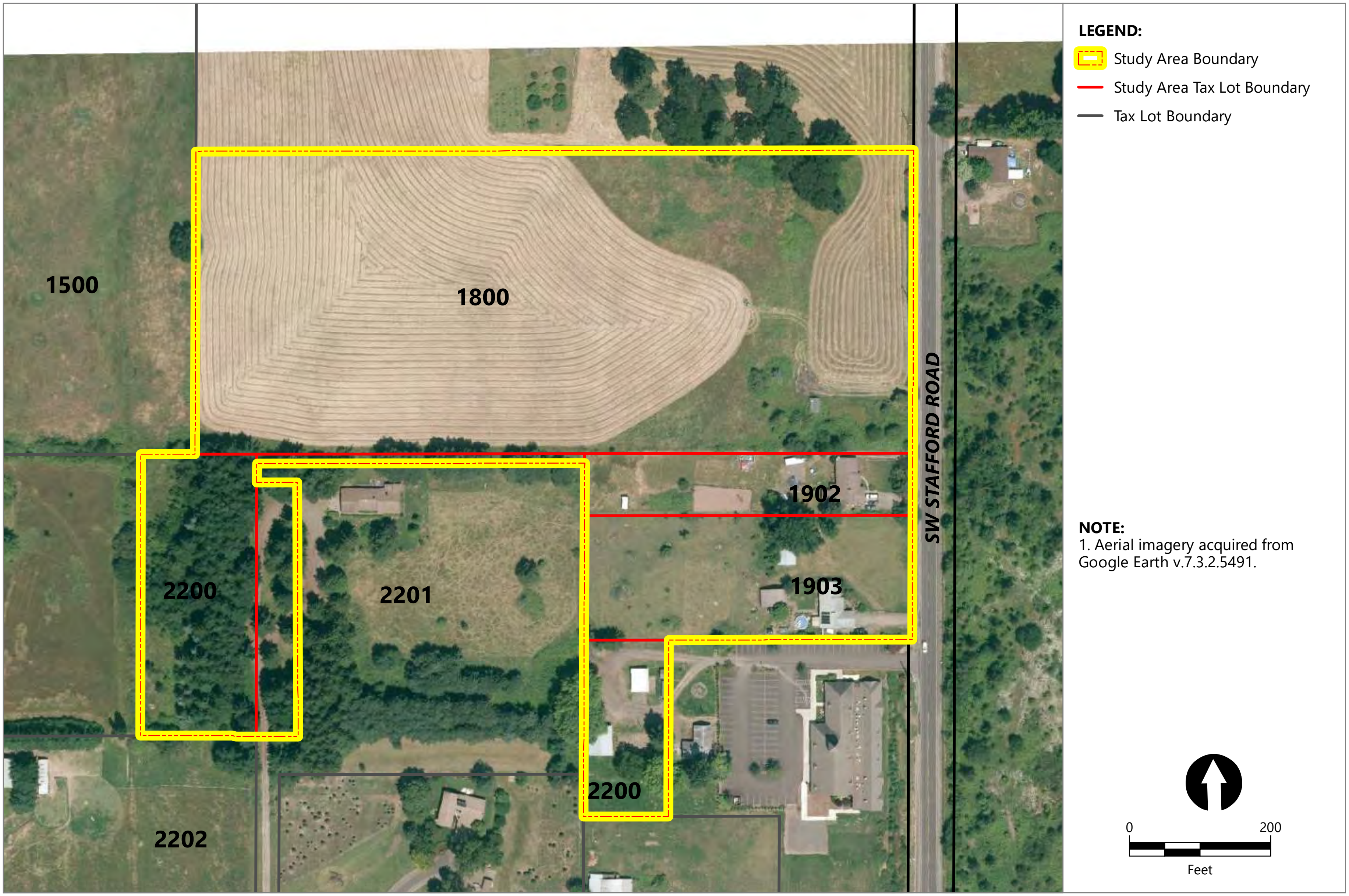
Publish Date: 2018/10/19, 11:58 AM | User: epipkin
Filepath: Q:\Jobs\West_Hills_Development_1015\Stafford_Meadows_2and3\Maps\WDR\FrogPondMeadows_WDR_AppxB_HistoricalAerials_DDP.mxd

Figure B7

Historical Aerial – 2008

Wetland Delineation Report

West Hills Land Development: Frog Pond Meadows Residential Development



LEGEND:

- ▭ Study Area Boundary
- ━ Study Area Tax Lot Boundary
- ━ Tax Lot Boundary

NOTE:
1. Aerial imagery acquired from Google Earth v.7.3.2.5491.

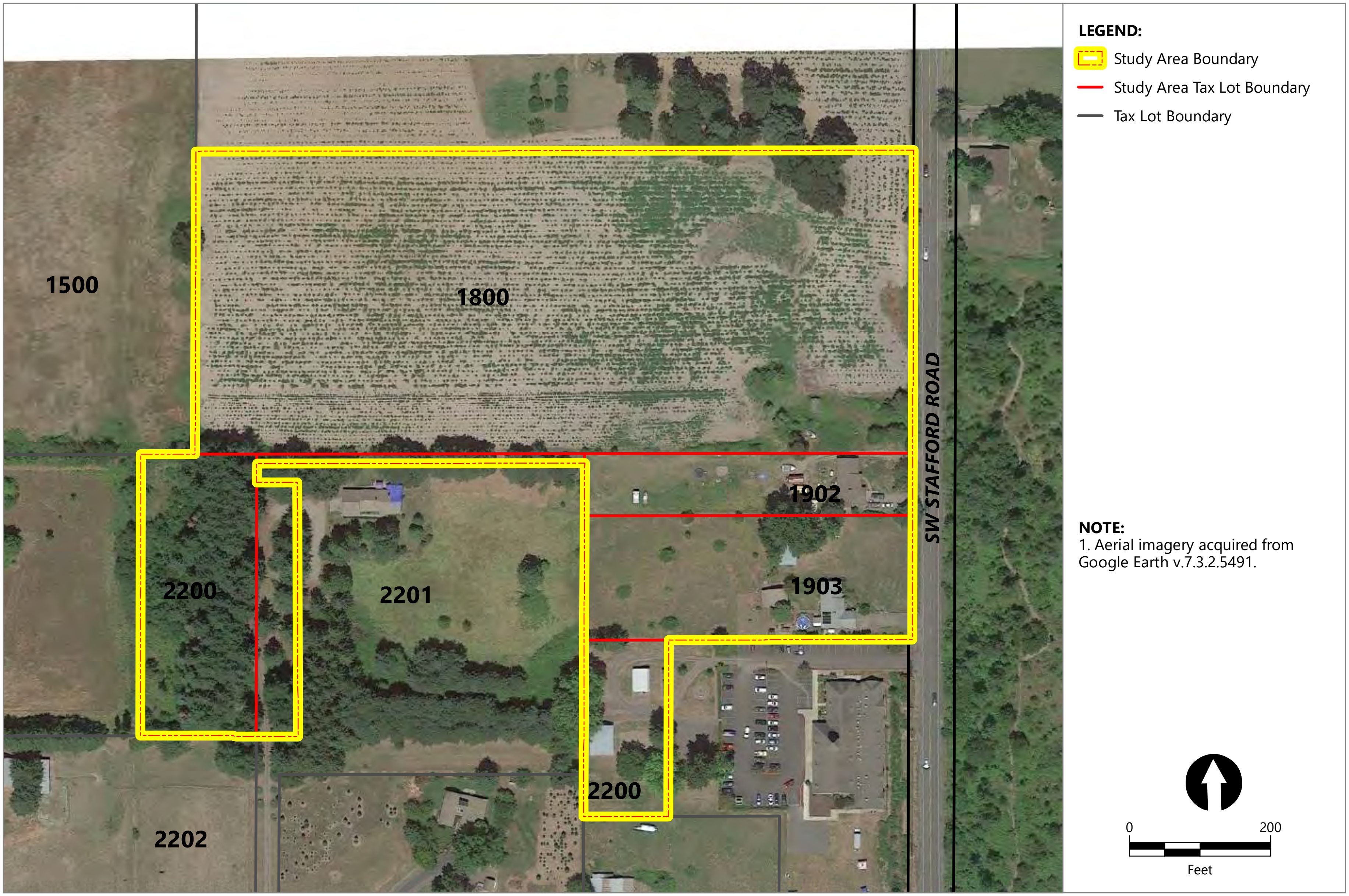
Publish Date: 2018/10/19, 11:58 AM | User: epipkin
Filepath: Q:\Jobs\West_Hills_Development_1015\Stafford_Meadows_2and3\Maps\WDR\FrogPondMeadows_WDR_AppxB_HistoricalAerials_DDP.mxd

ANCHOR QEA

Figure B8

Historical Aerial – 2012

Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development



NOTE:
1. Aerial imagery acquired from Google Earth v.7.3.2.5491.

Publish Date: 2018/10/19, 11:58 AM | User: epipkin
Filepath: Q:\Jobs\West_Hills_Development_1015\Stafford_Meadows_2and3\Maps\WDR\FrogPondMeadows_WDR_AppxB_HistoricalAerials_DDP.mxd

ANCHOR QEA

Figure B9

Historical Aerial – 2016

Wetland Delineation Report
West Hills Land Development: Frog Pond Meadows Residential Development

Appendix C

Precipitation Data

National Weather Service - Climate Data select { background-color: #FFFFB3; } function swapURL() { // make sure a new date was chosen if (document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value != "") { // all good // return true; document.myProd.submit(); } else { alert("Please chhose a valid date/time first."); return false; } }   These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.
Climatological Report (Daily)

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830
CDUS46 KPQR 151148
CLIPDX


CLIMATE REPORT
NATIONAL WEATHER SERVICE PORTLAND OREGON
448 AM PDT TUE MAY 15 2018


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...THE PORTLAND OR CLIMATE SUMMARY FOR MAY 14 2018...

CLIMATE NORMAL PERIOD 1981 TO 2010
CLIMATE RECORD PERIOD 1940 TO 2018


WEATHER ITEM   OBSERVED TIME   RECORD YEAR NORMAL DEPARTURE LAST
                VALUE   (LST)  VALUE       VALUE  FROM      YEAR
                                                  NORMAL
..................................................................
TEMPERATURE (F)
 YESTERDAY
  MAXIMUM         89    509 PM  91    2014  68     21       61
  MINIMUM         56    513 AM  33    1964  48      8       46
  AVERAGE         73                        58     15       54

PRECIPITATION (IN)
  YESTERDAY        0.00          0.70 1959   0.08  -0.08     0.05
  MONTH TO DATE    0.15                      1.09  -0.94     1.24
  SINCE OCT 1     27.31                     30.16  -2.85    47.25
  SINCE JAN 1     13.21                     16.04  -2.83    27.50

SNOWFALL (IN)
  YESTERDAY        0.0          MM      MM
  MONTH TO DATE    0.0
  SINCE MAR 1      T
  SINCE JUL 1      7.6

DEGREE DAYS
 HEATING
```

```
  YESTERDAY        0                 7    -7      11
  MONTH TO DATE   39               123   -84     126
  SINCE MAR 1    923              1028  -105    1077
  SINCE JUL 1   3844              4086  -242    4282

 COOLING
  YESTERDAY        8                 0     8       0
  MONTH TO DATE   20                 0    20      10
  SINCE MAR 1     29                 1    28      10
  SINCE JAN 1     29                 1    28      10
.................................................................


WIND (MPH)
  HIGHEST WIND SPEED    13   HIGHEST WIND DIRECTION    NW (320)
  HIGHEST GUST SPEED    16   HIGHEST GUST DIRECTION    NW (320)
  AVERAGE WIND SPEED     5.1


SKY COVER
  POSSIBLE SUNSHINE  MM
  AVERAGE SKY COVER 0.1


WEATHER CONDITIONS
 THE FOLLOWING WEATHER WAS RECORDED YESTERDAY.
  NO SIGNIFICANT WEATHER WAS OBSERVED.


RELATIVE HUMIDITY (PERCENT)
 HIGHEST    80           400 AM
 LOWEST     24           500 PM
 AVERAGE    52

..........................................................


THE PORTLAND OR CLIMATE NORMALS FOR TODAY
                         NORMAL    RECORD    YEAR
 MAXIMUM TEMPERATURE (F)   68       93      2006
 MINIMUM TEMPERATURE (F)   49       36      1964


SUNRISE AND SUNSET
MAY 15 2018...........SUNRISE   539 AM PDT   SUNSET   835 PM PDT
MAY 16 2018...........SUNRISE   538 AM PDT   SUNSET   836 PM PDT


-  INDICATES NEGATIVE NUMBERS.
R  INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T  INDICATES TRACE AMOUNT.
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } function swapURL() { // make sure a new date was chosen if (document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value != "") { // all good // return true; document.myProd.submit(); } else { alert("Please chhose a valid date/time first."); return false; } } These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

Climatological Report (Daily)

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CDUS46 KPQR 161143
CLIPDX


CLIMATE REPORT
NATIONAL WEATHER SERVICE PORTLAND OREGON
442 AM PDT WED MAY 16 2018



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...THE PORTLAND OR CLIMATE SUMMARY FOR MAY 15 2018...

CLIMATE NORMAL PERIOD 1981 TO 2010
CLIMATE RECORD PERIOD 1940 TO 2018


WEATHER ITEM   OBSERVED TIME   RECORD YEAR NORMAL DEPARTURE LAST
                VALUE   (LST)  VALUE       VALUE  FROM      YEAR
                                                  NORMAL
.................................................................
TEMPERATURE (F)
 YESTERDAY
  MAXIMUM         71    503 PM  93    2006  68      3       60
  MINIMUM         56    754 AM  36    1964  49      7       45
  AVERAGE         64                        58      6       53

PRECIPITATION (IN)
  YESTERDAY        0.00          0.75 2011   0.08  -0.08     0.22
  MONTH TO DATE    0.15                      1.17  -1.02     1.46
  SINCE OCT 1     27.31                     30.24  -2.93    47.47
  SINCE JAN 1     13.21                     16.12  -2.91    27.72

SNOWFALL (IN)
  YESTERDAY        0.0          MM      MM
  MONTH TO DATE    0.0
  SINCE MAR 1      T
  SINCE JUL 1      7.6

DEGREE DAYS
 HEATING
```

```
  YESTERDAY        1                      7     -6       12
  MONTH TO DATE   40                        130    -90      138
  SINCE MAR 1    924                    1035   -111     1089
  SINCE JUL 1   3845                    4093   -248     4294

 COOLING
  YESTERDAY        0                      0      0        0
  MONTH TO DATE   20                           0     20       10
  SINCE MAR 1     29                      1     28       10
  SINCE JAN 1     29                      1     28       10
..................................................................


WIND (MPH)
  HIGHEST WIND SPEED    12   HIGHEST WIND DIRECTION     W (290)
  HIGHEST GUST SPEED    13   HIGHEST GUST DIRECTION     N (350)
  AVERAGE WIND SPEED     4.0


SKY COVER
  POSSIBLE SUNSHINE  MM
  AVERAGE SKY COVER 0.7


WEATHER CONDITIONS
 THE FOLLOWING WEATHER WAS RECORDED YESTERDAY.
  NO SIGNIFICANT WEATHER WAS OBSERVED.


RELATIVE HUMIDITY (PERCENT)
 HIGHEST    86           300 AM
 LOWEST     57           400 PM
 AVERAGE    72

..........................................................


THE PORTLAND OR CLIMATE NORMALS FOR TODAY
                         NORMAL    RECORD    YEAR
 MAXIMUM TEMPERATURE (F)   68       92      2008
 MINIMUM TEMPERATURE (F)   49       40      1950


SUNRISE AND SUNSET
MAY 16 2018...........SUNRISE   538 AM PDT   SUNSET   836 PM PDT
MAY 17 2018...........SUNRISE   537 AM PDT   SUNSET   837 PM PDT


-  INDICATES NEGATIVE NUMBERS.
R  INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T  INDICATES TRACE AMOUNT.
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } f
unction swapURL() { // make sure a new date was chosen if
(document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value
!= "") { // all good // return true; document.myProd.submit(); } else {
alert("Please chhose a valid date/time first."); return false; } }   These
data are preliminary and have not undergone final quality control by the
National Climatic Data Center (NCDC). Therefore, these data are subject to
revision. Final and certified climate data can be accessed at the NCDC -
http://www.ncdc.noaa.gov.
Climatological Report (Daily)

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000
CDUS46 KPQR 171144
CLIPDX


CLIMATE REPORT
NATIONAL WEATHER SERVICE PORTLAND OREGON
444 AM PDT THU MAY 17 2018


...................................

...THE PORTLAND OR CLIMATE SUMMARY FOR MAY 16 2018...

CLIMATE NORMAL PERIOD 1981 TO 2010
CLIMATE RECORD PERIOD 1940 TO 2018


WEATHER ITEM   OBSERVED TIME   RECORD YEAR NORMAL DEPARTURE LAST
               VALUE   (LST)  VALUE       VALUE  FROM      YEAR
                                                 NORMAL
..................................................................
TEMPERATURE (F)
 YESTERDAY
  MAXIMUM         65    242 PM  92    2008  68     -3       56
  MINIMUM         55    616 AM  40    1950  49      6       47
  AVERAGE         60                        58      2       52

PRECIPITATION (IN)
  YESTERDAY        0.00          1.34 1945   0.07  -0.07     0.30
  MONTH TO DATE    0.15                      1.24  -1.09     1.76
  SINCE OCT 1     27.31                     30.31  -3.00    47.77
  SINCE JAN 1     13.21                     16.19  -2.98    28.02

SNOWFALL (IN)
  YESTERDAY        0.0          MM      MM
  MONTH TO DATE    0.0
  SINCE MAR 1      T
  SINCE JUL 1      7.6

DEGREE DAYS
 HEATING
```

```
  YESTERDAY        5                         7     -2       13
  MONTH TO DATE   45                         137    -92      151
  SINCE MAR 1    929                      1042   -113     1102
  SINCE JUL 1   3850                      4100   -250     4307

 COOLING
  YESTERDAY        0                         0      0        0
  MONTH TO DATE   20                           0     20       10
  SINCE MAR 1     29                         1     28       10
  SINCE JAN 1     29                         1     28       10
..................................................................


WIND (MPH)
  HIGHEST WIND SPEED    13   HIGHEST WIND DIRECTION     E (80)
  HIGHEST GUST SPEED    15   HIGHEST GUST DIRECTION     E (80)
  AVERAGE WIND SPEED     4.9


SKY COVER
  POSSIBLE SUNSHINE  MM
  AVERAGE SKY COVER 1.0


WEATHER CONDITIONS
 THE FOLLOWING WEATHER WAS RECORDED YESTERDAY.
  NO SIGNIFICANT WEATHER WAS OBSERVED.


RELATIVE HUMIDITY (PERCENT)
 HIGHEST    86           600 AM
 LOWEST     63           200 PM
 AVERAGE    75

..........................................................


THE PORTLAND OR CLIMATE NORMALS FOR TODAY
                         NORMAL    RECORD    YEAR
 MAXIMUM TEMPERATURE (F)   68        95      2008
 MINIMUM TEMPERATURE (F)   49        37      1966


SUNRISE AND SUNSET
MAY 17 2018...........SUNRISE   537 AM PDT   SUNSET   837 PM PDT
MAY 18 2018...........SUNRISE   536 AM PDT   SUNSET   838 PM PDT


-  INDICATES NEGATIVE NUMBERS.
R  INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T  INDICATES TRACE AMOUNT.
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } f
unction swapURL() { // make sure a new date was chosen if
(document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value
!= "") { // all good // return true; document.myProd.submit(); } else {
alert("Please chhose a valid date/time first."); return false; } }   These
data are preliminary and have not undergone final quality control by the
National Climatic Data Center (NCDC). Therefore, these data are subject to
revision. Final and certified climate data can be accessed at the NCDC -
http://www.ncdc.noaa.gov.
Climatological Report (Daily)

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090
CDUS46 KPQR 201142
CLIPDX


CLIMATE REPORT
NATIONAL WEATHER SERVICE PORTLAND OREGON
441 AM PDT THU SEP 20 2018



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...THE PORTLAND OR CLIMATE SUMMARY FOR SEPTEMBER 19 2018...

CLIMATE NORMAL PERIOD 1981 TO 2010
CLIMATE RECORD PERIOD 1940 TO 2018


WEATHER ITEM   OBSERVED TIME   RECORD YEAR NORMAL DEPARTURE LAST
                VALUE   (LST)  VALUE       VALUE  FROM      YEAR
                                      NORMAL
..................................................................
TEMPERATURE (F)
 YESTERDAY
  MAXIMUM         72    456 PM  93    1974  75     -3       65
  MINIMUM         48    551 AM  39    1957  52     -4       51
  AVERAGE         60                        64     -4       58

PRECIPITATION (IN)
  YESTERDAY        0.00          0.97 1988   0.05  -0.05     0.31
                                      1982
  MONTH TO DATE    1.55                      0.81   0.74     1.04
  SINCE OCT 1     29.99                     35.37  -5.38    50.11
  SINCE JAN 1     15.89                     21.25  -5.36    30.36

SNOWFALL (IN)
  YESTERDAY        0.0           MM      MM
  MONTH TO DATE    0.0
  SINCE SEP 1      0.0
  SINCE JUL 1      0.0

DEGREE DAYS
```

```
 HEATING
  YESTERDAY       5                      3      2        7
  MONTH TO DATE   35                     32      3       21
  SINCE SEP 1     35                     32      3       21
  SINCE JUL 1     43                     59    -16       23

 COOLING
  YESTERDAY       0                      2     -2        0
  MONTH TO DATE   36                     48    -12      118
  SINCE SEP 1     36                     48    -12      118
  SINCE JAN 1    679                    411    268      686
..................................................................


WIND (MPH)
  HIGHEST WIND SPEED    13   HIGHEST WIND DIRECTION    NW (320)
  HIGHEST GUST SPEED    19   HIGHEST GUST DIRECTION    NW (320)
  AVERAGE WIND SPEED     4.2


SKY COVER
  POSSIBLE SUNSHINE  MM
  AVERAGE SKY COVER 0.5


WEATHER CONDITIONS
 THE FOLLOWING WEATHER WAS RECORDED YESTERDAY.
  NO SIGNIFICANT WEATHER WAS OBSERVED.


RELATIVE HUMIDITY (PERCENT)
 HIGHEST    93          600 AM
 LOWEST     35          300 PM
 AVERAGE    64

..........................................................


THE PORTLAND OR CLIMATE NORMALS FOR TODAY
                         NORMAL    RECORD    YEAR
 MAXIMUM TEMPERATURE (F)   75        96      1952
 MINIMUM TEMPERATURE (F)   52        39      1957


SUNRISE AND SUNSET
SEPTEMBER 20 2018.....SUNRISE   655 AM PDT   SUNSET   712 PM PDT
SEPTEMBER 21 2018.....SUNRISE   656 AM PDT   SUNSET   710 PM PDT


-  INDICATES NEGATIVE NUMBERS.
R  INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T  INDICATES TRACE AMOUNT.
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } f
unction swapURL() { // make sure a new date was chosen if
(document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value
!= "") { // all good // return true; document.myProd.submit(); } else {
alert("Please chhose a valid date/time first."); return false; } }   These
data are preliminary and have not undergone final quality control by the
National Climatic Data Center (NCDC). Therefore, these data are subject to
revision. Final and certified climate data can be accessed at the NCDC -
http://www.ncdc.noaa.gov.
Climatological Report (Daily)

```
097
CDUS46 KPQR 211141
CLIPDX


CLIMATE REPORT
NATIONAL WEATHER SERVICE PORTLAND OREGON
441 AM PDT FRI SEP 21 2018


...................................

...THE PORTLAND OR CLIMATE SUMMARY FOR SEPTEMBER 20 2018...

CLIMATE NORMAL PERIOD 1981 TO 2010
CLIMATE RECORD PERIOD 1940 TO 2018


WEATHER ITEM   OBSERVED TIME   RECORD YEAR NORMAL DEPARTURE LAST
                VALUE   (LST)  VALUE       VALUE  FROM      YEAR
                                                  NORMAL
..................................................................
TEMPERATURE (F)
 YESTERDAY
  MAXIMUM         73    355 PM  96    1952  75     -2       61
  MINIMUM         49    453 AM  39    1957  52     -3       49
  AVERAGE         61                        64     -3       55

PRECIPITATION (IN)
  YESTERDAY       0.00          1.56 1982   0.06  -0.06     1.09
  MONTH TO DATE   1.55                      0.87   0.68     2.13
  SINCE OCT 1     29.99                    35.43  -5.44    51.20
  SINCE JAN 1     15.89                    21.31  -5.42    31.45

SNOWFALL (IN)
  YESTERDAY       0.0          MM      MM
  MONTH TO DATE   0.0
  SINCE SEP 1     0.0
  SINCE JUL 1     0.0

DEGREE DAYS
 HEATING
```

```
  YESTERDAY        4                        3      1        10
  MONTH TO DATE   39                        35      4       31
  SINCE SEP 1     39                    35      4       31
  SINCE JUL 1     47                    62    -15       33

 COOLING
  YESTERDAY        0                        2     -2        0
  MONTH TO DATE   36                        50    -14      118
  SINCE SEP 1     36                    50    -14      118
  SINCE JAN 1    679                    413    266      686
.................................................................


WIND (MPH)
  HIGHEST WIND SPEED     9   HIGHEST WIND DIRECTION    NW (320)
  HIGHEST GUST SPEED    11   HIGHEST GUST DIRECTION    NW (320)
  AVERAGE WIND SPEED     2.8


SKY COVER
  POSSIBLE SUNSHINE  MM
  AVERAGE SKY COVER 0.3


WEATHER CONDITIONS
 THE FOLLOWING WEATHER WAS RECORDED YESTERDAY.
  NO SIGNIFICANT WEATHER WAS OBSERVED.


RELATIVE HUMIDITY (PERCENT)
 HIGHEST    93          500 AM
 LOWEST     38          300 PM
 AVERAGE    66

..........................................................


THE PORTLAND OR CLIMATE NORMALS FOR TODAY
                        NORMAL    RECORD    YEAR
 MAXIMUM TEMPERATURE (F)   75        94      1952
 MINIMUM TEMPERATURE (F)   52        39      1964


SUNRISE AND SUNSET
SEPTEMBER 21 2018.....SUNRISE   656 AM PDT   SUNSET   710 PM PDT
SEPTEMBER 22 2018.....SUNRISE   658 AM PDT   SUNSET   708 PM PDT


-  INDICATES NEGATIVE NUMBERS.
R  INDICATES RECORD WAS SET OR TIED.
MM INDICATES DATA IS MISSING.
T  INDICATES TRACE AMOUNT.
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } f
unction swapURL() { // make sure a new date was chosen if
(document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value
!= "") { // all good // return true; document.myProd.submit(); } else {
alert("Please chhose a valid date/time first."); return false; } } Explanation
of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
536
CXUS56 KPQR 011200
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                   STATION:   PORTLAND OR
                                   MONTH:     AUGUST
                                   YEAR:      2017
                                   LATITUDE:   45 35 N
                                   LONGITUDE: 122 36 W

  TEMPERATURE IN F:      :PCPN:    SNOW:  WIND     :SUNSHINE: SKY     :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                 12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  97  62  80   9   0  15 0.00  0.0    0  6.2 20 320   M    M   0        24 310
 2 103  65  84  13   0  19 0.00  0.0    0  6.0 15 330   M    M   0 8      19 320
 3 105  66  86  15   0  21 0.00  0.0    0  3.9 12 270   M    M   2 8      14 320
 4  96  64  80  10   0  15 0.00  0.0    0  4.5 16 310   M    M   2 8      18 320
 5  89  59  74   4   0   9 0.00  0.0    0  4.8 12 320   M    M   2        14 320
 6  88  61  75   5   0  10 0.00  0.0    0  5.7 13 310   M    M   7        16 310
 7  89  62  76   6   0  11 0.00  0.0    0  6.2 13 320   M    M   6 8      16 290
 8  92  61  77   7   0  12 0.00  0.0    0  4.9 13 280   M    M   2 18     15 300
 9  94  63  79   9   0  14 0.00  0.0    0  5.6 13 310   M    M   1 8      15 330
10  90  62  76   6   0  11 0.00  0.0    0  5.4 12 290   M    M   1 8      14 270
11  85  62  74   4   0   9 0.00  0.0    0  4.8 12 320   M    M   3        15 320
12  80  60  70   0   0   5    T  0.0    0  5.0 13 320   M    M   8        16 270
13  75  58  67  -3   0   2 0.06  0.0    0  7.8 20 310   M    M   8 1      24 320
14  75  52  64  -6   1   0 0.00  0.0    0  5.1 13 300   M    M   5        15 300
15  83  55  69  -1   0   4 0.00  0.0    0  5.9 16 310   M    M   2        21 300
16  84  58  71   1   0   6 0.00  0.0    0  6.9 14 320   M    M   1        20 350
17  80  62  71   1   0   6 0.00  0.0    0  6.8 13 320   M    M   5        16 320
18  81  57  69  -1   0   4 0.00  0.0    0  6.9 17 320   M    M   2        23 320
19  79  59  69   0   0   4 0.00  0.0    0 10.5 18 320   M    M   4        23 320
20  81  56  69   0   0   4 0.00  0.0    0  7.0 16 320   M    M   5        22 340
21  91  59  75   6   0  10 0.00  0.0    0  7.1 17 320   M    M   2        20 320
22  88  61  75   6   0  10 0.00  0.0    0  4.4 12 320   M    M   5        14 320
```

```
23  83  61  72   3   0   7    T  0.0    0  5.4 16 310   M    M   7        21 320
24  75  61  68  -1   0   3 0.00  0.0    0 10.8 18 310   M    M   4        23 320
25  81  56  69   0   0   4 0.00  0.0    0  6.7 16 310   M    M   1        26 310
26  91  57  74   5   0   9 0.00  0.0    0  6.5 16 320   M    M   0        21 320
27  95  58  77   9   0  12 0.00  0.0    0  3.0  9 270   M    M   3        12 300
28  98  62  80  12   0  15 0.00  0.0    0  1.9  8 100   M    M   4 8       9  90
29  88  62  75   7   0  10 0.00  0.0    0  4.8 14 310   M    M   6 8      16 320
30  80  60  70   2   0   5 0.00  0.0    0  4.3 12 320   M    M   6        17 350
31  83  64  74   6   0   9 0.00  0.0    0  6.3 14 310   M    M   4        17 310
================================================================================
SM 2699 1865        1 275  0.06     0.0 181.1         M      108
================================================================================
AV 87.1 60.2                          5.8 FASTST   M    M   3    MAX(MPH)
                           MISC ---->  # 20 320              # 26  310
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                  STATION:  PORTLAND OR
                                  MONTH:    AUGUST
                                  YEAR:     2017
                                  LATITUDE:   45 35 N
                                  LONGITUDE: 122 36 W

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 73.6   TOTAL FOR MONTH:   0.06    1 = FOG OR MIST
DPTR FM NORMAL:   4.1   DPTR FM NORMAL:   -0.61    2 = FOG REDUCING VISIBILITY
HIGHEST:   105 ON  3    GRTST 24HR  0.06 ON 13-13      TO 1/4 MILE OR LESS
LOWEST:     52 ON 14                               3 = THUNDER
                   SNOW, ICE PELLETS, HAIL     4 = ICE PELLETS
                   TOTAL MONTH:   0.0 INCH     5 = HAIL
                   GRTST 24HR     0.0          6 = FREEZING RAIN OR DRIZZLE
                   GRTST DEPTH:   0            7 = DUSTSTORM OR SANDSTORM:
                                                  VSBY 1/2 MILE OR LESS
                                               8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                               X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:   1
MAX 90 OR ABOVE:  11    0.10 INCH OR MORE:   0
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   0
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.     1    CLEAR  (SCALE 0-3)  15
DPTR FM NORMAL    -9    PTCLDY (SCALE 4-7)  15
TOTAL FM JUL 1     2    CLOUDY (SCALE 8-10)  1
DPTR FM NORMAL   -25

[CDD (BASE 65) ]
```

```
TOTAL THIS MO.   275
DPTR FM NORMAL   123    [PRESSURE DATA]
TOTAL FM JAN 1   568    HIGHEST SLP 30.21 ON 19
DPTR FM NORMAL   205    LOWEST  SLP 29.76 ON 28

[REMARKS]
#FINAL-08-17#
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } f unction swapURL() { // make sure a new date was chosen if (document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value != "") { // all good // return true; document.myProd.submit(); } else { alert("Please chhose a valid date/time first."); return false; } } Explanation of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
188
CXUS56 KPQR 011200
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                   STATION:   PORTLAND OR
                                   MONTH:     SEPTEMBER
                                   YEAR:      2017
                                   LATITUDE:   45 35 N
                                   LONGITUDE: 122 36 W

  TEMPERATURE IN F:      :PCPN:    SNOW:  WIND     :SUNSHINE: SKY    :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                  12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  92  59  76   8   0  11 0.00  0.0   0  5.2 17 310   M    M  0        21 320
 2  98  60  79  11   0  14 0.00  0.0   0  4.4 15 320   M    M  1        18 320
 3  95  63  79  12   0  14 0.00  0.0   0  2.8  8 240   M    M  6 8      11 270
 4  91  62  77  10   0  12 0.00  0.0   0  2.5  9 270   M    M  7 8      11 280
 5  91  66  79  12   0  14 0.00  0.0   0  3.1 10 300   M    M  10 8     11 310
 6  82  65  74   7   0   9 0.00  0.0   0  5.5 14 120   M    M  10 8     16 110
 7  83  66  75   8   0  10 0.00  0.0   0  5.8 17 280   M    M  8 8      21 270
 8  76  65  71   5   0   6 0.00  0.0   0  3.9 10 310   M    M  9        13 340
 9  80  63  72   6   0   7 0.15  0.0   0  5.5 18 300   M    M  9 1      23 330
10  77  58  68   2   0   3 0.00  0.0   0  7.0 14 290   M    M  4        17 290
11  91  56  74   8   0   9 0.00  0.0   0  7.1 17 320   M    M  1        24 330
12  86  59  73   7   0   8 0.00  0.0   0  6.4 17 320   M    M  3        23 330
13  75  52  64  -1   1   0 0.00  0.0   0  5.3 13 330   M    M  5        21 330
14  74  56  65   0   0   0 0.00  0.0   0  4.8 13 320   M    M  7 8      16 310
15  80  49  65   0   0   0 0.00  0.0   0  2.4  9 310   M    M  4 8      14 320
16  77  54  66   1   0   1 0.00  0.0   0  3.6 10 320   M    M  9 8      13 320
17  65  54  60  -4   5   0 0.09  0.0   0  8.6 23 210   M    M  10 18    30 220
18  61  53  57  -7   8   0 0.49  0.0   0  8.2 22 230   M    M  8 1      29 210
19  65  51  58  -6   7   0 0.31  0.0   0 12.0 23 230   M    M  7 1      29 230
20  61  49  55  -9  10   0 1.09  0.0   0  7.8 21 230   M    M  8 13     27 220
21  63  48  56  -7   9   0 0.02  0.0   0  4.0  9 170   M    M  8 1      12 170
22  68  47  58  -5   7   0 0.00  0.0   0  2.8 10 100   M    M  7        12 110
```

```
23  71  51  61  -1   4   0 0.00  0.0    0  3.3  9 310   M    M   5        11 320
24  73  46  60  -2   5   0 0.00  0.0    0  2.0  9 310   M    M   4        12 310
25  69  55  62   0   3   0    T  0.0    0  2.4  8  70   M    M   9        11  70
26  80  55  68   6   0   3 0.00  0.0    0  6.1 13 300   M    M   3        15 280
27  86  56  71  10   0   6 0.00  0.0    0  8.0 22  80   M    M   1        27  80
28  86  54  70   9   0   5 0.00  0.0    0  5.3 13 120   M    M   1        16 120
29  64  50  57  -3   8   0 0.20  0.0    0  4.8 14 310   M    M   6 1      18 320
30  65  47  56  -4   9   0 0.03  0.0    0  4.2 18 360   M    M   6        25 360
================================================================================
SM 2325 1669        76 132  2.38     0.0 154.8          M      176
================================================================================
AV 77.5 55.6                          5.2 FASTST   M    M   6    MAX(MPH)
                             MISC ---->  # 23 210              # 30  220
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                     STATION:  PORTLAND OR
                                     MONTH:    SEPTEMBER
                                     YEAR:     2017
                                     LATITUDE:   45 35 N
                                     LONGITUDE: 122 36 W

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 66.6   TOTAL FOR MONTH:   2.38    1 = FOG OR MIST
DPTR FM NORMAL:   2.1   DPTR FM NORMAL:    0.91    2 = FOG REDUCING VISIBILITY
HIGHEST:    98 ON  2    GRTST 24HR  1.09 ON 20-20      TO 1/4 MILE OR LESS
LOWEST:     46 ON 24                               3 = THUNDER
                    SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                    TOTAL MONTH:   0.0 INCH    5 = HAIL
                    GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
                    GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                                   VSBY 1/2 MILE OR LESS
                                               8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                               X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:   8
MAX 90 OR ABOVE:   6    0.10 INCH OR MORE:   5
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   1
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   1

[HDD (BASE 65) ]
TOTAL THIS MO.    76    CLEAR  (SCALE 0-3)   7
DPTR FM NORMAL     0    PTCLDY (SCALE 4-7)  14
TOTAL FM JUL 1    78    CLOUDY (SCALE 8-10)  9
DPTR FM NORMAL   -25

[CDD (BASE 65) ]
TOTAL THIS MO.   132
```

```
DPTR FM NORMAL    73    [PRESSURE DATA]
TOTAL FM JAN 1   700    HIGHEST SLP 30.28 ON 10
DPTR FM NORMAL   278    LOWEST  SLP 29.60 ON 20

[REMARKS]
#FINAL-09-17#
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } f
unction swapURL() { // make sure a new date was chosen if
(document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value
!= "") { // all good // return true; document.myProd.submit(); } else {
alert("Please chhose a valid date/time first."); return false; } } Explanation
of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
989
CXUS56 KPQR 011544
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                          STATION:   PORTLAND OR
                                          MONTH:     OCTOBER
                                          YEAR:      2017
                                          LATITUDE:   45 35 N
                                          LONGITUDE: 122 36 W

  TEMPERATURE IN F:       :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                 12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  65  49  57  -3   8   0 0.01  0.0    0  4.5 16 320   M    M  6        21 320
 2  65  49  57  -3   8   0 0.02  0.0    0  4.3 15  40   M    M  5        23  40
 3  71  44  58  -1   7   0 0.00  0.0    0  5.4 22 100   M    M  1        29  90
 4  71  42  57  -2   8   0 0.00  0.0    0  4.4 13 290   M    M  2 1      14 300
 5  74  43  59   1   6   0 0.00  0.0    0  3.8 10 300   M    M  1 1      13 310
 6  73  43  58   0   7   0 0.00  0.0    0  4.5 15 270   M    M  4 8      19 230
 7  65  52  59   1   6   0 0.01  0.0    0  7.6 20 280   M    M  8        25 270
 8  64  45  55  -2  10   0 0.02  0.0    0  2.3  8 290   M    M  5 1      11 290
 9  67  39  53  -4  12   0 0.00  0.0    0  4.1 10 290   M    M  7 1      13 280
10  57  43  50  -7  15   0 0.01  0.0    0  3.2 13 270   M    M  7 1      15 270
11  57  45  51  -5  14   0 0.16  0.0    0  4.7 13 190   M    M  7 1      15 200
12  56  46  51  -5  14   0 0.50  0.0    0  8.4 20 260   M    M  8 13     25 250
13  59  40  50  -6  15   0    T  0.0    0  4.6 17 310   M    M  5 3      23 320
14  59  36  48  -7  17   0 0.00  0.0    0  2.8  9 280   M    M  4 1      12 280
15  67  38  53  -2  12   0 0.00  0.0    0  1.7  7 320   M    M  3 18      8 320
16  67  39  53  -2  12   0 0.00  0.0    0  1.8  6 100   M    M  1 128     7  50
17  58  42  50  -4  15   0 0.04  0.0    0  3.3 13 240   M    M  8 12     15 230
18  64  49  57   3   8   0 0.09  0.0    0  9.5 24 190   M    M 10 1      33 190
19  59  50  55   1  10   0 0.99  0.0    0 10.8 21 160   M    M 10 1      27 200
20  54  48  51  -3  14   0 0.11  0.0    0 11.1 23 270   M    M  7 1      28 280
21  61  47  54   1  11   0 2.13  0.0    0 15.5 26 210   M    M 10 1      37 210
22  61  47  54   1  11   0 0.47  0.0    0  7.5 25 210   M    M  8 12     33 210
```

```
23  64  48  56   3   9   0 0.00  0.0    0  2.7 10 290   M    M   5 12     13 290
24  70  44  57   5   8   0 0.00  0.0    0  3.4  9 310   M    M   2 1      10 270
25  62  43  53   1  12   0    T  0.0    0  4.4 12 320   M    M   7 12     15 330
26  71  51  61   9   4   0 0.01  0.0    0  9.2 25  90   M    M   4 1      30  90
27  73  46  60   8   5   0 0.00  0.0    0  8.6 25 100   M    M   0        30 100
28  71  42  57   6   8   0 0.00  0.0    0  3.1  8 130   M    M   0 1       9 130
29  59  49  54   3  11   0    T  0.0    0  4.2  9 320   M    M   6 128    12 310
30  63  41  52   1  13   0 0.00  0.0    0 17.3 29  80   M    M   1 8      38  90
31  62  35  49  -2  16   0 0.00  0.0    0  3.0  8 260   M    M   3         9 310
================================================================================
SM 1989 1375       326   0  4.57     0.0 181.7          M      155
================================================================================
AV 64.2 44.4                          5.9 FASTST   M    M   5    MAX(MPH)
                         MISC ---->  # 29  80              # 38   90
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                STATION:  PORTLAND OR
                                MONTH:    OCTOBER
                                YEAR:     2017
                                LATITUDE:   45 35 N
                                LONGITUDE: 122 36 W

[TEMPERATURE DATA]     [PRECIPITATION DATA]      SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 54.3   TOTAL FOR MONTH:   4.57    1 = FOG OR MIST
DPTR FM NORMAL:  -0.6   DPTR FM NORMAL:    1.57    2 = FOG REDUCING VISIBILITY
HIGHEST:    74 ON  5    GRTST 24HR  2.13 ON 21-21      TO 1/4 MILE OR LESS
LOWEST:     35 ON 31                               3 = THUNDER
                  SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                  TOTAL MONTH:   0.0 INCH    5 = HAIL
                  GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
                  GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                             VSBY 1/2 MILE OR LESS
                                          8 = SMOKE OR HAZE
[NO. OF DAYS WITH]     [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                          X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:  14
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:   6
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   3
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   1

[HDD (BASE 65) ]
TOTAL THIS MO.   326    CLEAR  (SCALE 0-3)  10
DPTR FM NORMAL    11    PTCLDY (SCALE 4-7)  17
TOTAL FM JUL 1   404    CLOUDY (SCALE 8-10)  4
DPTR FM NORMAL   -14

[CDD (BASE 65) ]
```

```
TOTAL THIS MO.     0
DPTR FM NORMAL    -2    [PRESSURE DATA]
TOTAL FM JAN 1   700    HIGHEST SLP 30.62 ON 23
DPTR FM NORMAL   276    LOWEST  SLP 29.57 ON 19

[REMARKS]
#FINAL-10-17#
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } f unction swapURL() { // make sure a new date was chosen if (document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value != "") { // all good // return true; document.myProd.submit(); } else { alert("Please chhose a valid date/time first."); return false; } } Explanation of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
595
CXUS56 KPQR 011200
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                  STATION:   PORTLAND OR
                                  MONTH:     NOVEMBER
                                  YEAR:      2017
                                  LATITUDE:   45 35 N
                                  LONGITUDE: 122 36 W

  TEMPERATURE IN F:      :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                  12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  58  47  53   3  12   0     T  0.0    0  5.8 16 280   M    M   8        19 280
 2  55  44  50   0  15   0 0.08  0.0    0  9.7 24 270   M    M   8 1      31 280
 3  50  42  46  -4  19   0 0.01  0.0    0  6.3 14 220   M    M   9        17 240
 4  47  40  44  -6  21   0 0.10  0.0    0  9.1 25 190   M    M  10 1      34 180
 5  51  38  45  -4  20   0 0.15  0.0    0 10.9 25 200   M    M   7        33 200
 6  49  39  44  -5  21   0     T  0.0    0  8.7 21 100   M    M   7        27 100
 7  48  40  44  -5  21   0 0.00  0.0    0 18.8 28 100   M    M   9        35 100
 8  48  43  46  -3  19   0 0.33  0.0    0 18.8 29 110   M    M  10 1      35 110
 9  55  42  49   1  16   0 0.27  0.0    0 11.4 25 110   M    M   9 1      31 130
10  50  44  47  -1  18   0 0.41  0.0    0  5.4 10 100   M    M  10 1       M  M
11  51  44  48   0  17   0 0.13  0.0    0 13.2 23 120   M    M   9 1      27 120
12  54  48  51   3  14   0 0.14  0.0    0 13.7 22 110   M    M   9 1      27 140
13  56  46  51   4  14   0 0.36  0.0    0 13.9 30 180   M    M   8 1      36 190
14  58  45  52   5  13   0     T  0.0    0 12.7 25 180   M    M   8        33 180
15  56  42  49   2  16   0 0.86  0.0    0 11.5 28 190   M    M  10 1      38 180
16  48  43  46  -1  19   0 0.21  0.0    0 10.9 22 210   M    M   9 1      26 210
17  52  41  47   1  18   0 0.11  0.0    0  6.8 18 200   M    M   8 1      21 210
18  53  36  45  -1  20   0 0.00  0.0    0  3.9 13 120   M    M   6 12     16 110
19  51  35  43  -3  22   0 0.17  0.0    0  7.8 16 110   M    M   9 12     19 180
20  56  43  50   4  15   0 0.92  0.0    0  6.4 22 210   M    M   7 1      31 210
21  51  45  48   3  17   0 0.61  0.0    0 11.4 24 110   M    M   9 1      30 120
22  62  49  56  11   9   0 0.22  0.0    0 12.2 21 110   M    M   9 1      25 110
```

```
23  63  46  55  10  10   0 0.18  0.0    0  8.3 21 210   M    M   8 18     29 230
24  56  41  49   5  16   0 0.00  0.0    0  7.5 14 200   M    M   5        18 190
25  49  37  43  -1  22   0 0.12  0.0    0  6.0 18 120   M    M   8 12     23 130
26  55  45  50   6  15   0 0.55  0.0    0  9.9 23 120   M    M   9 1      28 120
27  50  41  46   2  19   0    T  0.0    0  5.5 13 130   M    M   8 12     15 130
28  47  43  45   2  20   0 0.44  0.0    0  6.9 16 310   M    M  10 1      20 310
29  52  37  45   2  20   0 0.00  0.0    0  3.2  9 280   M    M   8 12     11 160
30  47  37  42  -1  23   0 0.07  0.0    0  3.8 13 120   M    M  10 12     15 120
================================================================================
SM 1578 1263       521   0  6.44     0.0 280.4          M      254
================================================================================
AV 52.6 42.1                         9.3 FASTST   M    M   8    MAX(MPH)
                       MISC ---->  # 30 180             # 38  180
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                             STATION:  PORTLAND OR
                             MONTH:    NOVEMBER
                             YEAR:     2017
                             LATITUDE:   45 35 N
                             LONGITUDE: 122 36 W

[TEMPERATURE DATA]     [PRECIPITATION DATA]      SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 47.4   TOTAL FOR MONTH:   6.44    1 = FOG OR MIST
DPTR FM NORMAL:   0.8   DPTR FM NORMAL:    0.81    2 = FOG REDUCING VISIBILITY
HIGHEST:    63 ON 23    GRTST 24HR  0.92 ON 20-20      TO 1/4 MILE OR LESS
LOWEST:     35 ON 19                               3 = THUNDER
                 SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                 TOTAL MONTH:   0.0 INCH    5 = HAIL
                 GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
                 GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                        VSBY 1/2 MILE OR LESS
                                    8 = SMOKE OR HAZE
[NO. OF DAYS WITH]     [WEATHER - DAYS WITH]     9 = BLOWING SNOW
                                    X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:  22
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:  19
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   4
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.   521    CLEAR  (SCALE 0-3)   0
DPTR FM NORMAL   -30    PTCLDY (SCALE 4-7)  12
TOTAL FM JUL 1   925    CLOUDY (SCALE 8-10) 18
DPTR FM NORMAL   -44

[CDD (BASE 65) ]
TOTAL THIS MO.     0
```

```
DPTR FM NORMAL     0    [PRESSURE DATA]
TOTAL FM JAN 1   700    HIGHEST SLP 30.47 ON 29
DPTR FM NORMAL   276    LOWEST  SLP 29.55 ON 20

[REMARKS]
#FINAL-11-17#
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } function swapURL() { // make sure a new date was chosen if (document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value != "") { // all good // return true; document.myProd.submit(); } else { alert("Please chhose a valid date/time first."); return false; } } Explanation of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
668
CXUS56 KPQR 241518
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                              STATION:   PORTLAND OR
                              MONTH:     DECEMBER
                              YEAR:      2017
                              LATITUDE:   45 35 N
                              LONGITUDE: 122 36 W

  TEMPERATURE IN F:      :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                 12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  50  45  48   5  17   0 0.02  0.0    0  6.5 16 200   M    M  10 1      21 210
 2  47  43  45   3  20   0 0.28  0.0    0  7.5 16 200   M    M  10 1      20 210
 3  47  39  43   1  22   0 0.07  0.0    0  3.8 10 270   M    M   8 1      13 280
 4  46  38  42   0  23   0    T  0.0    0  4.0  9 320   M    M   8        12 320
 5  50  34  42   0  23   0 0.00  0.0    0  4.2 17  90   M    M   4 1      22  80
 6  52  38  45   3  20   0 0.00  0.0    0 15.8 35  90   M    M   0        41  90
 7  50  37  44   3  21   0 0.00  0.0    0 17.1 26 100   M    M   0        35 110
 8  45  33  39  -2  26   0 0.00  0.0    0 10.7 20 130   M    M   3        23 130
 9  46  26  36  -5  29   0 0.00  0.0    0  8.8 20 120   M    M   2        24 110
10  45  27  36  -5  29   0 0.00  0.0    0 11.3 23 110   M    M   2        29 100
11  44  30  37  -3  28   0 0.00  0.0    0 11.6 21 110   M    M   1        27 100
12  45  25  35  -5  30   0 0.00  0.0    0  4.1 12 140   M    M   5        13 140
13  46  29  38  -2  27   0 0.00  0.0    0  7.8 20 110   M    M   3        23 120
14  44  32  38  -2  27   0 0.00  0.0    0 11.0 22 100   M    M   4        25 100
15  40  32  36  -4  29   0    T  0.0    0  3.9 15 120   M    M   8 18     18 120
16  45  37  41   1  24   0 0.02  0.0    0  3.8  9 140   M    M  10 1      12 140
17  49  41  45   5  20   0 0.02  0.0    0  6.6 12 190   M    M  10 1      15 190
18  53  47  50  10  15   0 0.02  0.0    0  7.3 21 200   M    M  10 1      26 200
19  53  41  47   7  18   0 0.50  0.0    0 12.2 26 190   M    M   9 1      35 180
20  46  30  38  -2  27   0 0.03  0.0    0  8.7 22 200   M    M   5 1      27 200
21  37  26  32  -8  33   0 0.00  0.0    0  3.0  7 260   M    M   8 12      9 130
22  40  34  37  -3  28   0 0.42  0.0    0  4.7 15 110   M    M  10 12     17 110
```

```
23  40  34  37  -3  28   0 0.13    T    0 15.1 24 100   M    M   9 1      31  80
24  35  28  32  -8  33   0 0.25  1.0    0 15.7 25 100   M    M   9 156    32 110
25  33  28  31  -9  34   0 0.10  0.0    1  8.1 18 130   M    M  10 16     22 130
26  35  23  29 -11  36   0    T  0.0    1  5.8 14 120   M    M   6 6      17 110
27  37  31  34  -6  31   0 0.05  0.0    0  7.7 13 110   M    M  10 16     16 120
28  53  37  45   5  20   0 0.66  0.0    0  9.3 17 120   M    M  10 1      22 180
29  56  49  53  13  12   0 0.52  0.0    0 13.8 29 200   M    M  10 1      37 190
30  52  34  43   3  22   0 0.00  0.0    0  2.6 15 220   M    M   5 12     17 230
31  50  31  41   1  24   0 0.00  0.0    0  9.2 22 100   M    M   7 2      29 100
================================================================================
SM 1411 1059       776   0  3.09     1.0 261.7          M      206
================================================================================
AV 45.5 34.2                       8.4 FASTST   M    M   7    MAX(MPH)
                     MISC ---->  # 35  90              # 41   90
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                           STATION:  PORTLAND OR
                           MONTH:    DECEMBER
                           YEAR:     2017
                           LATITUDE:   45 35 N
                           LONGITUDE: 122 36 W

[TEMPERATURE DATA]     [PRECIPITATION DATA]      SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 39.8   TOTAL FOR MONTH:   3.09    1 = FOG OR MIST
DPTR FM NORMAL:  -0.6   DPTR FM NORMAL:   -2.40    2 = FOG REDUCING VISIBILITY
HIGHEST:    56 ON 29    GRTST 24HR  0.66 ON 28-28      TO 1/4 MILE OR LESS
LOWEST:     23 ON 26                               3 = THUNDER
                SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                TOTAL MONTH:   1.0 INCH    5 = HAIL
                GRTST 24HR   1.0 ON 24-24  6 = FREEZING RAIN OR DRIZZLE
                GRTST DEPTH:   1 ON 26,25  7 = DUSTSTORM OR SANDSTORM:
                                             VSBY 1/2 MILE OR LESS
                                           8 = SMOKE OR HAZE
[NO. OF DAYS WITH]     [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                           X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:  15
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:   8
MIN 32 OR BELOW:  14    0.50 INCH OR MORE:   3
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.   776    CLEAR  (SCALE 0-3)   7
DPTR FM NORMAL    13    PTCLDY (SCALE 4-7)  10
TOTAL FM JUL 1  1701    CLOUDY (SCALE 8-10) 14
DPTR FM NORMAL   -31

[CDD (BASE 65) ]
```

```
TOTAL THIS MO.     0
DPTR FM NORMAL     0    [PRESSURE DATA]
TOTAL FM JAN 1   700    HIGHEST SLP 30.59 ON  6
DPTR FM NORMAL   276    LOWEST  SLP 29.62 ON 19

[REMARKS]
#FINAL-12-17#
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } function swapURL() { // make sure a new date was chosen if (document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value != "") { // all good // return true; document.myProd.submit(); } else { alert("Please chhose a valid date/time first."); return false; } } Explanation of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
537
CXUS56 KPQR 011717
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                   STATION:   PORTLAND OR
                                   MONTH:     JANUARY
                                   YEAR:      2018
                                   LATITUDE:   45 35 N
                                   LONGITUDE: 122 36 W

  TEMPERATURE IN F:      :PCPN:    SNOW:  WIND     :SUNSHINE: SKY    :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  46  29  38  -2  27   0 0.00  0.0    0  6.0 17 110   M    M   6 12     21 110
 2  44  30  37  -3  28   0 0.00  0.0    0 11.7 24 110   M    M   8        30 110
 3  47  34  41   1  24   0 0.00  0.0    0 10.9 22 110   M    M   7        30 120
 4  45  39  42   2  23   0 0.05  0.0    0  9.6 24 120   M    M   9        30 120
 5  53  39  46   6  19   0 0.22  0.0    0 13.8 24 190   M    M   7 1      31 200
 6  50  38  44   4  21   0 0.06  0.0    0  2.8 17 220   M    M   7 1      22 220
 7  45  39  42   2  23   0 0.12  0.0    0  5.6 13 120   M    M  10        15 120
 8  45  35  40  -1  25   0 0.07  0.0    0  2.6  9 100   M    M   8 1      12 130
 9  49  41  45   4  20   0 0.51  0.0    0  3.7  9 290   M    M  10 1      11 290
10  48  42  45   4  20   0 0.04  0.0    0  6.6 14 110   M    M  10 1      17 110
11  58  46  52  11  13   0 0.59  0.0    0 13.6 28 200   M    M  10 1      40 200
12  54  48  51  10  14   0 0.07  0.0    0  9.4 18 200   M    M   9 18     24 190
13  59  41  50   9  15   0 0.00  0.0    0  2.5  8 320   M    M   6 12      9 310
14  58  39  49   8  16   0 0.00  0.0    0 11.5 23 100   M    M   5 128    28 100
15  57  42  50   9  15   0 0.08  0.0    0 13.9 35 100   M    M   8 1      41  80
16  57  42  50   8  15   0 0.04  0.0    0 10.2 20 120   M    M   8 1      23 120
17  52  45  49   7  16   0 0.52  0.0    0 12.8 22 110   M    M  10 1      28 120
18  52  41  47   5  18   0 0.17  0.0    0  9.5 24 170   M    M   9 1      30 180
19  49  40  45   3  20   0 0.03  0.0    0 12.3 22 200   M    M   9        28 210
20  50  43  47   5  18   0 0.01  0.0    0 11.1 20 190   M    M   9        25 190
21  51  42  47   5  18   0 0.20  0.0    0 10.3 28 180   M    M   8 1      35 180
22  50  40  45   3  20   0 0.11  0.0    0  7.6 20 300   M    M   7 1      24 280
```

```
23  49  42  46   4  19   0 0.68  0.0    0 13.2 21 110   M    M  10 1      25 110
24  52  42  47   5  18   0 0.62  0.0    0 11.0 26 190   M    M  10 1      32 210
25  46  38  42   0  23   0 0.33  0.0    0 12.8 24 200   M    M   9 1      30 210
26  48  40  44   2  21   0 0.21  0.0    0 13.6 23 190   M    M   9 1      27 200
27  53  41  47   5  18   0 0.30  0.0    0 11.5 21 200   M    M  10 1      28 210
28  57  47  52  10  13   0    T  0.0    0  9.9 17 120   M    M   9 1      21 120
29  53  46  50   8  15   0 0.32  0.0    0  9.8 18 250   M    M   9 1      23 200
30  51  41  46   3  19   0 0.01  0.0    0  5.5 13 240   M    M   7        15 250
31  48  39  44   1  21   0 0.00  0.0    0  3.7  9 170   M    M  10 1      10 170
================================================================================
SM 1576 1251       595   0  5.36     0.0 289.0          M      263
================================================================================
AV 50.8 40.4                       9.3 FASTST   M    M   8    MAX(MPH)
                        MISC ---->  # 35 100              # 41   80
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                              STATION:  PORTLAND OR
                              MONTH:    JANUARY
                              YEAR:     2018
                              LATITUDE:   45 35 N
                              LONGITUDE: 122 36 W

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 45.6   TOTAL FOR MONTH:   5.36    1 = FOG OR MIST
DPTR FM NORMAL:   4.2   DPTR FM NORMAL:    0.48    2 = FOG REDUCING VISIBILITY
HIGHEST:    59 ON 13    GRTST 24HR  0.68 ON 23-23      TO 1/4 MILE OR LESS
LOWEST:     29 ON  1                               3 = THUNDER
                 SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                 TOTAL MONTH:   0.0 INCH    5 = HAIL
                 GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
                 GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                       VSBY 1/2 MILE OR LESS
                                    8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                    X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:  24
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:  14
MIN 32 OR BELOW:   2    0.50 INCH OR MORE:   5
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.   595    CLEAR  (SCALE 0-3)   0
DPTR FM NORMAL  -137    PTCLDY (SCALE 4-7)  11
TOTAL FM JUL 1  2296    CLOUDY (SCALE 8-10) 20
DPTR FM NORMAL  -168

[CDD (BASE 65) ]
```

```
TOTAL THIS MO.     0
DPTR FM NORMAL     0    [PRESSURE DATA]
TOTAL FM JAN 1     0    HIGHEST SLP 30.43 ON 13
DPTR FM NORMAL     0    LOWEST  SLP 29.61 ON  9

[REMARKS]
#FINAL-01-18#
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } function swapURL() { // make sure a new date was chosen if (document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value != "") { // all good // return true; document.myProd.submit(); } else { alert("Please chhose a valid date/time first."); return false; } } Explanation of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
000
CXUS56 KPQR 060110
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                   STATION:   PORTLAND OR
                                   MONTH:     FEBRUARY
                                   YEAR:      2018
                                   LATITUDE:   45 35 N
                                   LONGITUDE: 122 36 W

  TEMPERATURE IN F:      :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                  12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  51  41  46   3  19   0 0.10  0.0    0  3.5 13 110   M    M  10 1      17 120
 2  59  46  53  10  12   0    T  0.0    0  5.9 16 210   M    M   9 1      20 220
 3  58  46  52   9  13   0 0.02  0.0    0  3.2 15 230   M    M  10 1      19 220
 4  60  47  54  11  11   0 0.00  0.0    0  4.6 14 200   M    M   9        16 210
 5  58  43  51   8  14   0 0.00  0.0    0  1.9  6 300   M    M   7 1       8 300
 6  52  38  45   2  20   0 0.00  0.0    0  1.8  9 190   M    M   8 1      11 190
 7  59  38  49   6  16   0 0.00  0.0    0  1.2  7 100   M    M   7 1       7 100
 8  55  39  47   4  18   0 0.00  0.0    0  4.7 10 290   M    M   8 128    16 310
 9  51  39  45   2  20   0    T  0.0    0  2.8 12 360   M    M   8        16 360
10  50  35  43   0  22   0 0.00  0.0    0  3.7 12 290   M    M   7        13 290
11  49  36  43   0  22   0 0.00  0.0    0  5.0 13 300   M    M   7        17 320
12  49  31  40  -3  25   0 0.00  0.0    0  7.1 21  90   M    M   2        26  90
13  51  26  39  -5  26   0    T  0.0    0  1.7  8 320   M    M   3         9 320
14  48  34  41  -3  24   0 0.28    T    0  4.9 16 310   M    M   8 1      18 300
15  50  38  44   0  21   0 0.08  0.0    0  3.7 13 250   M    M   9 1      14 240
16  51  41  46   2  19   0 0.08  0.0    0 11.4 21 190   M    M  10 1      25 200
17  55  43  49   5  16   0 0.08  0.0    0 13.4 26 250   M    M   9 1      35 230
18  44  32  38  -6  27   0 0.21  0.2    0 10.5 24 190   M    M   8 1      31 190
19  40  30  35  -9  30   0    T    T    T  4.0 10 320   M    M   7        16 320
20  34  30  32 -12  33   0 0.30  4.2    0  9.2 17 110   M    M  10 1      20 110
21  37  23  30 -14  35   0 0.02  0.5    3  4.0 13 100   M    M   8 18     16 120
22  40  28  34 -10  31   0 0.07  1.7    3  5.8 15 100   M    M   8 1      18 110
```

```
23  39  24  32 -13  33   0    T    T    0  9.9 24 200   M    M   7        32 220
24  50  37  44  -1  21   0 0.03  0.0    0 10.9 23 210   M    M   8 8      31 210
25  46  34  40  -5  25   0 0.18    T    0 11.3 24 200   M    M   9 1      31 210
26  45  32  39  -6  26   0    T  0.0    0  2.7  8 100   M    M   8 1      10 110
27  46  34  40  -5  25   0 0.02  0.0    0  8.2 20 200   M    M  10        25 190
28  46  41  44  -2  21   0 0.39  0.0    0 11.0 22 190   M    M  10 1      33 180
================================================================================
SM 1373 1006       625   0  1.86     6.6 168.0          M      224
================================================================================
AV 49.0 35.9                          6.0 FASTST   M    M   8    MAX(MPH)
                             MISC ---->  # 26 250              # 35  230
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                  STATION:  PORTLAND OR
                                  MONTH:    FEBRUARY
                                  YEAR:     2018
                                  LATITUDE:   45 35 N
                                  LONGITUDE: 122 36 W

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 42.5   TOTAL FOR MONTH:   1.86    1 = FOG OR MIST
DPTR FM NORMAL:  -1.3   DPTR FM NORMAL:   -1.80    2 = FOG REDUCING VISIBILITY
HIGHEST:    60 ON  4    GRTST 24HR  0.39 ON 28-28      TO 1/4 MILE OR LESS
LOWEST:     23 ON 21                               3 = THUNDER
                   SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                   TOTAL MONTH:   6.6 INCHES  5 = HAIL
                   GRTST 24HR   4.2 ON 20-20  6 = FREEZING RAIN OR DRIZZLE
                   GRTST DEPTH:   3 ON 22,21  7 = DUSTSTORM OR SANDSTORM:
                                                VSBY 1/2 MILE OR LESS
                                             8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                             X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:  14
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:   6
MIN 32 OR BELOW:   9    0.50 INCH OR MORE:   0
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.   625    CLEAR  (SCALE 0-3)   2
DPTR FM NORMAL    31    PTCLDY (SCALE 4-7)  12
TOTAL FM JUL 1  2921    CLOUDY (SCALE 8-10) 14
DPTR FM NORMAL  -137

[CDD (BASE 65) ]
TOTAL THIS MO.     0
DPTR FM NORMAL     0    [PRESSURE DATA]
TOTAL FM JAN 1     0    HIGHEST SLP 30.53 ON 23
```

DPTR FM NORMAL   0   LOWEST SLP 29.56 ON 28

[REMARKS]
#FINAL-02-18#

National Weather Service - Climate Data select { background-color: #FFFFB3; } function swapURL() { // make sure a new date was chosen if (document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value != "") { // all good // return true; document.myProd.submit(); } else { alert("Please chhose a valid date/time first."); return false; } } Explanation of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
000
CXUS56 KPQR 011200
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                          STATION:   PORTLAND OR
                                          MONTH:     MARCH
                                          YEAR:      2018
                                          LATITUDE:   45 35 N
                                          LONGITUDE: 122 36 W

  TEMPERATURE IN F:      :PCPN:    SNOW:  WIND     :SUNSHINE: SKY    :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                 12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  50  38  44  -2  21   0 0.04  0.0    0  7.7 22 180   M    M   9        25 180
 2  51  36  44  -2  21   0    T  0.0    0  9.3 21 220   M    M   8        25 190
 3  52  35  44  -2  21   0 0.00  0.0    0  3.9  9 110   M    M   6        11 110
 4  51  33  42  -4  23   0    T  0.0    0  5.5 17 200   M    M   8        22 190
 5  51  36  44  -2  21   0 0.03  0.0    0  2.5 10  90   M    M   6 1      13  80
 6  58  30  44  -2  21   0 0.00  0.0    0  3.3 10 280   M    M   3 128    13 290
 7  55  34  45  -2  20   0 0.00  0.0    0  5.6 17 100   M    M   8        20 110
 8  57  43  50   3  15   0 0.14  0.0    0 14.0 31 180   M    M   9 1      42 180
 9  55  37  46  -1  19   0 0.01  0.0    0  3.5 14 210   M    M   6        19 210
10  63  33  48   1  17   0 0.00  0.0    0  6.5 15 100   M    M   4 1      19 110
11  68  42  55   8  10   0 0.00  0.0    0  6.0 14 120   M    M   3        17 110
12  69  41  55   7  10   0 0.00  0.0    0 11.6 25 110   M    M   5 8      33 100
13  61  46  54   6  11   0 0.38  0.0    0  8.4 23 110   M    M   9 1      27 110
14  55  41  48   0  17   0 0.01  0.0    0  6.0 22 210   M    M   7        27 210
15  56  37  47  -1  18   0 0.22  0.0    0  6.6 23 200   M    M   8 1      26 200
16  55  39  47  -1  18   0 0.01  0.0    0  3.2 14  80   M    M   8        16  80
17  51  41  46  -2  19   0 0.22  0.0    0  2.9 15 200   M    M   9 13     16 100
18  54  41  48  -1  17   0    T  0.0    0  5.1 14 290   M    M   9        17 290
19  58  35  47  -2  18   0 0.00  0.0    0  4.7 12 290   M    M   4 12     14 280
20  62  33  48  -1  17   0 0.00  0.0    0  3.1  9 290   M    M   2        13 280
21  54  38  46  -3  19   0 0.21  0.0    0  4.8 14 190   M    M   8        18 180
22  50  39  45  -4  20   0 0.34  0.0    0 11.3 26 180   M    M   9 13     38 190
```

```
23  46  37  42  -7  23   0 0.56  0.0    0  9.1 22 200   M    M  10 1      29 200
24  45  36  41  -8  24   0 0.15  0.0    0  6.4 21 210   M    M   9 1      25 210
25  54  40  47  -3  18   0 0.10  0.0    0  2.6  8 310   M    M   7 1      11 310
26  50  39  45  -5  20   0 0.03  0.0    0  7.3 16 200   M    M  10        22 180
27  57  47  52   2  13   0 0.05  0.0    0  6.9 15 200   M    M  10 1      20 200
28  58  43  51   1  14   0 0.00  0.0    0  4.6 10 300   M    M   7        14 360
29  61  37  49  -1  16   0 0.00  0.0    0  4.6 12 290   M    M   6        15 280
30  58  44  51   1  14   0 0.00  0.0    0  3.0 10 310   M    M   9 1      12 320
31  64  44  54   4  11   0 0.00  0.0    0  4.1  9 310   M    M   6        13 330
================================================================================
SM 1729 1195       546   0  2.50     0.0 184.1          M      222
================================================================================
AV 55.8 38.6                            5.9 FASTST   M    M   7    MAX(MPH)
                              MISC ---->  # 31 180              # 42  180
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                       STATION:  PORTLAND OR
                                       MONTH:    MARCH
                                       YEAR:     2018
                                       LATITUDE:   45 35 N
                                       LONGITUDE: 122 36 W

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 47.2   TOTAL FOR MONTH:   2.50    1 = FOG OR MIST
DPTR FM NORMAL:  -1.0   DPTR FM NORMAL:   -1.18    2 = FOG REDUCING VISIBILITY
HIGHEST:    69 ON 12    GRTST 24HR  0.56 ON 23-23      TO 1/4 MILE OR LESS
LOWEST:     30 ON  6                               3 = THUNDER
                      SNOW, ICE PELLETS, HAIL     4 = ICE PELLETS
                      TOTAL MONTH:   0.0 INCH    5 = HAIL
                      GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
                      GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                                     VSBY 1/2 MILE OR LESS
                                                 8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                 X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:  16
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:   9
MIN 32 OR BELOW:   1    0.50 INCH OR MORE:   1
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.   546    CLEAR  (SCALE 0-3)   3
DPTR FM NORMAL    24    PTCLDY (SCALE 4-7)  14
TOTAL FM JUL 1  3467    CLOUDY (SCALE 8-10) 14
DPTR FM NORMAL  -113

[CDD (BASE 65) ]
```

```
TOTAL THIS MO.     0
DPTR FM NORMAL     0    [PRESSURE DATA]
TOTAL FM JAN 1     0    HIGHEST SLP 30.50 ON 28
DPTR FM NORMAL     0    LOWEST  SLP 29.45 ON  1

[REMARKS]
#FINAL-03-18#
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } f
unction swapURL() { // make sure a new date was chosen if
(document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value
!= "") { // all good // return true; document.myProd.submit(); } else {
alert("Please chhose a valid date/time first."); return false; } }   Explanation
of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
326
CXUS56 KPQR 030518
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                   STATION:   PORTLAND OR
                                   MONTH:     APRIL
                                   YEAR:      2018
                                   LATITUDE:   45 35 N
                                   LONGITUDE: 122 36 W

  TEMPERATURE IN F:      :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                 12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  50  37  44  -6  21   0 0.27  0.0    0  7.4 18 200   M    M   9 1      23 200
 2  52  37  45  -5  20   0    T    T    0  4.7 14 310   M    M   7        16 360
 3  53  34  44  -6  21   0    T  0.0    0  2.5  8 270   M    M   7        10 260
 4  60  46  53   2  12   0 0.02  0.0    0  6.3 13 280   M    M   9        14 130
 5  55  49  52   1  13   0 0.38  0.0    0  7.2 12 110   M    M  10 1      14 110
 6  69  52  61  10   4   0 0.04  0.0    0  9.4 24 110   M    M   9 1      29 110
 7  61  49  55   4  10   0 1.14  0.0    0 15.5 30 210   M    M   9 13     40 210
 8  56  47  52   1  13   0 0.36  0.0    0 12.0 22 210   M    M   9        33 200
 9  66  42  54   3  11   0 0.00  0.0    0  4.9 15 130   M    M   8        18 110
10  63  50  57   6   8   0 0.14  0.0    0 11.2 21 180   M    M   8 1      25 190
11  57  44  51   0  14   0 0.15  0.0    0 10.7 20  90   M    M   9 1      28 130
12  51  42  47  -5  18   0 0.12  0.0    0 12.6 26 210   M    M   9 1      32 210
13  58  47  53   1  12   0 0.02  0.0    0 14.0 25 200   M    M  10        30 210
14  62  50  56   4   9   0 0.17  0.0    0 12.6 23 200   M    M   9 8      29 190
15  51  43  47  -5  18   0 0.34  0.0    0  7.0 26 180   M    M  10 1      36 170
16  52  42  47  -5  18   0 0.09  0.0    0 14.8 23 200   M    M   8        29 200
17  57  44  51  -1  14   0    T  0.0    0  8.1 25 260   M    M   8        30 270
18  64  43  54   2  11   0 0.00  0.0    0  4.8 13  80   M    M   8        15  70
19  68  39  54   1  11   0 0.00  0.0    0  4.6 13 310   M    M   2        17 300
20  68  41  55   2  10   0 0.00  0.0    0  3.7 15 200   M    M   5        17 210
21  63  47  55   2  10   0    T  0.0    0  7.5 18 220   M    M   5        23 220
22  65  42  54   1  11   0 0.00  0.0    0  6.6 16 310   M    M   2        20 310
```

```
23  74  42  58   5   7   0 0.00  0.0    0 12.8 28 100   M    M   3        37  90
24  80  53  67  13   0   2 0.00  0.0    0 11.8 24  80   M    M   6        30 100
25  84  52  68  14   0   3 0.00  0.0    0  3.7  9 290   M    M   3        11 280
26  86  52  69  15   0   4 0.00  0.0    0  5.7 17  30   M    M   1        22  30
27  58  50  54   0  11   0 0.03  0.0    0  7.7 18 210   M    M   9        22 210
28  62  49  56   2   9   0 0.02  0.0    0  4.1 15 300   M    M   9 1      18 300
29  60  48  54  -1  11   0 0.03  0.0    0  5.0 16 300   M    M   8        21 310
30  59  48  54  -1  11   0 0.02  0.0    0  4.1 10 310   M    M   9        13 310
================================================================================
SM 1864 1361       338   9  3.34    T    243.0          M      218
================================================================================
AV 62.1 45.4                         8.1 FASTST   M    M   7    MAX(MPH)
                             MISC ---->  # 30 210              # 40  210
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                     STATION:  PORTLAND OR
                                     MONTH:    APRIL
                                     YEAR:     2018
                                     LATITUDE:   45 35 N
                                     LONGITUDE: 122 36 W

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 53.8   TOTAL FOR MONTH:   3.34    1 = FOG OR MIST
DPTR FM NORMAL:   1.5   DPTR FM NORMAL:    0.61    2 = FOG REDUCING VISIBILITY
HIGHEST:    86 ON 26    GRTST 24HR  1.14 ON  7- 7      TO 1/4 MILE OR LESS
LOWEST:     34 ON  3                               3 = THUNDER
                     SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                     TOTAL MONTH:    T          5 = HAIL
                     GRTST 24HR    T  ON  2- 2  6 = FREEZING RAIN OR DRIZZLE
                     GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                                   VSBY 1/2 MILE OR LESS
                                                8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:  17
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:   9
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   1
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   1

[HDD (BASE 65) ]
TOTAL THIS MO.   338    CLEAR  (SCALE 0-3)   4
DPTR FM NORMAL   -45    PTCLDY (SCALE 4-7)   9
TOTAL FM JUL 1  3805    CLOUDY (SCALE 8-10) 17
DPTR FM NORMAL  -158

[CDD (BASE 65) ]
TOTAL THIS MO.     9
```

```
DPTR FM NORMAL     8    [PRESSURE DATA]
TOTAL FM JAN 1     9    HIGHEST SLP 30.44 ON 21
DPTR FM NORMAL     8    LOWEST  SLP 29.40 ON  7

[REMARKS]
#FINAL-04-18#
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } f
unction swapURL() { // make sure a new date was chosen if
(document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value
!= "") { // all good // return true; document.myProd.submit(); } else {
alert("Please chhose a valid date/time first."); return false; } } Explanation
of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
000
CXUS56 KPQR 311200
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                   STATION:   PORTLAND OR
                                   MONTH:     MAY
                                   YEAR:      2018
                                   LATITUDE:   45 35 N
                                   LONGITUDE: 122 36 W

  TEMPERATURE IN F:      :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                 12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  59  51  55   0  10   0 0.00  0.0    0  6.4 13 310   M    M  9        16 310
 2  74  43  59   4   6   0 0.00  0.0    0  4.6 10 320   M    M  2        14 340
 3  80  49  65   9   0   0 0.00  0.0    0  5.5 15 280   M    M  6        20 260
 4  70  52  61   5   4   0 0.00  0.0    0  5.4 12 320   M    M  8        14 310
 5  75  53  64   8   1   0    T  0.0    0  5.8 13 280   M    M  9        15 270
 6  73  53  63   7   2   0 0.01  0.0    0  6.2 14 260   M    M  7 3      17 270
 7  77  56  67  11   0   2 0.00  0.0    0  5.0 12 280   M    M  6        14 300
 8  82  53  68  11   0   3 0.08  0.0    0  5.5 23 210   M    M  5 1      30 200
 9  70  54  62   5   3   0 0.01  0.0    0  8.1 17 290   M    M  7        21 250
10  65  52  59   2   6   0 0.05  0.0    0  7.6 21 310   M    M  8 1      26 310
11  69  47  58   1   7   0 0.00  0.0    0  7.7 20 320   M    M  6        25 310
12  80  52  66   8   0   1 0.00  0.0    0  5.9 15 320   M    M  4 8      20 320
13  90  52  71  13   0   6 0.00  0.0    0  4.0 13 320   M    M  1        16 330
14  89  56  73  15   0   8 0.00  0.0    0  5.1 13 320   M    M  1        16 320
15  71  56  64   6   1   0 0.00  0.0    0  4.0 12 290   M    M  7        13 350
16  65  55  60   2   5   0 0.00  0.0    0  4.9 13  80   M    M 10        15  80
17  68  55  62   3   3   0    T  0.0    0  4.4 10 320   M    M  9        13 320
18  69  55  62   3   3   0 0.00  0.0    0  6.1 12 310   M    M  7        14 320
19  71  53  62   3   3   0 0.00  0.0    0  3.0 13 320   M    M  9        16 320
20  72  54  63   4   2   0 0.00  0.0    0  6.2 14 320   M    M  6        17 310
21  73  50  62   3   3   0 0.00  0.0    0  5.5 17 320   M    M  3        22 320
22  86  54  70  10   0   5 0.00  0.0    0  6.0 14 320   M    M  1        20 340
```

```
23  82  57  70  10   0   5 0.00  0.0    0  4.1  9 350   M    M   3        14 350
24  76  57  67   7   0   2 0.00  0.0    0  6.1 15 300   M    M   6        19 320
25  72  54  63   3   2   0 0.00  0.0    0  9.4 20 300   M    M   7        24 310
26  69  50  60   0   5   0 0.00  0.0    0  4.9 14 300   M    M   6        17 310
27  80  53  67   7   0   2 0.00  0.0    0  6.8 14 310   M    M   2        19 320
28  73  53  63   2   2   0 0.00  0.0    0  8.9 17 320   M    M   4        22 320
29  68  50  59  -2   6   0 0.00  0.0    0 10.0 21 300   M    M   6        25 320
30  69  45  57  -4   8   0 0.00  0.0    0  6.3 20 310   M    M   6        24 310
================================================================================
SM 2217 1574        82  34  0.15     0.0 179.4          M      171
================================================================================
AV 73.9 52.5                          6.0 FASTST   M    M   6    MAX(MPH)
                     MISC ---->  # 23 210              # 30  200
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                           STATION:  PORTLAND OR
                           MONTH:    MAY
                           YEAR:     2018
                           LATITUDE:   45 35 N
                           LONGITUDE: 122 36 W

[TEMPERATURE DATA]     [PRECIPITATION DATA]      SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 63.2   TOTAL FOR MONTH:   0.15    1 = FOG OR MIST
DPTR FM NORMAL:   5.0   DPTR FM NORMAL:   -2.24    2 = FOG REDUCING VISIBILITY
HIGHEST:    90 ON 13    GRTST 24HR  0.08 ON  8- 8      TO 1/4 MILE OR LESS
LOWEST:     43 ON  2                               3 = THUNDER
               SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
               TOTAL MONTH:   0.0 INCH    5 = HAIL
               GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
               GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                     VSBY 1/2 MILE OR LESS
                                  8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                  X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:   4
MAX 90 OR ABOVE:   1    0.10 INCH OR MORE:   0
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   0
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.    82    CLEAR  (SCALE 0-3)   5
DPTR FM NORMAL  -136    PTCLDY (SCALE 4-7)  20
TOTAL FM JUL 1  3887    CLOUDY (SCALE 8-10)  5
DPTR FM NORMAL  -294

[CDD (BASE 65) ]
TOTAL THIS MO.    34
```

```
DPTR FM NORMAL    23    [PRESSURE DATA]
TOTAL FM JAN 1    43    HIGHEST SLP M ON M
DPTR FM NORMAL    31    LOWEST  SLP 29.73 ON 22

[REMARKS]


5
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } f
unction swapURL() { // make sure a new date was chosen if
(document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value
!= "") { // all good // return true; document.myProd.submit(); } else {
alert("Please chhose a valid date/time first."); return false; } }   Explanation
of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
631
CXUS56 KPQR 011200
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                   STATION:   PORTLAND OR
                                   MONTH:     JUNE
                                   YEAR:      2018
                                   LATITUDE:   45 35 N
                                   LONGITUDE: 122 36 W

  TEMPERATURE IN F:      :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                 12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  72  52  62   1   3   0 0.00  0.0    0  2.3  9 310   M    M   6       13  40
 2  83  52  68   7   0   3 0.00  0.0    0  5.7 12 320   M    M   2       15 320
 3  72  56  64   2   1   0 0.03  0.0    0  7.7 15 300   M    M   7       21 310
 4  69  54  62   0   3   0 0.00  0.0    0  6.6 15 300   M    M   7       18 280
 5  74  47  61  -1   4   0 0.00  0.0    0  5.4 14 310   M    M   2       25 230
 6  80  52  66   4   0   1 0.00  0.0    0  5.5 15 320   M    M   5       19 320
 7  71  58  65   3   0   0 0.00  0.0    0  3.8 12  70   M    M   9       14  80
 8  71  57  64   2   1   0 0.18  0.0    0  6.8 15 170   M    M  10 1     23 140
 9  62  51  57  -5   8   0 0.20  0.0    0  5.9 22 290   M    M   9 138   27 300
10  58  50  54  -8  11   0 0.21  0.0    0  7.6 17 210   M    M  10       21 200
11  72  47  60  -3   5   0    T  0.0    0  5.2 13 300   M    M   3 1     17 280
12  80  47  64   1   1   0 0.00  0.0    0  5.3 14 280   M    M   6       16 280
13  68  56  62  -1   3   0 0.00  0.0    0  7.5 16 320   M    M   8       23 330
14  69  55  62  -1   3   0 0.00  0.0    0  5.3 15 280   M    M   8       19 310
15  73  55  64   1   1   0 0.00  0.0    0  7.9 18 310   M    M   7       23 310
16  79  57  68   4   0   3 0.02  0.0    0  6.6 16  50   M    M   7 3     23  50
17  92  56  74  10   0   9 0.37  0.0    0  6.9 30 100   M    M   3 13    35 100
18  83  58  71   7   0   6 0.00  0.0    0  6.5 12  80   M    M   6       14 360
19  91  58  75  11   0  10 0.00  0.0    0  4.9 12 310   M    M   4       15 310
20  95  63  79  15   0  14 0.00  0.0    0  5.8 16 190   M    M   6       20 250
21  71  62  67   3   0   2    T  0.0    0  5.1 13 320   M    M  10 3     15 320
22  76  60  68   3   0   3    T  0.0    0  6.5 12 350   M    M   8       18 350
```

```
23  76  59  68   3   0   3    T  0.0    0  5.9 15 310   M    M   6 1      22 310
24  91  57  74   9   0   9    T  0.0    0  6.9 24 320   M    M   3        32 330
25  72  58  65   0   0   0 0.02  0.0    0  7.4 18 310   M    M   6        21 320
26  76  53  65  -1   0   0 0.00  0.0    0  8.1 18 310   M    M   3        25 320
27  78  55  67   1   0   2    T  0.0    0  8.8 22 320   M    M   4        27 320
28  75  57  66   0   0   1 0.00  0.0    0  6.1 13 270   M    M   6        17 280
29  79  56  68   2   0   3 0.00  0.0    0  5.9 15 320   M    M   2        19 320
30  78  60  69   3   0   4 0.00  0.0    0  5.7 14 350   M    M   7        19 340
================================================================================
SM 2286 1658        44  73  1.03     0.0 185.6          M      180
================================================================================
AV 76.2 55.3                          6.2 FASTST   M    M   6    MAX(MPH)
                         MISC ---->  # 30 100             # 35  100
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                STATION:  PORTLAND OR
                                MONTH:    JUNE
                                YEAR:     2018
                                LATITUDE:   45 35 N
                                LONGITUDE: 122 36 W

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 65.7   TOTAL FOR MONTH:   1.03    1 = FOG OR MIST
DPTR FM NORMAL:   2.1   DPTR FM NORMAL:   -0.67    2 = FOG REDUCING VISIBILITY
HIGHEST:    95 ON 20    GRTST 24HR  0.37 ON 17-17      TO 1/4 MILE OR LESS
LOWEST:     47 ON 12,11                            3 = THUNDER
                  SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                  TOTAL MONTH:   0.0 INCH    5 = HAIL
                  GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
                  GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                              VSBY 1/2 MILE OR LESS
                                           8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                           X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:   7
MAX 90 OR ABOVE:   4    0.10 INCH OR MORE:   4
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   0
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.    44    CLEAR  (SCALE 0-3)   6
DPTR FM NORMAL   -47    PTCLDY (SCALE 4-7)  18
TOTAL FM JUL 1  3938    CLOUDY (SCALE 8-10)  6
DPTR FM NORMAL  -340

[CDD (BASE 65) ]
TOTAL THIS MO.    73
```

```
DPTR FM NORMAL    26    [PRESSURE DATA]
TOTAL FM JAN 1   116    HIGHEST SLP 30.26 ON  2
DPTR FM NORMAL    52    LOWEST  SLP 29.74 ON 24

[REMARKS]
#FINAL-06-18#
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } f
unction swapURL() { // make sure a new date was chosen if
(document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value
!= "") { // all good // return true; document.myProd.submit(); } else {
alert("Please chhose a valid date/time first."); return false; } } Explanation
of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
736
CXUS56 KPQR 011200
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                  STATION:   PORTLAND OR
                                  MONTH:     JULY
                                  YEAR:      2018
                                  LATITUDE:   45 35 N
                                  LONGITUDE: 122 36 W

  TEMPERATURE IN F:      :PCPN:    SNOW:  WIND     :SUNSHINE: SKY    :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                 12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  77  58  68   1   0   3 0.00  0.0    0  8.0 21 320   M    M  5       26 320
 2  71  55  63  -4   2   0 0.02  0.0    0  8.2 20 320   M    M  6 1      24 310
 3  79  51  65  -2   0   0 0.00  0.0    0  5.7 16 280   M    M  3       20 280
 4  85  59  72   5   0   7    T  0.0    0 10.0 26  90   M    M  8 8     32  80
 5  87  57  72   4   0   7 0.00  0.0    0  4.9 21 320   M    M  4       26 320
 6  83  62  73   5   0   8 0.00  0.0    0  7.5 22 250   M    M  3       29 240
 7  80  63  72   4   0   7 0.00  0.0    0  7.3 15 310   M    M  5 8      20 280
 8  87  58  73   5   0   8 0.00  0.0    0  7.1 17 320   M    M  2       22 320
 9  71  60  66  -2   0   1    T  0.0    0  4.5 12 320   M    M  9       14 320
10  79  61  70   2   0   5 0.00  0.0    0  5.7 17 300   M    M  6       21 300
11  89  60  75   6   0  10 0.00  0.0    0  9.0 23 320   M    M  2       28 320
12  97  65  81  12   0  16 0.00  0.0    0  8.7 20 320   M    M  0       25 320
13  92  65  79  10   0  14 0.00  0.0    0  7.4 15 320   M    M  3       21 320
14  93  59  76   7   0  11 0.00  0.0    0  7.2 14 320   M    M  1       17 320
15 100  66  83  14   0  18 0.00  0.0    0  5.4 13 320   M    M  2       17 320
16  98  66  82  12   0  17 0.00  0.0    0  5.8 13 300   M    M  2       15 290
17  91  63  77   7   0  12 0.00  0.0    0  5.5 14 310   M    M  1       19 310
18  84  61  73   3   0   8 0.00  0.0    0  6.5 14 320   M    M  4       20 320
19  72  58  65  -5   0   0 0.00  0.0    0  8.9 20 300   M    M  5       22 300
20  79  51  65  -5   0   0 0.00  0.0    0  6.9 18 320   M    M  2       23 320
21  81  56  69  -1   0   4 0.00  0.0    0  7.2 15 320   M    M  2       20 320
22  94  58  76   6   0  11 0.00  0.0    0  7.1 15 290   M    M  1       19 290
```

```
23  95  63  79   9   0  14 0.00  0.0    0  5.4 14 320   M    M   2        17 320
24  95  63  79   9   0  14 0.00  0.0    0  6.1 16 320   M    M   1        20 320
25  97  62  80  10   0  15 0.00  0.0    0  6.0 15 320   M    M   1        20 310
26  96  64  80  10   0  15 0.00  0.0    0  5.2 13 290   M    M   0        17 350
27  91  60  76   5   0  11 0.00  0.0    0  5.6 10 320   M    M   1        13 360
28  90  60  75   4   0  10 0.00  0.0    0  5.6 13 290   M    M   2        15 290
29  99  64  82  11   0  17 0.00  0.0    0  4.8 10 320   M    M   1 8      14 330
30  92  67  80   9   0  15 0.00  0.0    0  5.0 10 300   M    M   5        16 350
31  89  62  76   5   0  11 0.00  0.0    0  6.8 15 320   M    M   3        20 330
================================================================================
SM 2713 1877         2 289  0.02     0.0 205.0          M       92
================================================================================
AV 87.5 60.6                          6.6 FASTST   M    M   3    MAX(MPH)
                   MISC ---->  # 26  90              # 32   80
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                         STATION:  PORTLAND OR
                         MONTH:    JULY
                         YEAR:     2018
                         LATITUDE:   45 35 N
                         LONGITUDE: 122 36 W

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 74.0   TOTAL FOR MONTH:   0.02    1 = FOG OR MIST
DPTR FM NORMAL:   4.8   DPTR FM NORMAL:   -0.63    2 = FOG REDUCING VISIBILITY
HIGHEST:   100 ON 15    GRTST 24HR  0.02 ON  2- 2      TO 1/4 MILE OR LESS
LOWEST:     51 ON 20, 3                            3 = THUNDER
              SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
              TOTAL MONTH:   0.0 INCH    5 = HAIL
              GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
              GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                   VSBY 1/2 MILE OR LESS
                                 8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                 X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:   1
MAX 90 OR ABOVE:  15    0.10 INCH OR MORE:   0
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   0
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.     2    CLEAR  (SCALE 0-3)  20
DPTR FM NORMAL   -15    PTCLDY (SCALE 4-7)  10
TOTAL FM JUL 1     2    CLOUDY (SCALE 8-10)  1
DPTR FM NORMAL   -15

[CDD (BASE 65) ]
```

```
TOTAL THIS MO.   289
DPTR FM NORMAL   142    [PRESSURE DATA]
TOTAL FM JAN 1   405    HIGHEST SLP 30.28 ON 10
DPTR FM NORMAL   194    LOWEST  SLP 29.82 ON  4

[REMARKS]
#FINAL-07-18#
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } function swapURL() { // make sure a new date was chosen if (document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value != "") { // all good // return true; document.myProd.submit(); } else { alert("Please chhose a valid date/time first."); return false; } } Explanation of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
691
CXUS56 KPQR 011508
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                   STATION:   PORTLAND OR
                                   MONTH:     AUGUST
                                   YEAR:      2018
                                   LATITUDE:   45 35 N
                                   LONGITUDE: 122 36 W

  TEMPERATURE IN F:      :PCPN:    SNOW:  WIND     :SUNSHINE: SKY    :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                 12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  85  61  73   2   0   8 0.00  0.0    0  6.9 14 320   M    M   4       19 320
 2  72  60  66  -5   0   1    T  0.0    0  3.8 12 310   M    M   8       16 310
 3  77  62  70  -1   0   5    T  0.0    0  3.9 12 310   M    M   7       15 320
 4  86  59  73   3   0   8 0.00  0.0    0  4.6 12 310   M    M   4       15 350
 5  92  60  76   6   0  11 0.00  0.0    0  4.9 10 300   M    M   4       13 300
 6  92  63  78   8   0  13 0.00  0.0    0  6.9 15 310   M    M   7       17 320
 7  95  62  79   9   0  14 0.00  0.0    0  6.9 15 280   M    M   6       20 280
 8  95  64  80  10   0  15 0.00  0.0    0  4.1  8  30   M    M   9       11 320
 9  96  64  80  10   0  15 0.00  0.0    0  3.9 13 320   M    M   8       15 280
10  92  67  80  10   0  15 0.00  0.0    0  5.3 16 310   M    M   5       20 320
11  78  64  71   1   0   6 0.01  0.0    0  6.3 18 240   M    M   7       23 240
12  78  62  70   0   0   5 0.00  0.0    0  7.0 18 320   M    M   9       25 320
13  91  60  76   6   0  11 0.00  0.0    0  7.4 17 320   M    M   7 8     21 320
14  95  62  79   9   0  14 0.00  0.0    0  4.5 12 290   M    M  10 8     14 280
15  89  64  77   7   0  12 0.00  0.0    0  5.1 12 280   M    M   9 8     15 290
16  83  61  72   2   0   7 0.00  0.0    0  6.4 17 320   M    M   8       20 320
17  82  55  69  -1   0   4 0.00  0.0    0  6.2 12 310   M    M   2       17 320
18  88  57  73   3   0   8 0.00  0.0    0  5.0 13 320   M    M   2       16 310
19  88  59  74   5   0   9 0.00  0.0    0  4.9 15 300   M    M   3 18    20 290
20  83  60  72   3   0   7 0.00  0.0    0  2.6  8 280   M    M   8 8     11 310
21  94  62  78   9   0  13 0.00  0.0    0  9.2 23  80   M    M   8 8     28  80
22  93  60  77   8   0  12 0.00  0.0    0  5.0 13 310   M    M   8 8     17 320
```

```
23  74  59  67  -2   0   2    T  0.0    0  5.9 17 310   M    M   8 18     21 320
24  72  53  63  -6   2   0 0.00  0.0    0  5.2 13 320   M    M   6        18 360
25  71  52  62  -7   3   0 0.01  0.0    0  3.5 12 310   M    M   7 18     14 320
26  68  59  64  -5   1   0    T  0.0    0  4.4 15 310   M    M  10 18     20 320
27  79  60  70   2   0   5 0.04  0.0    0  5.8 14 310   M    M   6 1      17 310
28  89  55  72   4   0   7 0.00  0.0    0  5.4 14 310   M    M   2        18 310
29  85  56  71   3   0   6 0.00  0.0    0  5.1 17 350   M    M   4        23 350
30  75  59  67  -1   0   2 0.00  0.0    0  3.6 13 310   M    M   8        19 320
31  76  59  68   0   0   3    T  0.0    0  6.9 15 300   M    M   6        23 290
================================================================================
SM 2613 1860        6 238  0.06     0.0 166.6          M      200
================================================================================
AV 84.3 60.0                          5.4 FASTST   M    M   6    MAX(MPH)
                         MISC ---->  # 23  80             # 28   80
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                              STATION:  PORTLAND OR
                              MONTH:    AUGUST
                              YEAR:     2018
                              LATITUDE:   45 35 N
                              LONGITUDE: 122 36 W

[TEMPERATURE DATA]     [PRECIPITATION DATA]      SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 72.2   TOTAL FOR MONTH:   0.06    1 = FOG OR MIST
DPTR FM NORMAL:   2.6   DPTR FM NORMAL:   -0.61    2 = FOG REDUCING VISIBILITY
HIGHEST:    96 ON  9    GRTST 24HR  0.04 ON 27-27      TO 1/4 MILE OR LESS
LOWEST:     52 ON 25                               3 = THUNDER
                 SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                 TOTAL MONTH:   0.0 INCH    5 = HAIL
                 GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
                 GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                       VSBY 1/2 MILE OR LESS
                                    8 = SMOKE OR HAZE
[NO. OF DAYS WITH]     [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                    X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:   3
MAX 90 OR ABOVE:  10    0.10 INCH OR MORE:   0
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   0
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.     6    CLEAR  (SCALE 0-3)   4
DPTR FM NORMAL    -4    PTCLDY (SCALE 4-7)  18
TOTAL FM JUL 1     8    CLOUDY (SCALE 8-10)  9
DPTR FM NORMAL   -19

[CDD (BASE 65) ]
```

```
TOTAL THIS MO.   238
DPTR FM NORMAL    86    [PRESSURE DATA]
TOTAL FM JAN 1   643    HIGHEST SLP 30.26 ON 17
DPTR FM NORMAL   280    LOWEST  SLP 29.75 ON 14

[REMARKS]
#FINAL-08-18#
```

National Weather Service - Climate Data select { background-color: #FFFFB3; } function swapURL() { // make sure a new date was chosen if (document.myProd.specdate.options[document.myProd.specdate.selectedIndex].value != "") { // all good // return true; document.myProd.submit(); } else { alert("Please chhose a valid date/time first."); return false; } }   Explanation of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Center (NCDC). Therefore, these data are subject to revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

```
000
CXUS56 KPQR 011437
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                   STATION:   PORTLAND OR
                                   MONTH:     SEPTEMBER
                                   YEAR:      2018
                                   LATITUDE:   45 35 N
                                   LONGITUDE: 122 36 W

  TEMPERATURE IN F:      :PCPN:    SNOW:  WIND      :SUNSHINE: SKY     :PK WND
================================================================================
1   2   3   4   5  6A  6B    7    8   9   10  11  12  13   14  15   16   17  18
                                 12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
================================================================================

 1  75  52  64  -4   1   0 0.00  0.0    0  6.8 17 310   M    M   3        21 320
 2  81  53  67  -1   0   2 0.00  0.0    0  6.8 18 320   M    M   0        22 320
 3  79  57  68   1   0   3 0.00  0.0    0  6.8 14 320   M    M   4        20 310
 4  84  52  68   1   0   3 0.00  0.0    0  6.3 16 320   M    M   1        22 320
 5  91  55  73   6   0   8 0.00  0.0    0  4.7 12 270   M    M   1        14 280
 6  88  57  73   6   0   8 0.00  0.0    0  4.5 12 320   M    M   1        17 340
 7  86  56  71   4   0   6    T  0.0    0  5.0 18 320   M    M   3        24 320
 8  76  60  68   2   0   3    T  0.0    0  5.0 10 340   M    M   8        16 350
 9  80  55  68   2   0   3 0.00  0.0    0  6.2 15 260   M    M   4        19 270
10  72  56  64  -2   1   0 0.06  0.0    0  4.7 17 320   M    M   8 1      21 310
11  69  56  63  -3   2   0 0.13  0.0    0  6.0 15 240   M    M   7 1      19 230
12  68  54  61  -5   4   0 0.82  0.0    0  5.4 17 140   M    M   8 13     19 140
13  71  51  61  -4   4   0 0.19  0.0    0  4.9 21 260   M    M   8 12     24 270
14  72  54  63  -2   2   0 0.00  0.0    0  3.8 13 310   M    M   6 1      15 310
15  68  53  61  -4   4   0    T  0.0    0  5.3 20 260   M    M   7        23 250
16  70  54  62  -3   3   0 0.35  0.0    0  9.2 20 190   M    M   8 1      24 190
17  70  49  60  -4   5   0    T  0.0    0  6.0 14 310   M    M   6 1      18 320
18  72  50  61  -3   4   0 0.00  0.0    0  5.3 13 340   M    M   4        18 330
19  72  48  60  -4   5   0 0.00  0.0    0  4.2 13 320   M    M   5        19 320
20  73  49  61  -3   4   0 0.00  0.0    0  2.8  9 320   M    M   3        11 320
21  75  50  63   0   2   0    T  0.0    0  4.9 16 190   M    M   6        19 180
22  71  52  62  -1   3   0 0.02  0.0    0  9.6 21 320   M    M   6 1      25 310
```

```
23  68  50  59  -3   6   0 0.00  0.0    0  4.7 17 310   M    M   4        22 310
24  74  47  61  -1   4   0 0.00  0.0    0  5.5 13 320   M    M   2        18 320
25  82  50  66   4   0   1 0.00  0.0    0  6.4 13 320   M    M   1        17 340
26  83  52  68   6   0   3 0.00  0.0    0  6.1 13 290   M    M   1        19 320
27  84  52  68   7   0   3 0.00  0.0    0  4.1 10 300   M    M   1        14 280
28  86  53  70   9   0   5 0.00  0.0    0  5.4 13 130   M    M   0        15 130
29  67  55  61   1   4   0    T  0.0    0  4.8 13 180   M    M   7        15 210
30  70  53  62   2   3   0 0.02  0.0    0  5.9 14 240   M    M   9 12     16  80
================================================================================
SM 2277 1585        61  48  1.59     0.0 167.1          M      132
================================================================================
AV 75.9 52.8                          5.6 FASTST   M    M   4    MAX(MPH)
                         MISC ---->  # 21 260             # 25  310
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6) , PAGE 2

                                STATION:  PORTLAND OR
                                MONTH:    SEPTEMBER
                                YEAR:     2018
                                LATITUDE:   45 35 N
                                LONGITUDE: 122 36 W

[TEMPERATURE DATA]      [PRECIPITATION DATA]       SYMBOLS USED IN COLUMN 16

AVERAGE MONTHLY: 64.4   TOTAL FOR MONTH:   1.59    1 = FOG OR MIST
DPTR FM NORMAL:  -0.1   DPTR FM NORMAL:    0.12    2 = FOG REDUCING VISIBILITY
HIGHEST:    91 ON  5    GRTST 24HR  0.82 ON 12-12      TO 1/4 MILE OR LESS
LOWEST:     47 ON 24                               3 = THUNDER
                  SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                  TOTAL MONTH:   0.0 INCH    5 = HAIL
                  GRTST 24HR     0.0         6 = FREEZING RAIN OR DRIZZLE
                  GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                                 VSBY 1/2 MILE OR LESS
                                              8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                              X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:   7
MAX 90 OR ABOVE:   1    0.10 INCH OR MORE:   4
MIN 32 OR BELOW:   0    0.50 INCH OR MORE:   1
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0

[HDD (BASE 65) ]
TOTAL THIS MO.    61    CLEAR  (SCALE 0-3)  12
DPTR FM NORMAL   -15    PTCLDY (SCALE 4-7)  16
TOTAL FM JUL 1    69    CLOUDY (SCALE 8-10)  2
DPTR FM NORMAL   -34

[CDD (BASE 65) ]
TOTAL THIS MO.    48
```

```
DPTR FM NORMAL   -11    [PRESSURE DATA]
TOTAL FM JAN 1   691    HIGHEST SLP 30.24 ON 24
DPTR FM NORMAL   269    LOWEST  SLP 29.66 ON 28

[REMARKS]
#FINAL-09-18#
```

WETS Table

WETS Station: N WILLAMETTE EXP STN, OR

Requested years: 1971 - 2000

Month	Avg Max Temp	Avg Min Temp	Avg Mean Temp	Avg Precip	30% chance precip less than	30% chance precip more than	Avg number days precip 0.10 or more	Avg Snowfall
Jan	47.0	33.5	40.2	5.94	3.97	7.11	13	0.5
Feb	51.1	34.8	43.0	5.24	3.90	6.13	12	0.3
Mar	56.1	37.2	46.7	4.28	3.30	4.96	12	0.0
Apr	60.5	40.2	50.4	3.27	2.15	3.93	9	0.0
May	67.0	45.1	56.0	2.50	1.64	3.00	7	0.0
Jun	73.1	49.8	61.5	1.80	1.05	2.18	5	0.0
Jul	80.4	53.2	66.8	0.73	0.24	0.85	2	0.0
Aug	80.8	53.0	66.9	0.83	0.22	0.93	2	0.0
Sep	75.8	48.9	62.3	1.79	0.93	2.12	5	0.0
Oct	64.5	41.9	53.2	3.36	1.77	4.10	7	0.0
Nov	52.6	37.7	45.2	6.48	4.50	7.71	14	0.1
Dec	45.8	32.9	39.3	6.44	4.09	7.76	12	0.6
Annual:					38.35	47.19		
Average	62.9	42.4	52.6	-	-	-	-	-
Total	-	-	-	42.65			101	1.4

GROWING SEASON DATES

Years with missing data:	24 deg = 0	28 deg = 1	32 deg = 1
Years with no occurrence:	24 deg = 6	28 deg = 0	32 deg = 0
Data years used:	24 deg = 30	28 deg = 29	32 deg = 29
Probability	24 F or higher	28 F or higher	32 F or higher
50 percent *	1/27 to 1/3: 341 days	3/1 to 11/22: 266 days	4/14 to 10/29: 198 days
70 percent *	1/14 to 1/17: 368 days	2/20 to 12/1: 284 days	4/7 to 11/5: 212 days

* Percent chance of the growing season occurring between the Beginning and Ending dates.

STATS TABLE - total precipitation (inches)

Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
1963	M1.14	4.02	6.48		4.34	1.62	0.81	0.36	1.11	3.09	5.86	4.45	33.28
1964	11.36	0.83	2.93	1.21	0.94	1.67	0.74	0.58	1.49	1.52	7.21	13.84	44.32
1965	8.51	2.07	1.09	3.23	1.30	0.66	0.23	0.99	0.05	2.79	6.63	6.78	34.33
1966	7.84	1.92	5.96	1.22	0.93	1.18	1.16	0.31	1.41	2.97	5.62	6.57	37.09
1967	6.77	1.53	4.79	2.58	2.12	0.72	0.00	0.00	0.26	5.58	2.04	5.65	32.04
1968	4.68	8.20	3.06	2.04	2.99	2.34	0.98	4.17	2.75	6.88	7.02	M12.46	57.57
1969	7.41	3.03	1.45	2.99	1.76	3.20	0.11	0.08	3.42	4.69	2.94	8.53	39.61
1970	11.72	5.12	2.30	2.36	1.30	0.31	0.07	T	1.38	3.49	6.94	8.92	43.91
1971	7.59	3.49	5.59	3.71	1.77	2.92	0.08	0.43	3.	3.	6.	8.02	47.

								51	69	49		29
1972	6.59	4.78	5.77	3.61	2.65	0.60	0.47	0.65	3.50	0.87	5.07	8.81	43.37
1973	4.45	1.96	M2.67	1.28	1.56	1.47	0.01	0.82	2.58	2.94	13.04	10.02	42.80
1974	8.24	5.48	6.28	2.23	1.98	0.96	2.31	0.02	0.26	1.62	6.56	6.53	42.47
1975	6.84	4.24	2.22	2.46	1.86	1.27	0.65	2.53	0.00	5.61	4.37	6.66	38.71
1976	6.32	6.68	2.82	3.00	1.48	0.57	0.95	2.41	1.18	0.85	1.67	1.48	29.41
1977	1.37	2.80	4.26	0.64	3.82	1.54	0.83	2.69	3.23	2.45	6.61	10.52	40.76
1978	5.35	3.59	1.69	3.50	4.52	1.69	0.90	2.08	2.74	0.37	4.92	3.54	34.89
1979	3.45	7.36	3.22	3.35	2.36	0.47	0.82	0.82	3.25	5.35	3.77	6.75	40.97
1980	9.99	4.68	3.59	4.07	1.23	2.52	0.14	0.49	1.69	1.67	6.87	11.90	48.84
1981	2.01	4.11	3.48	2.29	2.23	4.27	0.19	0.03	2.68	4.14	5.39	10.27	41.09
1982	6.24	6.94	3.12	8.98	M0.89	0.86	0.34	0.99	3.61	3.74	5.04	8.92	49.67
1983	7.18	9.54	7.18	2.67	2.13	2.60	2.68	2.52	0.86	2.25	9.04	6.33	54.98
1984	3.05	4.69	4.46	4.09	4.59	5.35	T	0.03	1.99	5.78	12.90	3.68	50.61
1985	0.45	3.49	4.54	1.42	0.97	2.48	0.45	0.79	1.93	3.17	5.00	2.46	27.15
1986	6.26	7.65	2.95	2.09	2.74	0.38	1.28	0.04	2.93	2.81	6.71	4.13	39.97
1987	6.75	4.94	5.55	2.19	1.66	0.30	2.00	0.10	0.53	0.23	2.40	10.55	37.20
1988	7.88	1.71	3.73	4.63	2.56	2.94	0.21	0.03	1.25	0.20	9.88	3.28	38.30
1989	4.24	3.16	7.02	1.24	2.27	0.91	0.52	1.37	1.34	2.15	3.72	4.15	32.09
1990	8.98	4.97	3.42	2.22	1.71	2.94	0.54	1.09	0.50	6.18	5.00	3.39	40.94
1991	2.83	3.69	4.39	4.62	4.58	2.42	0.16	0.75	0.30	3.70	7.31	5.53	40.28
1992	5.34	5.23	1.46	4.28	0.19	0.63	1.31	0.48	1.88	4.83	5.15	6.71	37.49
1993	2.96	M0.26	5.32	6.30	4.25	2.20	2.44	0.30	0.00	1.35	1.39	6.90	33.67
1994	4.78	6.93	3.58	1.88	1.63	1.57	0.06	0.02	1.12	6.94	8.32	7.70	44.53
1995	7.65	M4.45	4.42	5.14	1.84	2.07	M0.60	1.55	1.52	5.63	10.18	7.66	52.71
1996	9.09	12.04	3.91	6.76	4.63	1.05	0.80	0.14	3.06	5.51	11.39	15.72	74.10
1997	9.55	3.34	8.59	4.59	2.47	2.97	0.80	1.11	3.38	6.25	4.65	3.41	51.11
1998	8.98	5.73	4.91	1.42	5.57	1.27	0.22	0.25	0.90	4.69	10.96	0.54	45.44
1999	7.58	9.08	4.68	1.35	2.53	1.23	0.18	0.47	0.05	2.47	7.68	4.35	41.65
2000	6.21	5.15	3.46	2.15	2.39	1.40	0.01	0.00		3.21	3.04	3.16	30.18
2001	1.55	1.28	3.51	0.69	1.05	1.67	0.73	1.19	0.69	3.80			16.16
2002			5.59	2.44	1.35	1.83	0.07	0.24	1.95		3.22	10.02	26.71
2003	8.73	2.99	7.14	5.64	1.05	0.28	0.00	0.42	0.95	2.45	4.31	9.84	43.80
2004	6.19	4.04	1.09	1.07	1.92	1.63	0.12	2.52	1.74	4.34	2.71	4.46	31.83
2005	1.87	0.58	5.00	2.97	5.02	2.75	0.58	0.00	2.	M2.	6.	10.	40.

									14	63	22	53	29
2006	13.70	2.77	4.30	2.77	2.79	0.99	0.07	0.11	0.84	1.68	13.05	7.43	50.50
2007	4.75	5.26	5.29	2.26	0.90	0.53	0.63	0.66					20.28
Notes: Data missing in any month have an "M" flag. A "T" indicates a trace of precipitation.													
Data missing for all days in a month or year is blank.													
Creation date: 2016-07-22													

Appendix D

Site Photographs

P1: Southeastern portion of tax lot 1800, looking north

P2: Eastern portion of tax lot 1800, looking west

P3: Southern portion of tax lot 1800, looking northwest

P4: Northwestern portion of tax lot 1800 and Wetland B, looking south

Filepath: \\pdx1\portland\Projects\West_Hills_Development\01_Active_Projects\Frog_Pond_Meadows\Deliverables\WDR\06_Appendix_D_Site_Photographs

Photographs 1 through 4

Overview of Tax Lot 1800 (West Linn/Wilsonville School District Property) and Wetland B

P5: Northwest portion of riparian corridor and Wetland A, looking east

P6: Northwest portion of riparian corridor and Wetland A, looking southeast

P7: Southwest portion of riparian corridor and Wetland A, looking northeast

P8: Forested patch on tax lot 2200, looking south

Photographs 5 through 8

Overview of Tax Lot 2200 (West Linn/Wilsonville School District Property), Wetland A, Riparian Corridor, and Forested Patch

P9: North central portion of tax lot 1800 and Wetland C, looking south

P10: North portion of tax lot 1800 and Wetland F, looking northwest

P11: Southeast portion of tax lot 1800 and Wetland D, looking north

P12: East boundary of tax lot 1800, Wetland D, and roadside ditch, looking north

Filepath: \\pdx1\portland\Projects\West_Hills_Development\01_Active_Projects\Frog_Pond_Meadows\Deliverables\WDR\06_Appendix_D_Site_Photographs

ANCHOR QEA

Photographs 9 through 12

Overview of Tax Lot 1800 (West Linn/Wilsonville School District Property), Wetland C, Wetland D, and Wetland F

P13: Central portion of tax lot 1800 and Wetland E, looking south

P14: North boundary of tax lot 1902 and Wetland E, looking west

P15: West portion of tax lot 1903 and Wetland E, looking north

P16: Southwest boundary of tax lot 1902 and Wetland E, looking south toward Community of Hope Church Property

Filepath: \\pdx1\portland\Projects\West_Hills_Development\01_Active_Projects\Frog_Pond_Meadows\Deliverables\WDR\06_Appendix_D_Site_Photographs

ANCHOR QEA

Photographs 13 through 16

Overview of Tax Lots 1902 and 1903 (Eaton Properties), Wetland E, and Tax Lot 2000 (Community of Hope Church Property)

Wetland Delineation Report

West Hills Land Development: Frog Pond Meadows Residential Development

Appendix E

Wetland Determination Data Forms

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/14/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-01A
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7481744 Long: 45.3188302 Datum: NAD88
Soil Map Unit Name: Concord Silt Loam NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks: Wetland A
Riparian wetland around Willow Creek

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1. *Populus nigra L.*	30	Yes	NOL
2.			
3.			
4.			
5.			
50%= 15 20%= 6 Total Cover:	**30**		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Rosa nutkana*	15	Yes	FAC
2.			
3.			
4.			
5.			
50%= 7.5 20%= 3 Total Cover:	**15**		
Herb Stratum (Plot size: 5 ft)			
1. *Schedonorus arundinaceus*	60	Yes	FAC
2. *Alopecurus pratensis*	35	Yes	FAC
3. *Anthoxanthum odoratum*	5	No	FACU
4. *Vicia sativa*	1	No	UPL
5.			
6.			
7.			
8.			
9.			
50%= 50.5 20%= 20.2 Total Cover:	**101**		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	**0**		

% Bare Ground in Herb Stratum **0** % Cover of Biotic Crust ____

Dominance Test worksheet:

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

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:
OBL species	**0**	x1 =	**0**
FACW species	**0**	x2 =	**0**
FAC species	**110**	x3 =	**330**
FACU species	**5**	x4 =	**20**
UPL species	**1**	x5 =	**5**
Column Totals:	**116** (A)		**355** (B)

Prevalence Index = B/A = **3.1**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-01A

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	95	7.5YR 5/6	3	C	M	SiL	
			7.5YR 5/6	2	C	PL		oxidized rhizospheres
4-16	10YR 4/2		7.5YR 5/6	10	C	M	SiL	
			7.5YR 5/6	2	C	PL		oxidized rhizospheres
			5YR 3/4	5	C	M		

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck 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)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed Soils (C6)
___ Stunted or Stressed Plants (D1) (**LRR A**)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water-Stained Leaves (B9) (**MLRA 1, 2, 4A and 4B**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Saturation Visible on Aerial Imagery (C9)
X Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)
X 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? Yes ___ No X Depth (inches): ___
(includes capillary fringe)

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

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/14/2018

Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-02A

Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West

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

Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7482146 Long: 45.3188187 Datum: NAD88

Soil Map Unit Name: Concord Silt Loam NWI Classification: none

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

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

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

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

Hydrophytic Vegetation Present? Yes ____ No X

Hydric Soil Present? Yes X No ____

Wetland Hydrology Present? Yes ____ No X

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

Remarks: Data plot located just upslope from DP-01 in Wetland A.

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1. *Pseudotsuga menziesii*	25	Yes	FACU
2. *Populus nigra L.*	25	Yes	NOL
3.			
4.			
5.			
50%= 25 20%= 10 Total Cover:	**50**		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Prunus laurocerasus*	10	Yes	NOL
2. *Rubus armeniacus*	10	Yes	FAC
3.			
4.			
5.			
50%= 10 20%= 4 Total Cover:	**20**		
Herb Stratum (Plot size: 5 ft)			
1. *Anthoxanthum odoratum*	60	Yes	FACU
2. *Vicia americana*	15	No	FAC
3. *Taraxacum officinale*	5	No	FACU
4. *Alopecurus pratensis*	5	No	FAC
5.			
6.			
7.			
8.			
9.			
50%= 42.5 20%= 17 Total Cover:	**85**		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	**0**		

% Bare Ground in Herb Stratum **0** % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	**1**	(A)
Total Number of Dominant Species Across All Strata:	**3**	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	**33%**	(A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x1 =	**0**
FACW species	**0**	x2 =	**0**
FAC species	**30**	x3 =	**90**
FACU species	**90**	x4 =	**360**
UPL species	**0**	x5 =	**0**
Column Totals:	**120** (A)		**450** (B)

Prevalence Index = B/A = **3.8**

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

____ 2 - Dominance Test is >50%

____ 3 - Prevalence Index is ≤3.0[1]

____ 4 - Morphological Adaptation[1] (Provide supporting data in Remarks or on a separate sheet)

____ 5 - Wetland Non-Vascular Plants[1]

____ Problematic Hydrophytic Vegetation[1] (Explain)

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

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

Remarks:

SOIL

Sampling Point: DP-02A

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	
4-10	10YR 3/2	98	5YR 3/4	2	C	M	SiL	
10-16	10YR 3/2	90	5YR 3/4	10	C	M	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 Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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 (Unnamed Tributary gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/14/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-03A
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7478913 Long: 45.3198140 Datum: NAD88
Soil Map Unit Name: Concord Silt Loam NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks: Wetland A

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Rosa nutkana*	40	Yes	FAC
2. *Rubus armeniacus*	30	Yes	FAC
3.			
4.			
5.			
50%= 35 20%= 14 Total Cover:	70		
Herb Stratum (Plot size: 5 ft)			
1. *Holcus lanatus*	40	Yes	FAC
2. *Epilobium ciliatum*	10	No	FACW
3. *Carex deweyana*	20	Yes	FAC
4. *Schedonorus arundinaceus*	25	Yes	FAC
5. *Scirpus microcarpus*	5	No	OBL
6.			
7.			
8.			
9.			
50%= 50 20%= 20 Total Cover:	100		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

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	5	x1 =	5
FACW species	10	x2 =	20
FAC species	155	x3 =	465
FACU species	0	x4 =	0
UPL species	0	x5 =	0
Column Totals:	170 (A)		490 (B)

Prevalence Index = B/A = 2.9

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: DP-03A

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 3/2	100					SiL	
3-6	10YR 3/2	95	7.5YR 5/6	5	C	M	SiL	
6-12	10YR 3/2	85	5YR 5/6	5	C	PL	SiL	oxidized rhizospheres
			7.5YR 5/6	10	C	M		
12-16	10YR 5/1	30	7.5YR 5/6	30	C	M	SiCL	mixed matrix
	10YR 4/2	40						

[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 Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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): 15
Saturation Present? (includes capillary fringe)	Yes	X	No		Depth (inches): 6

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

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/14/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-04A
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7478603 Long: 45.3198197 Datum: NAD88
Soil Map Unit Name: Concord Silt Loam NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks: Data plot located just upslope from DP-04 in Wetland A.

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1. *Pinus ponderosa*	15	Yes	FACU
2. *Sequoiadendron giganteum*	10	No	NOL
3. *Pseudotsuga menziesii*	15	Yes	FACU
4. *Picea abies*	5	No	NOL
5. *Frangula purshiana*	10	No	FAC
50%= 27.5 20%= 11 Total Cover:	**55**		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Rosa nutkana*	30	Yes	FAC
2. *Crataegus monogyna*	20	Yes	FAC
3. *Rubus armeniacus*	10	No	FAC
4. *Rubus ursinus*	15	Yes	FACU
5.			
50%= 37.5 20%= 15 Total Cover:	**75**		
Herb Stratum (Plot size: 5 ft)			
1. *Holcus lanatus*	50	Yes	FAC
2. *Carex deweyana*	20	Yes	FAC
3. *Polystichum munitum*	10	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
50%= 40 20%= 16 Total Cover:	**80**		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	**0**		

% Bare Ground in Herb Stratum **20** % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **4** (A)
Total Number of Dominant Species Across All Strata: **7** (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: **57%** (A/B)

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:
OBL species	**0**	x1 =	**0**
FACW species	**0**	x2 =	**0**
FAC species	**140**	x3 =	**420**
FACU species	**55**	x4 =	**220**
UPL species	**0**	x5 =	**0**
Column Totals:	**195** (A)		**640** (B)

Prevalence Index = B/A = **3.3**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-04A

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	
4-10	10YR 3/2	95	5YR 4/6	5	C	M	SiL	
10-12	10YR 4/2	90	7.5YR 5/6	10	C	M	SiL	
12-16	10YR 5/1	30	7.5YR 5/6	30	C	M	SiL	
	10YR 4/2	40						

[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)
X Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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 (Unnamed Tributary gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/14/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-01E
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7455492 Long: 45.3194208 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks: Wetland E

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Trifolium repens*	20	Yes	FAC
2. *Ranunculus repens*	5	No	FAC
3. *Holcus lanatus*	5	No	FAC
4. *Festuca spp.*	30	Yes	-
5. *Agrostis stolonifera*	30	Yes	FAC
6. *Taraxacum officinale*	5	No	FACU
7.			
8.			
9.			
50%= 47.5 20%= 19 Total Cover:	95		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	0		
% Bare Ground in Herb Stratum 5 % Cover of Biotic Crust ____			

Dominance Test worksheet:

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

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	**0**	x1 =	**0**
FACW species	**0**	x2 =	**0**
FAC species	**60**	x3 =	**180**
FACU species	**5**	x4 =	**20**
UPL species	**0**	x5 =	**0**
Column Totals:	**65** (A)		**200** (B)

Prevalence Index = B/A = **3.1**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-01E

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
0-7	7.5YR 3/2	90	5YR 5/6	5	C	PL	SiL	oxidized rhizospheres
			5YR 5/6	5	C	M		
7-12	7.5YR 4/2	88	5YR 4/4	5	C	M	SiL	
			5YR 5/6	5	C	M		
			5YR 3/3	2	C	M		
12-16	7.5YR 5/2	70	5YR 5/6	30	C	M	SiCL	

[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 Muck 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)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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** X **No** ___

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/14/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-02E
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7455237 Long: 45.3194214 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks:

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Trifolium repens*	30	Yes	FAC
2. *Agrostis stolonifera*	30	Yes	FAC
3. *Poa spp.*	30	Yes	-
4. *Taraxacum officinale*	10	No	FACU
5.			
6.			
7.			
8.			
9.			
50%= 50 20%= 20 Total Cover:	100		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ___

Dominance Test worksheet:

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

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:	
OBL species	0	x1 =	0	
FACW species	0	x2 =	0	
FAC species	60	x3 =	180	
FACU species	10	x4 =	40	
UPL species	0	x5 =	0	
Column Totals:	70	(A)	220	(B)

Prevalence Index = B/A = **3.1**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-02E

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
0-6	7.5YR 3/3	94	7.5YR 4/6	5	C	M		
			7.5YR 4/6	1	C	PL		oxidized rhizospheres
6-16	7.5YR 4/3	80						mixed matrix
	7.5YR 4/4	20						

[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 Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ___
Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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? Yes ___ No X Depth (inches): ___
(includes capillary fringe)

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

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/14/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-03E
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7455760 Long: 45.3194226 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks:

VEGETATION

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status?
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Taraxacum officinale*	20	Yes	FACU
2. *Trifolium repens*	35	Yes	FAC
3. *Agrostis stolonifera*	15	No	FAC
4. *Anthoxanthum odoratum*	25	Yes	FACU
5.			
6.			
7.			
8.			
9.			
50%= 47.5 20%= 19 Total Cover:	95		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 5 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **1** (A)
Total Number of Dominant Species Across All Strata: **3** (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: **33%** (A/B)

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:	
OBL species	**0**	x1 =	**0**	
FACW species	**0**	x2 =	**0**	
FAC species	**50**	x3 =	**150**	
FACU species	**45**	x4 =	**180**	
UPL species	**0**	x5 =	**0**	
Column Totals:	**95**	(A)	**330**	(B)

Prevalence Index = B/A = **3.5**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-03E

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	7.5YR 3/3	50	7.5YR 5/6	5	C	M	SiL	
	7.5YR 4/4	40	7.5YR 5/6	5	C	PL		oxidized rhizospheres
10-16	7.5YR 4/3	80	7.5YR 5/6	20	C	M	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 Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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 (Unnamed Tributary gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/14/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-04E
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7455466 Long: 45.3193062 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks: Wetland E

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Trifolium repens*	20	Yes	FAC
2. *Taraxacum officinale*	10	No	FACU
3. *Agrostis stolonifera*	35	Yes	FAC
4. *Poa spp.*	35	Yes	-
5.			
6.			
7.			
8.			
9.			
50%= 50 20%= 20 Total Cover:	100		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ___

Dominance Test worksheet:

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

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:
OBL species	**0**	x1 =	**0**
FACW species	**0**	x2 =	**0**
FAC species	**55**	x3 =	**165**
FACU species	**10**	x4 =	**40**
UPL species	**0**	x5 =	**0**
Column Totals:	**65** (A)		**205** (B)

Prevalence Index = B/A = **3.2**

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes X No ___

Remarks:

SOIL

Sampling Point: DP-04E

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	7.5YR 3/2	100						mass roots
3-7	7.5YR 4/2	90	5YR 5/6	5	C	PL		oxidized rhizospheres
			5YR 5/6	5	C	M		
7-16	7.5YR 5/2	75	7.5YR 5/6	20	C	M		
			5YR 3/4	5	C	M		

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

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

Remarks: Wet soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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** X **No** ______

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/14/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-05E
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7455803 Long: 45.3192914 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks:

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	**0**		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	**0**		
Herb Stratum (Plot size: 5 ft)			
1. *Agrostis stolonifera*	30	Yes	FAC
2. *Trifolium repens*	30	Yes	FAC
3. *Hypochaeris radicata*	25	Yes	FACU
4. *Anthoxanthum odoratum*	5	No	FACU
5. *Medicago lupulina*	5	No	FACU
6.			
7.			
8.			
9.			
50%= 47.5 20%= 19 Total Cover:	**95**		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	**0**		

% Bare Ground in Herb Stratum **5** % Cover of Biotic Crust ____

Dominance Test worksheet:

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

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:	
OBL species	**0**	x1 =	**0**	
FACW species	**0**	x2 =	**0**	
FAC species	**60**	x3 =	**180**	
FACU species	**35**	x4 =	**140**	
UPL species	**0**	x5 =	**0**	
Column Totals:	**95**	(A)	**320**	(B)

Prevalence Index = B/A = **3.4**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-05E

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	7.5YR 4/3	98	5YR 5/6	2	C	PL	SiL	oxodized rhizospheres
2-10	7.5YR 4/3	90	7.5YR 4/4	10	C	M	SiL	
10-16	7.5YR 4/3	60					SiL	mixed matrix
	7.5YR 4/4	20						
	7.5YR 5/3	20						

[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 Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

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

Remarks: Upland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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 (Unnamed Tributary gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-01E
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7455492 Long: 45.3194208 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks: Wetland B

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Juncus bufonius*	45	Yes	FACW
2. *Anthoxanthum odoratum*	30	Yes	FACU
3. *Alopecurus pratensis*	20	Yes	FAC
4. *Medicago lupulina*	5	No	FACU
5.			
6.			
7.			
8.			
9.			
50%= 50 20%= 20 Total Cover:	100		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

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

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:
OBL species	**0**	x1 =	**0**
FACW species	**45**	x2 =	**90**
FAC species	**20**	x3 =	**60**
FACU species	**35**	x4 =	**140**
UPL species	**0**	x5 =	**0**
Column Totals:	**100** (A)		**290** (B)

Prevalence Index = B/A = **2.9**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-01E

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 3/3	100					SiL	
2-5	10YR 4/2	88	5YR 5/6	10	C	M	SiCL	
			5YR 5/6	2	C	PL		oxidized rhizospheres
5-12	10YR 4/2	80	5YR 5/6	15	C	M	SiCL	
			5YR 5/6	5	C	PL		oxidized rhizospheres
12-16	10YR 4/1	75	5YR 5/6	25	C	M	SiCL	

[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 Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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** X **No** ___

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-02B
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7476000 Long: 45.3211301 Datum: NAD88
Soil Map Unit Name: Concord Silt Loam NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks:

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Anthoxanthum odoratum*	50	Yes	FACU
2. *Medicago lupulina*	35	Yes	FACU
3. *Juncus bufonius*	10	No	FACW
4. *Trifolium repens*	5	No	FAC
5.			
6.			
7.			
8.			
9.			
50%= 50 20%= 20 Total Cover:	100		
Woody Vine Stratum (Plot size:)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)
Total Number of Dominant Species Across All Strata: **2** (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**	x1 =	**0**	
FACW species	**10**	x2 =	**20**	
FAC species	**5**	x3 =	**15**	
FACU species	**85**	x4 =	**340**	
UPL species	**0**	x5 =	**0**	
Column Totals:	**100**	(A)	**375**	(B)

Prevalence Index = B/A = **3.8**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-02B

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 3/3	100					SiL	
3-7	10YR 3/3	99	7.5YR 5/6	1	C	PL	SiL	trace oxodized rhizospheres
7-16	10YR 3/2	70	10YR 5/2	15	D	M	SiL	
			7.5YR 5/6	15	C	M		

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ________________

Depth (inches): ________________

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

Remarks: upland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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? Yes ___ No _X_ Depth (inches): ________
(includes capillary fringe)

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

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-01C
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7461775 Long: 45.3205328 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks: Wetland C, School Ag Central

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Juncus bufonius*	45	Yes	FACW
2. *Phleum pratense*	30	Yes	FAC
3. *Anthoxanthum odoratum*	20	Yes	FACU
4. *Medicago lupulina*	5	No	FACU
5.			
6.			
7.			
8.			
9.			
50%= 50 20%= 20 Total Cover:	100		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

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

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:	
OBL species	**0**	x1 =	**0**	
FACW species	**45**	x2 =	**90**	
FAC species	**30**	x3 =	**90**	
FACU species	**25**	x4 =	**100**	
UPL species	**0**	x5 =	**0**	
Column Totals:	**100**	(A)	**280**	(B)

Prevalence Index = B/A = **2.8**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-01C

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 4/2	100					SiL	
2-6	10YR 4/2	93	7.5YR 5/6	5	C	M	SiL	
			7.5YR 5/6	2	C	PL		oxodized rhizopheres
6-12	N 4/0	80	2.5YR 4/6	15	C	M	SiL	
			2.5YR 4/6	5	C	PL		oxodized rhizopheres
12-16	10YR 4/1	70	10YR 5/2	20	D	M	SiL	
			7.5YR 5/6	10	C	M		

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1)
- ___ Sandy gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- X 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) (**LRR B**)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

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

Remarks: wet

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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** X **No** ______

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-02C
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7461922 Long: 45.3205053 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks:

VEGETATION

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status?
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Holcus lanatus*	5	No	FAC
2. *Phleum pratense*	10	No	FAC
3. *Anthoxanthum odoratum*	60	Yes	FACU
4. *Medicago lupulina*	25	Yes	FACU
5.			
6.			
7.			
8.			
9.			
50%= 50 20%= 20 Total Cover:	100		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)
Total Number of Dominant Species Across All Strata: **2** (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**	x1 =	**0**	
FACW species	**0**	x2 =	**0**	
FAC species	**15**	x3 =	**45**	
FACU species	**85**	x4 =	**340**	
UPL species	**0**	x5 =	**0**	
Column Totals:	**100**	(A)	**385**	(B)

Prevalence Index = B/A = **3.9**

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL

Sampling Point: DP-02C

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 4/3	100					SiL	
2-4	10YR 4/2	98	10YR 5/6	2	C	M	SiL	
4-9	N 4/0	85	2.5YR 4/6	10	C	M	SiL	
			2.5YR 4/6	5	C	PL		oxodized rhizopheres
9-16	10YR 4/1	70	10YR 5/2	20	D	M	SiL	
			7.5YR 5/6	10	C	M		

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Muck 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) (**LRR B**)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type:

Depth (inches):

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

Remarks: upland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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? Yes No X Depth (inches):
(includes capillary fringe)

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

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-07E
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7458509 Long: 45.3199300 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks: Wetland E

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Holcus lanatus*	30	Yes	FAC
2. *Juncus bufonius*	20	Yes	FACW
3. *Anthoxanthum odoratum*	30	Yes	FACU
4. *Agrostis stolonifera*	10	No	FAC
5. *Medicago lupulina*	5	No	FACU
6. *Poa spp.*	5	No	-
7.			
8.			
9.			
50%= 50 20%= 20 Total Cover:	100		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	0		
% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____			

Dominance Test worksheet:

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

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:
OBL species	**0**	x1 =	**0**
FACW species	**20**	x2 =	**40**
FAC species	**40**	x3 =	**120**
FACU species	**35**	x4 =	**140**
UPL species	**0**	x5 =	**0**
Column Totals:	**95** (A)		**300** (B)

Prevalence Index = B/A = **3.2**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-07E

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 4/2	100					SiL	
2-6	10YR 4/2	93	7.5YR 5/6	5	C	M	SiL	
			7.5YR 5/6	2	C	PL		oxidized rhizospheres
6-12	10YR 4/1	85	2.5YR 3/6	5	C	M	SiL	
			5YR 4/6	10	C	PL		
12-16	10YR 4/1	40	7.5YR 5/6	20	C	M	SiL	mixed matrix
	10YR 5/1	40						

[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 Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

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

Remarks: wet

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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** X **No** ____

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-08E
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7458643 Long: 45.3199517 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks:

VEGETATION

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status?
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Anthoxanthum odoratum*	60	Yes	FACU
2. *Holcus lanatus*	15	No	FAC
3. *Medicago lupulina*	10	No	FACU
4. *Trifolium repens*	10	No	FAC
5. *Rumex acetosella*	5	No	FACU
6. *Taraxacum officinale*	0.5	No	FACU
7.			
8.			
9.			
50%= 50.25 20%= 20.1 Total Cover:	100.5		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	0		
% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____			

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**	x1 =	**0**	
FACW species	**0**	x2 =	**0**	
FAC species	**25**	x3 =	**75**	
FACU species	**75.5**	x4 =	**302**	
UPL species	**0**	x5 =	**0**	
Column Totals:	**100.5**	(A)	**377**	(B)

Prevalence Index = B/A = **3.8**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-08E

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 3/3	100					SiL	
2-6	10YR 3/2	95	7.5YR 5/6	5	C	M	SiL	
6-11	10YR 4/2	85	5YR 5/6	10	C	M	SiL	
			5YR 5/6	5	C	PL		oxidized rhizosperes
11-16	10YR 4/2	70	7.5YR 5/6	20	C	M	SiL	
			10YR 5/1	10	D	M		

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck 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)
X Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks: upland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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** X **No** ___

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-06E
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7455327 Long: 45.3200498 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks:

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Anthoxanthum odoratum*	90	Yes	FACU
2. *Agrostis stolonifera*	5	No	FAC
3. *Trifolium campestre*	5	No	NOL
4.			
5.			
6.			
7.			
8.			
9.			
50%= 50 20%= 20 Total Cover:	100		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

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**	x1 =	**0**
FACW species	**0**	x2 =	**0**
FAC species	**5**	x3 =	**15**
FACU species	**90**	x4 =	**360**
UPL species	**0**	x5 =	**0**
Column Totals:	**95** (A)		**375** (B)

Prevalence Index = B/A = **3.9**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-06E

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
0-6	10YR 3/2	100						
6-12	10YR 3/2	95	7.5YR 5/6	5	C	M		
			7.5YR 5/6	1	C	PL		oxidized rhizospheres
12-16	10YR 3/2	90	10YR 4/2	5	D	M		
			7.5YR 3/4	5	C	M		

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type:

Depth (inches):

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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? Yes ___ No X Depth (inches):
(includes capillary fringe)

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

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-09E
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7453017 Long: 45.3200259 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks: Wetland E

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Agrostis stolonifera*	40	Yes	FAC
2. *Anthoxanthum odoratum*	40	Yes	FACU
3. *Trifolium campestre*	15	No	NOL
4. *Trifolium repens*	5	No	FAC
5. *Epilobium ciliatum*	0.5	No	FACW
6.			
7.			
8.			
9.			
50%= 50.25 20%= 20.1 Total Cover:	**100.5**		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	**0**		
% Bare Ground in Herb Stratum **0** % Cover of Biotic Crust ____			

Dominance Test worksheet:

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

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:	
OBL species	**0**	x1 =	**0**	
FACW species	**0.5**	x2 =	**1**	
FAC species	**45**	x3 =	**135**	
FACU species	**40**	x4 =	**160**	
UPL species	**0**	x5 =	**0**	
Column Totals:	**85.5**	(A)	**296**	(B)

Prevalence Index = B/A = **3.5**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-09E

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	
4-9	10YR 3/2	98	7.5YR 5/6	2	C	M	SiL	
			7.5YR 5/6	1	C	PL		oxidized rhizospheres
9-13	10YR 3/1	90	2.5YR 3/6	5	C	M	SiL	
			7.5YR 5/6	5	C	M		
			7.5YR 5/6	1	C	PL		oxidized rhizospheres
13-16	10YR 4/1	80	10YR 5/1	10	D	M	SiL	
			7.5YR 5/6	10	C	M		

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type:
Depth (inches):

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

Remarks: upland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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 (Unnamed Tributary gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-10E
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7453388 Long: 45.3200166 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks:

VEGETATION

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status?
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Agrostis stolonifera*	40	Yes	FAC
2. *Anthoxanthum odoratum*	20	Yes	FACU
3. *Ranunculus repens*	15	No	FAC
4. *Alopecurus pratensis*	10	No	FAC
5. *Trifolium campestre*	5	No	NOL
6. *Epilobium ciliatum*	5	No	FACW
7. *Holcus lanatus*	5	No	FAC
8.			
9.			
50%= 50 20%= 20 Total Cover:	100		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

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

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:	
OBL species	**0**	x1 =	**0**	
FACW species	**5**	x2 =	**10**	
FAC species	**70**	x3 =	**210**	
FACU species	**20**	x4 =	**80**	
UPL species	**0**	x5 =	**0**	
Column Totals:	**95**	(A)	**300**	(B)

Prevalence Index = B/A = **3.2**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-10E

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	
4-6	10YR 3/2	98	7.5YR 5/6	2	C	M	SiL	
6-10	10YR 3/1	83	2.5YR 3/6	10	C	M	SiL	
			2.5YR 3/6	2	C	PL		oxidized rhizospheres
			10YR 4/1	5	D	M		
10-16	10YR 4/1	80	5YR 5/6	1	C	PL	SiL	oxidized rhizospheres
			5YR 5/6	15	C	M		
			10YR 5/1	5	D	M		

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

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck 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) (**LRR B**)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks: wet

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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** X **No** ___

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-11E
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7451258 Long: 45.3198621 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks: Wetland E

VEGETATION

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status?
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	**0**		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	**0**		
Herb Stratum (Plot size: 5 ft)			
1. *Anthoxanthum odoratum*	25	Yes	FACU
2. *Juncus tenuis*	20	Yes	FAC
3. *Alopecurus pratensis*	20	Yes	FAC
4. *Agrostis stolonifera*	15	No	FAC
5. *Holcus lanatus*	10	No	FAC
6. *Schedonorus arundinaceus*	5	No	FAC
7. *Vicia americana*	0.5	No	FAC
8. *Plantago major*	0.5	No	FAC
9.			
50%= 48 20%= 19.2 Total Cover:	**96**		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	**0**		

% Bare Ground in Herb Stratum **4** % Cover of Biotic Crust ____

Dominance Test worksheet:

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

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:	
OBL species	**0**	x1 =	**0**	
FACW species	**0**	x2 =	**0**	
FAC species	**71**	x3 =	**213**	
FACU species	**25**	x4 =	**100**	
UPL species	**0**	x5 =	**0**	
Column Totals:	**96**	(A)	**313**	(B)

Prevalence Index = B/A = **3.3**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-11E

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	
4-7	10YR 3/2	93	5YR 5/6	2	C	PL	SiL	oxidized rhizospheres
			5YR 5/6	5	C	M		
7-12	10YR 4/2	90	5YR 4/4	10	C	M	SiL	
12-16	10YR 4/1	90	5YR 5/6	5	C	M	SiL	
			5YR 4/4	5	C	M		

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
X Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks: wet

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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** X **No** ___

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-12E
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7450700 Long: 45.3198619 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks:

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Rubus armeniacus*	20	Yes	FAC
2. *Crataegus monogyna*	10	Yes	FAC
3. *Corylus cornuta*	10	Yes	FACU
4.			
5.			
50%= 20 20%= 8 Total Cover:	40		
Herb Stratum (Plot size: 5 ft)			
1. *Anthoxanthum odoratum*	40	Yes	FACU
2. *Festuca rubra*	20	Yes	FAC
3. *Taraxacum officinale*	10	No	FACU
4. *Vicia americana*	10	No	FAC
5. *Holcus lanatus*	5	No	FAC
6. *Madia sativa*	5	No	NOL
7. *Geranium dissectum*	1	No	NOL
8.			
9.			
50%= 45.5 20%= 18.2 Total Cover:	91		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	0		
% Bare Ground in Herb Stratum 9 % Cover of Biotic Crust ____			

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **3** (A)
Total Number of Dominant Species Across All Strata: **5** (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: **60%** (A/B)

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:
OBL species	**0**	x1 =	**0**
FACW species	**0**	x2 =	**0**
FAC species	**65**	x3 =	**195**
FACU species	**60**	x4 =	**240**
UPL species	**0**	x5 =	**0**
Column Totals:	**125** (A)		**435** (B)

Prevalence Index = B/A = **3.5**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-12E

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 3/3	100					SiL	
4-7	10YR 3/3	95	5YR 5/6	1	C	PL	SiL	oxidized rhizospheres
			5YR 5/6	5	C	M		
7-10	10YR 4/2	60	5YR 4/4	10	C		SiL	mixed matrix
	10YR 4/3	30						
10-16	10YR 5/2	60	5YR 5/6	5	C		SiL	mixed matrix
	10YR 5/3	25	7.5YR 5/6	10	C			

[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 Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ______________________

Depth (inches): ______________________

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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? Yes _____ No X Depth (inches): __________
(includes capillary fringe)

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

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-01F
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7455382 Long: 45.3208759 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks: Wetland F

VEGETATION

		Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum	(Plot size: 30 ft)			
1.				
2.				
3.				
4.				
5.				
50%= 0	20%= 0	Total Cover: 0		
Sapling/Shrub Stratum	(Plot size: 15 ft)			
1.				
2.				
3.				
4.				
5.				
50%= 0	20%= 0	Total Cover: 0		
Herb Stratum	(Plot size: 5 ft)			
1.	*Juncus bufonius*	30	Yes	FACW
2.	*Holcus lanatus*	20	No	FAC
3.	*Alopecurus pratensis*	20	No	FAC
4.	*Anthoxanthum odoratum*	20	No	FACU
5.	*Agrostis stolonifera*	10	No	FAC
6.	*Ranunculus repens*	10	No	FAC
7.				
8.				
9.				
50%= 55	20%= 22	Total Cover: 110		
Woody Vine Stratum	(Plot size: ____)			
1.				
2.				
		Total Cover: 0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

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

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:
OBL species	**0**	x1 =	**0**
FACW species	**30**	x2 =	**60**
FAC species	**60**	x3 =	**180**
FACU species	**20**	x4 =	**80**
UPL species	**0**	x5 =	**0**
Column Totals:	**110** (A)		**320** (B)

Prevalence Index = B/A = **2.9**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-01F

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 4/2	100					SiL	
2-6	10YR 4/2	93	7.5YR 5/6	5	M	M	SiL	
			7.5YR 5/6	2	PL	PL		oxodized rhizopheres
6-12	N 4/0	80	2.5YR 4/6	15	M	M	SiL	
			2.5YR 4/6	5	PL	PL		oxodized rhizopheres
12-16	10YR 4/1	70	10YR 5/2	20	M	M	SiL	
			7.5YR 5/6	10	M	M		

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck Mineral (S1)
___ Sandy gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
X 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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? Yes ___ No X Depth (inches): ___
(includes capillary fringe)

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

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-02F
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7455189 Long: 45.3208488 Datum: NAD88
Soil Map Unit Name: Aloha Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks:

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	**0**		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	**0**		
Herb Stratum (Plot size: 5 ft)			
1. *Anthoxanthum odoratum*	30	Yes	FACU
2. *Holcus lanatus*	20	No	FAC
3. *Agrostis stolonifera*	20	No	FAC
4. *Juncus bufonius*	20	No	FACW
5. *Alopecurus pratensis*	10	No	FAC
6. *Ranunculus repens*	10	No	FAC
7.			
8.			
9.			
50%= 55 20%= 22 Total Cover:	**110**		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	**0**		

% Bare Ground in Herb Stratum **0** % Cover of Biotic Crust ____

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**	x1 =	**0**	
FACW species	**20**	x2 =	**40**	
FAC species	**60**	x3 =	**180**	
FACU species	**30**	x4 =	**120**	
UPL species	**0**	x5 =	**0**	
Column Totals:	**110**	(A)	**340**	(B)

Prevalence Index = B/A = **3.1**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-02F

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 4/3	100					SiL	
2-4	10YR 4/2	98	10YR 5/6	2	C	M	SiL	
4-9	N 4/0	85	2.5YR 4/6	10	C	M	SiL	
			2.5YR 4/6	5	C	PL		oxodized rhizopheres
9-16	10YR 4/1	70	10YR 5/2	20	D	M	SiL	
			7.5YR 5/6	10	C	M		

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck Mineral (S1)
___ Sandy gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
X 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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** X **No** ___

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-01D
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7440500 Long: 45.3206063 Datum: NAD88
Soil Map Unit Name: Huberly Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks: Wetland D

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status?
Tree Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Holcus lanatus*	25	Yes	FAC
2. *Alopecurus pratensis*	20	Yes	FAC
3. *Trifolium repens*	15	No	FAC
4. *Anthoxanthum odoratum*	15	No	FACU
5. *Agrostis stolonifera*	15	No	FAC
6. *Matricaria discoidea*	5	No	FACU
7.			
8.			
9.			
50%= 47.5 20%= 19 Total Cover:	95		
Woody Vine Stratum (Plot size: ___)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 5 % Cover of Biotic Crust ___

Dominance Test worksheet:

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

Prevalence Index Worksheet:

Total % Cover of:			Multiply by:
OBL species	**0**	x1 =	**0**
FACW species	**0**	x2 =	**0**
FAC species	**75**	x3 =	**225**
FACU species	**20**	x4 =	**80**
UPL species	**0**	x5 =	**0**
Column Totals:	**95** (A)		**305** (B)

Prevalence Index = B/A = **3.2**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-01D

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						
4-10	10YR 3/2	93	7.5YR 5/4	5	C	M		
			7.5YR 6/6	2	C	PL		oxidized rhizospheres
10-12	10YR 4/2	80	7.5YR 4/6	15	C	M		
			2.5YR 4/6	5	C	M		
12-16	10YR 4/2	85	7.5YR 4/4	15	C	M		

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks: wet

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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** X **No** ___

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

Remarks:

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

Project/Site: Frog Pond Meadows City/County: Wilsonville/Clackamas Sampling Date: 5/15/2018
Applicant/Owner: West Hills Land Development State: OR Sampling Point: DP-02D
Investigator(s): Julie Fox and Joe Pursley Section, Township, Range: SE 1/4 of Section 12, T3 South, R1 West
Landform (hillslope, terrace, etc.): plain Local relief (concave, convex, none): none Slope: <2%
Subregion (LRR): Northwest Forests and Coast (LRR A) Lat: -122.7441014 Long: 45.3206281 Datum: NAD88
Soil Map Unit Name: Huberly Silt Loam, 0-3% slopes NWI Classification: none
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" Present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Remarks:

VEGETATION

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status?
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
50%= 0 20%= 0 Total Cover:	0		
Herb Stratum (Plot size: 5 ft)			
1. *Anthoxanthum odoratum*	40	Yes	FACU
2. *Trifolium pratense*	35	Yes	FACU
3. *Trifolium campestre*	15	No	NOL
4. *Holcus lanatus*	10	No	FAC
5. *Schedonorus arundinaceus*	1	No	FAC
6. *Agrostis stolonifera*	1	No	FAC
7.			
8.			
9.			
50%= 51 20%= 20.4 Total Cover:	102		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: **0** (A)
Total Number of Dominant Species Across All Strata: **2** (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**	x1 =	**0**	
FACW species	**0**	x2 =	**0**	
FAC species	**12**	x3 =	**36**	
FACU species	**75**	x4 =	**300**	
UPL species	**0**	x5 =	**0**	
Column Totals:	**87**	(A)	**336**	(B)

Prevalence Index = B/A = **3.9**

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: DP-02D

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
0-6	10YR 3/2	100						
6-10	10YR 3/2	98	7.5YR 5/6	2	C	M		
			7.5YR 5/6	1	C	PL		oxidized rhizospheres
10-16	10YR 3/1	88	7.5YR 5/6	2	C	M		
			7.5YR 4/4	5	C	M		
			10YR 4/1	5	D	M		

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Muck 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) (**LRR B**)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ___
Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum 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 Plowed 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 (Unnamed Tributary gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Appendix E

Significant Resource Impact Report

October 2018
West Hills Land Development: Frog Pond Meadows Residential Development

Significant Resource Impact Report and Significant Resource Overlay Zone Map Refinement Request

Prepared for West Hills Land Development

October 2018
West Hills Land Development: Frog Pond Meadows Residential Development

Significant Resource Impact Report and Significant Resource Overlay Zone Map Refinement Request

Prepared for
West Hills Land Development
3330 NW Yeon Avenue
Portland, OR 97210

Prepared by
Anchor QEA, LLC
6720 SW Macadam Avenue, Suite 125
Portland, Oregon 97219

Project Number: 161015-01.01/161015-02.01
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FIGURES

APPENDICES

ABBREVIATIONS

City	City of Wilsonville
Cowardin classification system	*Classification of Wetlands and Deepwater Habitats of the United States*
dbh	diameter at breast height
DSL	Oregon Department of State Lands
ESA	Endangered Species Act
FAC	facultative
FACU	facultative upland
FACW	facultative wetland
HGM	hydrogeomorphic
LIDA	Low Impact Development Approaches
LWI	Local Wetlands Inventory
Master Plan	*Frog Pond West Master Plan*
NGVD	National Geodetic Vertical Datum
NOL	not on list
NWI	National Wetlands Inventory
OBL	obligate
OFWAM	Oregon Freshwater Wetland Assessment Methodology
Oregon HGM classification system	*Guidebook for Hydrogeomorphic (HGM)-Based Assessment of Oregon Wetland and Riparian Sites: Statewide Classification and Profiles*
PEM	palustrine emergent
PEM1C	palustrine emergent, persistent, seasonally flooded
PFO	palustrine forested
PSS	palustrine scrub-shrub
PHS	Pacific Habitat Services, Inc.
R5UBH	perennial riverine unconsolidated bottom, permanently flooded
R-5	Residential, small lot single family
R-7	Residential, medium lot single family
SRIR	Significant Resource Impact Report
SROZ	Significant Resource Overlay Zone
UGB	urban growth boundary
UGMFP	Urban Growth Management Functional Plan
UPL	upland
USACE	U.S. Army Corps of Engineers

1 Introduction

Anchor QEA, LLC, was retained by West Hills Land Development to prepare a Significant Resource Impact Report (SRIR) and Significant Resource Overlay Zone (SROZ) Map Refinement Request consistent with Section 4.139.00 of the City of Wilsonville's (City's) SROZ Ordinance for the proposed Frog Pond Meadows residential development in Wilsonville, Clackamas County, Oregon (Figures 1 and 2). The proposed 15.64-acre project site for that development consists of five properties—two West Linn/Wilsonville School District properties, two Eaton properties, the Community of Hope Church Property, and the Kreilkamp property—located just outside the City limits but inside the Metro urban growth boundary (UGB) in the 181-acre Frog Pond West Neighborhood planning area (Figure 3). The Frog Pond West Neighborhood is part of the larger Frog Pond Area, a 500-acre planning area that includes future development areas that are both within the UGB and outside of the UGB in the urban reserve.

Specific location information for the project site is as follows:

City/County/State:	Wilsonville, Clackamas County, Oregon
General Location:	Northwest of the intersection of SW Boeckman Road and SW Wilsonville/SW Stafford Road
Tax Lots:	31W12D01800 and portion of 31W12D02200 (West Linn/Wilsonville School District Properties)
	31W12D01902 and 31W12D01903 (Eaton Properties)
	Portion of 31W12D02000 (Community of Hope Church Property)
	Portion of 31W12D002201 (Kreilkamp Property)
Latitude/Longitude[1]:	45.320179° North/- 122.745995° West
Public Land Survey System:	SE 1/4 of Section 12, Township 3 South, Range 1 West, Willamette Meridian
Street Address:	27657 SW Stafford Road (tax lot 31W12D01800)
	7035 SW Boeckman Road (tax lot 31W12D02200)
	27687 SW Stafford Road Stafford Road (tax lot 31W12D01902)
	27767 SW Stafford Road Stafford Road (tax lot 31W12D01903)
	27817 SW Stafford Road Stafford Road (tax lot 31W12D02000)
	6875 SW Boeckman Road (tax lot 31W12D002201)

Approximate Area:	10 acres (tax lot 31W12D01800)
	1.5 acres (tax lot 31W12D02200)
	0.94 acre (tax lot 31W12D01902)
	1.88 acres (tax lot 1W12D01903)
	0.68 acre (tax lot 31W12D02000)
	0.64 acre (tax lot 31W12D002201)
	Total Area: 15.64 acres
Zoning:	Tax lot 31W12D01800: Residential, medium lot single family (R-7), and small lot single family (R-5)
	Eastern portion of tax lot 31W12D02000: R-7
	Tax lots 31W12D01902 and 31W12D01903: R-5
	Eastern portion of tax lot 31W12D02000: Civic subdistrict (housing in Civic subdistrict is subject to the R-7 regulations)
	Portion of tax lot 31W12D002201: R-7
Waterways:	None on project site but Willow Creek, a tributary to the Willamette River, is adjacent to the site

Note:

1. Latitude and longitude shown are for the approximate centroid of the project site.

This report is prepared in accordance with the requirements of Section 4.139.06, Significant Resource Impact Report and Review Criteria, of the City's SROZ Ordinance and addresses the requirements of a Standard SRIR per Section 4.139.06(.02) and those required for SROZ map refinement per Section 4.139.10(.01)(D). Specifically, it includes the following:

- A description of the project site location and an overview of the existing site conditions
- A physical analysis that describes and maps the physical features present on the project site, including its soils, geology, hydrology, wetland and waterbodies, topography, existing structures and other features, and the locations of any SROZs or other mapped resource boundaries (e.g., Metro Urban Growth Management Functional Plan (UGMFP) Title 3 Water Quality Resource Area boundaries)
- An ecological analysis that describes the type and characteristics of the vegetation communities, wetlands, riparian corridors, and wildlife habitat resources present on the project site
- A discussion of the riparian corridor type present on the project site as it compares to the SROZ currently mapped by the City and a request to refine the existing mapping
- A description of the proposed project and any proposed encroachments into SROZs or their associated Impact Areas

- A list of recommended measures for minimizing adverse impact of the proposed development on the natural resources of the project site
- The proposed Significant Resource Mitigation and Enhancement Plan
- A summary of the project's compliance with the SRIR Review Criteria
- The names and qualifications of the report preparers

Please note that this report documents the investigation, best professional judgment, and conclusions of Anchor QEA and should be used for planning purposes only until verified in writing by the City.

2 Project Site Location and Existing Conditions

The 15.64-acre project site is located north of SW Boeckman Road, west of SW Stafford Road, and south of SW Frog Pond Lane on tax lots 31W12D01800 (1800), 31W12D01902 (1902), and 31W12D01903 (1903) and portions of tax lots 31W12D02200 (2200), 31W12D02000 (2000), and 31W12D002201 (2201) in Wilsonville, Clackamas County, Oregon (Figures 1 through 3). It is in the northwestern portion of the Frog Pond Area in an area known as the Frog Pond West Neighborhood. The future conceptual development of the larger Frog Pond Area is addressed in the City's *Frog Pond Area Plan* (City of Wilsonville 2015). The specific development strategy for the Frog Pond West Neighborhood is addressed in the recently adopted *Frog Pond West Master Plan* (Master Plan; City of Wilsonville 2017).

2.1 Landscape Setting

The project site is situated in the Prairie Terraces subregion of the Willamette Valley ecoregion near the boundaries of the Valley Foothills subregion (Thorson et al. 2003). This subregion is characterized by level to undulating topography drained by low-gradient, meandering streams and rivers; poorly drained soils derived from fluvial geologic deposits from the Missoula floods; and a mild climate with cool, wet winters, warm, dry summers, and a mean annual precipitation of 40 to 50 inches (Watershed Professionals Network 1999). Hydrologically, the project site is in the Coffee Lake Creek-Willamette River subwatershed (hydrologic unit code 170900070402) of the Willamette River basin (USGS 2015).

2.2 Current Site Description

The current conditions of the project site are depicted in the 2017 aerial photograph provided in Figure 4. The predominant land use and existing structures for each of the properties and parcels contained within the project site are briefly described in the following sections:

- **West Linn/Wilsonville School District Property (tax lot 1800)** – This property consists of an agricultural field with narrow bands of scrub-shrub vegetation along the western, eastern, and southern boundaries and a small tree grove along the northeastern boundary that extends off site to the north. In the southeast portion of the tax lot, a small shed and gravel road are present and surrounded by primarily non-native tree, scrub-shrub, and herbaceous vegetation. At the time of the May 2018 site visits, the agricultural field was being used to grow hay; at the time of the September site visit, the field had been recently cut and baled.

- **West Linn/Wilsonville School District Property (eastern portion of tax lot 2200)** – This parcel consists of a 1.5-acre area on the eastern end of tax lot 2200. It is undeveloped and dominated by forested, scrub-shrub, and herbaceous vegetation. The western portion of the parcel includes a riparian corridor associated with a linear section of Willow Creek that flows from north to south across the off-site portion of tax lot 02200. At the time of the May 2018 site visits, the riparian corridor contained a dense mixture of predominantly herbaceous and scrub-shrub vegetation interspersed with forested components. Vegetation in the eastern portion of the parcel was predominantly forested with a more open understory. At the time of the September 2018 site visit, the majority of the understory throughout the parcel had been cleared to remove nuisance scrub-shrub vegetation to facilitate a tree survey, leaving behind only herbaceous vegetation and woody species with a 6-inch-or-greater diameter at breast height (dbh). This clearing work was approved by the City on August 23, 2018 (Rappold 2018a).
- **Eaton Property (tax lot 1902)** – This property contains a rural residence and associated landscaping with scattered trees and shrubs. The majority of the property is dominated by herbaceous vegetation.
- **Eaton Property (tax lot 1903)** – This property contains a rural residence and associated landscaping with scattered trees and shrubs. The majority of the property is dominated by herbaceous vegetation.
- **Community of Hope Church Property (portion of tax lot 2000)** – This parcel consists of a 0.68-acre portion of tax lot 2000. It contains two buildings and a gravel road/driveway that connects to the adjacent parking lot of the Community of Hope Church to the east. Vegetation on this parcel includes a mix of herbaceous, scrub-shrub, and forested vegetation.
- **Kreilkamp Property (portion of tax lot 2201)** – This parcel consists of a 0.64-acre portion of tax lot 2201 that was previously included in the project site for the adjacent Stafford Meadows residential development site, which is currently under construction. It includes a gravel driveway that previously provided access to the former Kreilkamp residence. At the time of the May 2018 site visit, vegetation in this area included a mix of trees, scattered shrubs, and herbaceous vegetation. By the September 2018 site visit, nearly all of this vegetation had been cleared as part of the Stafford Meadows construction work.

Access to each of these properties is currently provided by two private driveways and an unimproved gravel road off SW Stafford Road.

3 Physical Analysis

As required by Section 4.139.06(.02)(D)(2) of the City's SROZ Ordinance, the following sections provide a description of the physical features of the project site.

3.1 Soil Types

The Natural Resources Conservation Service online Web Soil Survey maps four soil types within the project site (Figure 5): Aloha silt loam, 0% to 3% slopes; Aloha silt loam, 3% to 6% slopes; Concord silt loam; and Huberly silt loam (NRCS 2018). Table 1 summarizes the soil mapping information for the project site. Of these soil types, Concord silt loam and Huberly silt loam are classified as hydric soils. The remaining soil types on the project site are considered non-hydric but are known to contain potential inclusions of hydric soils in low areas and swales.

Table 1
Soils Mapped on the Project Site by Natural Resources Conservation Service Web Soil Survey

Map Unit	Soil Type Name	Drainage Class	Hydrologic Soil Group[1]	Hydric Rating	Hydric Inclusions[2]	Acres
1A	Aloha silt loam, 0 to 3% slopes	Somewhat poorly drained	C/D	5	Yes	12.54
1B	Aloha silt loam, 3 to 6% slopes	Somewhat poorly drained	C/D	5	Yes	0.13
21	Concord silt loam	Poorly drained	C/D	93	Yes	2.15
41	Huberly silt loam	Poorly drained	C/D	92	Yes	0.82

Notes:

1. Hydrologic soil groups are based on runoff potential according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.
   i. Group C soils have slow infiltration rates when thoroughly wet, caused by either an underlying layer that impedes the downward movement of water or soils of moderately fine or fine texture.
   ii. Group D soils have a very slow infiltration rate (high runoff potential) when thoroughly wet and include soils consisting of clays with high shrink-swell potential, soils that have a high water table, soils that have a clay or claypan layer at or near the surface, and soils that are shallow over nearly impervious material.
2. Non-hydric soils may have inclusions of hydric soil (Huberly and Dayton) in the lower positions on the landform.

3.2 Geology

According to the Oregon Department of Geology and Mineral Industries' online interactive Geologic Map of Oregon, the project site is underlain by Quaternary Age sediments that are classified in the Quaternary Surficial Deposits terrane group (DOGAMI 2017). These materials typically consist of deposits of fine-grained, unconsolidated sediment deposits derived from alluvium, colluvium, river and coastal terraces, landslides, glacial, eolian, beach, lacustrine, playa and pluvial lake deposits, and outburst flood deposits left by the Missoula and Bonneville floods.

3.3 Topography and Slope

Topography on the project site predominantly slopes gently to the southwest toward Willow Creek (Figure 6). According to the U.S. Geological Survey's 7.5-minute series (topographic) quadrangle map for Canby, Oregon, general elevations on the project site range from approximately 240 feet National Geodetic Vertical Datum (NGVD) in the northern portion of tax lot 1800 to approximately 220 feet NGVD in the southwest portion of tax lot 2200 (Figure 4; USGS 2017). The far eastern portion of the site slopes gently to the southeast toward a roadside ditch along SW Stafford Road. Elevations on that portion of the site range from approximately 235 feet NGVD to approximately 230 feet NGVD. Surrounding topography is also generally flat, with elevations gradually sloping from northeast to southwest. A more detailed topographic survey with a 2-foot contour was conducted by Otak, Inc. That survey shows the lowest elevation as being around 218 feet NGVD in the southwest portion of the project site adjacent to off-site Willow Creek. The highest elevation on the site is 240 feet NGVD along the northern boundary of tax lot 1800. Slopes across the entire project site range from 0% to 50%, and the steepest slope within wetlands on the project site is 6.4%.

As required by Section 4.139.06(.02)(D)(1)(i) of the SROZ Ordinance, five slope cross-section measurements were completed perpendicular to the off-site section of Willow Creek that extends along the western site boundary. These measurements, which were taken at not more than 100-foot increments, are included in Appendix A and indicate that the slopes within the stream channel range from 2.0% to 5.6%. across all cross sections.

3.4 Hydrology

The majority of the project site drains to a linear section of Willow Creek that flows from north to south just outside the western boundary of the project site (Figure 7). Willow Creek flows south to SW Boeckman Road, where it crosses under the road through a pair of 18-inch-diameter concrete culverts. On the south side of SW Boeckman Road, Willow Creek[1] continues to the south and southeast, eventually draining into the Willamette River, approximately 1.15 miles to the south of the project site. Flow entering this stream from the project site includes both overland flows and subsurface flows routed through existing drainage tiles. The drainage basin of Willow Creek at SW Boeckman Road is estimated to be 55 acres.

In the eastern portion of the project site, a portion of tax lots 1800, 1902, and 1903 drain toward an off-site roadside ditch that runs within the western right-of-way of SW Stafford Road (Figure 7). That ditch flows toward the south and eventually discharges to a different unnamed tributary of Meridian Creek on the south side of SW Boeckman Road/SW Advance Road. That tributary also eventually drains into the Willamette River. The drainage basin of this ditch at SW Boeckman Road is

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[1] Some maps (e.g., Fishman Environmental Services' 1999 City of Wilsonville Local Wetland and Riparian Corridor Inventory North map) identify the section of the stream to the south of SW Boeckman Road as Meridian Creek.

estimated to be approximately 56 acres. At the time of the site visits, no flow was observed in the ditch.

Sources of hydrology for the on-site wetlands (Section 4.2) include direct precipitation, overland flow (runoff), and a seasonally high water table.

3.5 Wetlands and Other Waters

The presence of wetland and other waters on the project site was evaluated using existing resource maps and inventories and during a series of wetland determinations and a formal wetland delineation that were performed on the project site and adjacent properties by Anchor QEA.

3.5.1 National Wetlands Inventory

The U.S. Fish and Wildlife Service National Wetland Inventory (NWI) online Wetlands Mapper indicates one mapped NWI wetland off site but adjacent to the western boundary of the project site: an unknown perennial riverine unconsolidated bottom, permanently flooded water regime (R5UBH) wetland (Figure 8; USFWS 2018). The location of the R5UBH wetland coincides with the location of Willow Creek.

3.5.2 Local Wetlands Inventory

The project site was not included in the survey area for the 1999 Local Wetlands Inventory (LWI) that was prepared for the City by Fishman Environmental Services (FES 1998); however, the off-site portion of Willow Creek that is south of SW Boeckman Road is shown on the LWI but is identified as a tributary to Meridian Creek (Figure 9). The stream segment that receives water from the project site is identified as R2.15 and is described in the LWI as a relatively narrow and shallow intermittent stream that is bordered by upland vegetation.

3.5.3 Frog Pond Area Wetland Inventory

Potential wetlands and other waters were inventoried in the Frog Pond Area by Pacific Habitat Services, Inc. (PHS), in April 2014 as part of a natural resources inventory for the Frog Pond and Advance Road Urban Growth Areas (PHS 2014). The PHS study was based on a combination of off- and on-site wetland determination methods and did not involve formal wetland delineation of any properties on the project site (i.e., no wetland boundaries were established, and no formal wetland delineation data was collected in the field). On-site determinations were only conducted on sites where property access permission had been granted and where property owner contact information had been provided.[2] Wetland mapping was completed by drawing the approximated wetland boundaries on an aerial photograph of the project site using GIS.

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[2] In their report, PHS does not specify which sites were visited in the field and which were inventoried using only off-site methods.

Wetland and other waters mapped on the project site by PHS include a narrow strip of wetland along off-site Willow Creek that is shown as connecting to a much larger, mostly agricultural wetland (Wetland 5; Figure 10) that extends across tax lot 1800 and a portion of tax lot 1902. This wetland also extends onto portions of tax lots 1500, 1700, and 2201. Collectively, these areas and the off-site wetland are identified as Wetland 5, which is estimated to be approximately 13.22 acres in size.

Although the study did not include a quality assessment or local significance determination using the Oregon Freshwater Wetland Assessment Methodology (OFWAM), PHS did provide a qualitative assessment of whether or not the identified wetlands that are larger than 0.5 acre would meet the City's significance criteria of Section 4.139.09.02 of the SROZ Ordinance. Based on this assessment, no potentially significant wetlands were identified on the project site or any of the adjacent properties.

3.5.4 Wetland Determinations and Delineation

Anchor QEA wetland scientists performed a formal wetland delineation of the project site in May 2018. During that delineation, the seven following potential wetlands/waters of the United States and State of Oregon were identified (Figure 11):

- **Wetland A** – Located in the riparian area adjacent to Willow Creek in the eastern portion of tax lot 2200 and continues off site to the north and south of the project site. The on-site area of Wetland A was estimated to be 9,862 square feet (0.226 acre) in size.
- **Wetland B** – Located in the northwest corner of the agricultural field on tax lot 1800 and continues off site to the northwest into an adjacent fallow agricultural field. The on-site area of Wetland B was estimated to be 65 square feet (0.002 acre).
- **Wetland C** – Located in the central portion of the agricultural field on tax lot 1800 and is isolated. The area of Wetland C was estimated to be 961 square feet (0.022 acre).
- **Wetland D** – Located in the eastern portion of the agricultural field on tax lot 1800 and is connected to an off-site roadside ditch immediately east of the project site. The on-site area of Wetland D was estimated to be 9,133 square feet (0.210 acre).
- **Wetland E** – Located in the south-central portion of the agricultural field on tax lot 1800 and the western portions of tax lots 1902 and 1903 and once continued off site to the southwest. The off-site portion of Wetland E was recently filled under Oregon Department of State Lands (DSL) Removal-Fill Permit No. 61223-RF. The on-site area of Wetland E was estimated to be 22,328 square feet (0.513 acre).
- **Wetland F** – Located in the north-central portion of the agricultural field on tax lot 1800 and is isolated. The area of Wetland F was estimated to be 996 square feet (0.023 acre).
- **Off-Site Intermittent Stream** – Located in the location of Willow Creek just outside the western boundary of the project site on the off-site portion of tax lot 2200. As discussed in

Section 3.4, this section of Willow Creek flows to the south and eventually connects to Willamette River.

Additional information on the methods used for the wetland delineation and a more detailed description of the identified wetlands and other waters, including their classification, typical vegetation, soils, and hydrologic sources, is provided in Section 4.2. A copy of the wetland delineation report will be provided as an addendum to the Site Development Permit Application package submitted for the proposed project. Site photographs of wetlands are provided in Appendix B.

3.6 Tree Survey

A total of 272 trees with a dbh of greater than 6 inches are present on the project site (Figure 11). Most of these trees occur in the eastern portion of tax lot 2200. There are nine Oregon white oak (*Quercus garryana*) along the northeastern boundary of tax lot 1800 and a few other trees scattered across the eastern portions of tax lots 1902 and 1903 and the western portion of tax lot 2000.

3.7 Existing Structures and Other Features

Figure 11 shows the existing structures and other features currently present on the project site. As described in Section 2.2, structures currently present primarily include rural residential buildings (e.g., garages and sheds), gravel and asphalt driveways and access roads, and various types of fences (including electric fences). Except for sanitary sewer service, most of the utilities (e.g., electricity, phone, and natural gas) servicing the properties of the project site are located underground and extend west from SW Stafford Road. Sanitary sewer service appears to be provided on individual septic systems. Agricultural drainage tile is also known to occur in various locations on the project site, including in the agricultural field on tax lot 1800 and in the eastern portion of tax lot 2200.

3.8 Mapped Resource Areas

The following sections describe the natural resources mapped on the project site by regional and local entities, including Metro and the City. These areas are shown in Figure 11.

3.8.1 Metro Title 3 Water Quality Resource Areas

No Metro Title 3 Water Quality Resource Areas occur on the project site (Figure 11). Although the off-site portion of Willow Creek located south of SW Boeckman Road is mapped as a Title 3 Water Quality Resource Area, this mapping ends at SW Boeckman Road and does not extend onto the project site.

3.8.2 City of Wilsonville Significant Resource Zone Overlay Mapping

The City's April 29, 2009 SROZ map (City of Wilsonville 2009) does not show any mapped SROZs on the project site. However, in the 2017 Master Plan, the City identifies a potential SROZ along Willow Creek north of SW Boeckman Road (Figure 11). This SROZ extends approximately 822 feet to the north of SW Boeckman Road to the southern boundary of tax lot 31W12D001500, crossing the tax lot to the south of the project site (tax lot 31W12D002202) and along the outside western boundary of the project site on tax lot 2200. Although no specific width is assigned to this SROZ in the Master Plan, information provided by the City indicates that it is assumed to extend 50 feet on either side of the Willow Creek channel.

3.8.3 Goal 5 Safe Harbor Boundary

Criteria for establishing the Goal 5 Safe Harbor Boundary around riparian corridors is found in Oregon Administrative Rule 660-023-0090(5), subsections (a) through (d). Because the segment of Willow Creek adjacent to the project site does not carry annual average stream flow of greater than 1,000 cubic feet per second, is not fish-bearing, and does not include a significant wetland, it is presumed that a Goal 5 Safe Harbor Boundary is not required for the on-site riparian corridor.

4 Ecological Analysis

As required by Section 4.139.06(.02)(D)(3) of the City's SROZ Ordinance, the following sections provide an ecological analysis of the vegetation, wetlands and other waters, and wildlife habitat currently present on the project site.

4.1 Vegetation Communities

The project site contains a mix of forested, scrub-shrub, and herbaceous vegetation including a variety of native, introduced, and invasive species. Most of the project site properties are dominated by herbaceous vegetation in the form of agricultural fields or maintained lawns; a few forested areas are also present. A summary of the plant species observed on the project site at the time of the site visits is provided in Appendix C, including their individual wetland indicator status according to the National Wetland Plant List: 2016 Wetland Ratings (Lichvar et al. 2016) and native status determined using the U.S. Department of Agriculture online PLANTS database (USDA 2018), with invasive status determined using the Clackamas County Weed List from Clackamas Soil and Water Conservation District (Clackamas SWCD 2018). The following sections provide a brief description of the common vegetation observed on each of the project site properties at the time of the site visits.

4.1.1 Common Vegetation on Tax Lot 1800

At the time of the May 2018 site visits, the dominant vegetation in the agricultural field included various species of fescue (*Festuca* spp.), bentgrass (*Agrostis* spp.), and bluegrass (*Poa* spp.), along with meadow foxtail (*Alopecurus pratensis*), common velvetgrass (*Holcus lanatus*), sweet vernal grass (*Anthoxanthum odoratum*), toad rush (*Juncus bufonius*), black medick (*Medicago lupulina*), and field clover (*Trifolium campestre*). The narrow bands of scrub-shrub vegetation along the property boundaries were dominated by wild rose (*Rosa* spp.), Douglas' spirea (*Spiraea douglasii*), Himalayan blackberry (*Rubus armeniacus*), and common hawthorn (*Crataegus monogyna*). The forested patch along the northeastern boundary was dominated by Oregon white oak with some Himalayan blackberry and other various herbaceous vegetation in the understory. Common vegetation in the southeastern portion of the property included a Scots pine (*Pinus sylvestris*), a Colorado blue spruce (*Picea pungens*), a few linden trees (*Tilia* spp.), cultivated apple trees (*Malus* spp.), Himalayan blackberry, and various herbaceous vegetation. At the time of the September 2018 site visit, the agricultural field had been cut and bailed with regrowth occurring of species observed during the May 2018 visits.

4.1.2 Common Vegetation on Eastern Portion of Tax Lot 2200

At the time of the May 2018 site visits, common herbaceous vegetation present in the eastern riparian area of off-site Willow Creek includes coastal hedge-nettle (*Stachys chamissonis* var. *cooleyae*), small-fruited bulrush (*Scirpus microcarpus*), slough sedge (*Carex obnupta*), Dewey sedge (*Carex deweyana*), fringed willowherb (*Epilobium ciliatum*), and various grasses. Common shrubs, saplings, and trees in the riparian zone included wild rose, Douglas' spirea, Himalayan blackberry, willow species (*Salix* spp.), cultivated apple trees, western red cedar (*Thuja plicata*), and Oregon white oak. The forested patch was dominated by Douglas fir (*Pseudotsuga menziesii*), along with ponderosa pine (*Pinus ponderosa*), Norway spruce (*Picea abies*), and bitter cherry (*Prunus emarginatus*) in the tree layer, with a sparse scrub-shrub understory dominated by beaked hazelnut (*Corylus cornuta*), Pacific rhododendron (*Rhododendron macrophyllum*), Himalayan blackberry, trailing blackberry (*Rubus ursinus*), and Pacific poison oak (*Toxicodendron diversilobum*). At the time of September 2018 site visit, herbaceous vegetation and only woody species with 6 inches or greater dbh were observed.

4.1.3 Common Vegetation on Tax Lot 1902

At the time of the May 2018 site visits, the dominant herbaceous vegetation included various species of fescue, bentgrass, and bluegrass, along with meadow foxtail, common velvetgrass, sweet vernal grass, toad rush, creeping buttercup (*Ranunculus repens*), black medick, hairy cat's ear (*Hypochaeris radicata*), and other various grasses and forbs. In the tree and scrub-shrub layer, beaked hazelnut, common hawthorn, wild rose, Himalayan blackberry, and red pine (*Pinus resinosa*) are present.

4.1.4 Common Vegetation on Tax Lot 1903

At the time of the May 2018 site visits, the dominant herbaceous vegetation included various species of fescue, bentgrass, and bluegrass, along with meadow foxtail, common velvetgrass, sweet vernal grass, toad rush, creeping buttercup, black medick, hairy cat's ear, and other various grasses and forbs. In the tree and scrub-shrub layer, common hawthorn, wild rose, Himalayan blackberry, red pine, and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) are present.

4.1.5 Common Vegetation on Eastern Portion of Tax Lot 2000

At the time of the May 2018 site visits, the dominant herbaceous vegetation included various species of fescue, bentgrass, and bluegrass, along with meadow foxtail, common velvetgrass, sweet vernal grass, English plantain (*Plantago lanceolata*), common dandelion (*Taraxacum officinale*), hairy cat's ear, and other various grasses and forbs. In the tree and scrub-shrub layer, Himalayan blackberry, black cottonwood, and Douglas fir are present.

4.1.6 Common Vegetation on Western and Northern Portion of Tax Lot 2201

Tax lot 2201 is currently under construction, and most of the existing vegetation has been removed.

4.2 Wetlands

Anchor QEA wetland scientists performed wetland delineation field work on May 14, 15, and 16, 2018. Field work was conducted according to methods presented in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (USACE 2010), and Oregon Administrative Rules 141-090-0005 to 141-090-0055. Plant indicator status was determined using the National Wetland Plant List: 2016 Wetland Ratings (Lichvar et al. 2016).

As stated in Section 3.5.4, six wetlands (Wetlands A through F) were identified on the project site, and one other water (Willow Creek) was identified just outside of the project site during the delineation (Figure 11). The description, classification, and on-site area of these features are summarized in Table 2 with site photos provided in Appendix B. Each area is also briefly described in the following sections. An assessment of whether the identified wetland would meet the City's criteria for adding wetlands to their SROZ inventory per Section 4.139.10(.02) of the SROZ Ordinance[3] is provided in Appendix D.

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[3] The criteria contained in Section 4.139.10(.02) of the City's SROZ Ordinance are identical to those from Section 3.07.340(E)(3) of Title 3 of Metro's UGMFP.

Table 2
Potential Wetlands and Other Waters Delineated on the Frog Pond Meadows Project Site

Wetlands	Description	Classification		On-Site Area	
		Cowardin[1]	Oregon Hydrogeomorphic[2]	Square Feet	Acres
Wetland A	Forested/ herbaceous riparian wetland	PFO/PEM1C	Slope	3,282	0.075
Wetland B	Herbaceous wetland	PEM1C	Slope	65	0.0015
Wetland C	Herbaceous wetland	PEM1C	Slope	961	0.022
Wetland D	Herbaceous wetland with minor scrub-shrub component	PSS/PEM1C	Slope	9,133	0.210
Wetland E	Herbaceous wetland with minor scrub-shrub component	PSS/PEM1C	Slope	22,328	0.513
Wetland F	Herbaceous wetland	PEM1C	Slope	996	0.023
Total Area of Wetlands and Non-Wetland Other Waters				**36,765**	**0.845**

Notes:

1. *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin classification system; Cowardin et al. 1979) wetland codes:
   PEM1C: palustrine emergent, persistent, seasonally flooded
   PFO: palustrine forested
   PSS: palustrine scrub-shrub
2. *Guidebook for Hydrogeomorphic (HGM)-Based Assessment of Oregon Wetland and Riparian Sites: Statewide Classification and Profiles* (Oregon HGM classification system; Adamus 2001)

4.2.1 Wetland A

Wetland A is a 3,282-square-foot (0.075-acre) riparian wetland located along the western boundary of the project site on tax lot 2200 and adjacent to the eastern boundary of off-site Willow Creek (Figure 11). Wetland A continues off site to the south and north. Wetland A is classified as a palustrine forested (PFO), palustrine emergent (PEM) wetland under the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin classification system; Cowardin et al. 1979) and as a slope wetland under the *Guidebook for Hydrogeomorphic (HGM)-Based Assessment of Oregon Wetland and Riparian Sites: Statewide Classification and Profiles* (Oregon HGM classification system; Adamus 2001).

At the time of the delineation field work in May 2018, Wetland A was dominated by tall fescue (*Schedonorus arundinaceus*; facultative [FAC]), common velvetgrass (FAC), meadow foxtail (FAC), and reed canarygrass (*Phalaris arundinacea*; facultative wetland [FACW]) in the herbaceous layer, with Dewey sedge (FAC), slough sedge (obligate [OBL]), small-fruited bulrush (OBL), fringed willowherb (FACW), and sweet vernal grass (facultative upland [FACU]) also present to a lesser extent. In the shrub layer, Douglas' spirea (FACW), wild rose (UPL to FAC), common hawthorn (FAC), and Oregon ash (*Fraxinus latifolia*; FACW) saplings were present. In the tree layer, Pacific willow

(*Salix lasiandra*; FACW), Scouler's willow (*Salix scouleriana*; FAC), western red cedar (FAC), and Lombardy poplar (*Populus nigra* L.; not on list [NOL]) were present. At the time of the September 2018 site visit, only herbaceous and forested vegetation were present; no shrubs were observed. The water regime of Wetland A was determined to be seasonally saturated, with overland flow, seasonal high water table, direct precipitation, and overbank flows from Willow Creek during storm events being the primary hydrologic sources.

Wetland A is not mapped in the City's 1999 LWI (Figure 9) but is shown on the 2014 wetland inventory conducted by PHS (Figure 10). As indicated in Appendix D, Wetland A does not meet the City's criteria for adding wetlands to the SROZ.

4.2.2 Wetland B

Wetland B is a 65-square-foot (0.0015-acre) herbaceous wetland located in the northwestern portion of the agricultural field on tax lot 1800 (Figure 11). It continues off site to the northwest into the adjacent fallow agricultural field. Wetland B is classified as a PEM wetland under the Cowardin classification system (Cowardin et al. 1979) and as a slope wetland under the Oregon HGM classification system (Adamus 2001).

Dominant vegetation in Wetland B includes toad rush (FACW), meadow foxtail (FAC), and sweet vernal grass (FACU). Black medick (FACU) was also present but to a lesser degree. The water regime of Wetland B was determined to be seasonally saturated, with overland flow, seasonal high water table, and direct precipitation being the primary hydrologic sources. Degraded drainage tile may lie underneath Wetland B, which could be a secondary hydrologic source.

Wetland B was not mapped in the City's 1999 LWI (Figure 9) but is shown in the location of Wetland 5 on the 2014 wetland inventory conducted by PHS (Figure 10). As indicated in Appendix D, Wetland B does not meet the City's criteria for adding wetlands to the SROZ.

4.2.3 Wetland C

Wetland C is a 961-square-foot (0.022-acre) herbaceous wetland located in the north-central portion of the agricultural field on tax lot 1800 (Figure 11). Wetland C is classified as a PEM wetland under the Cowardin classification system (Cowardin et al. 1979) and as a slope wetland under the Oregon HGM classification system (Adamus 2001).

Dominant vegetation in Wetland C includes toad rush (FACW), Timothy grass (*Phleum pratense*; FAC), and sweet vernal grass (FACU). Black medick (FACU) was also present but to a lesser degree. The water regime of Wetland C was determined to be seasonally saturated, with overland flow, seasonal high water table, and direct precipitation being the primary hydrologic sources. Degraded drainage tile may lie underneath Wetland C, which could be a secondary hydrologic source.

Wetland C was not mapped in the City's 1999 LWI (Figure 9) but is shown in the location of Wetland 5 on the 2014 wetland inventory conducted by PHS (Figure 10). As indicated in Appendix D, Wetland C does not meet the City's criteria for adding wetlands to the SROZ.

4.2.4 Wetland D

Wetland D is a 9,133-square-foot (0.210-acre) predominantly herbaceous wetland located in the eastern portion of the agricultural field on tax lot 1800 (Figure 11). Wetland D has a narrow scrub-shrub component where connected to a roadside ditch along SW Stafford Road. Wetland D is classified as a PEM/PSS wetland under the Cowardin classification system (Cowardin et al. 1979) and as a slope wetland under the Oregon HGM classification system (Adamus 2001).

Dominant vegetation in the herbaceous portions of Wetland D includes common velvetgrass (FAC), meadow foxtail (FAC), and sweet vernal grass (FACU). Slough sedge (OBL), northern lady fern (*Athyrium filix-femina*; FAC), white clover (*Trifolium repens*; FAC), bentgrass (UPL to FACW), pineappleweed (*Matricaria discoidea*; FACU) and other herbaceous vegetation were also present but to a lesser degree. In the narrow scrub-shrub component along the roadside ditch, wild rose (UPL to FAC), Douglas' spirea (FACW), and Himalayan blackberry (FAC) dominate, with lesser amounts of common hawthorn (FAC) and Oregon ash (FACW) saplings. The water regime of Wetland D was determined to be seasonally saturated, with overland flow, seasonal high water table, and direct precipitation being the primary hydrologic sources. Degraded drainage tile may lie underneath Wetland D, which could be a secondary hydrologic source.

Wetland D was not mapped in the City's 1999 LWI (Figure 9) but is shown in the location of Wetland 5 on the 2014 wetland inventory conducted by PHS (Figure 10). As indicated in Appendix D, Wetland D does not meet the City's criteria for adding wetlands to the SROZ.

4.2.5 Wetland E

Wetland E is a 22,328-square-foot (0.513-acre) predominantly herbaceous wetland located in the south-central portion of the agricultural field on tax lot 1800 and in the eastern portions of tax lots 1902 and 1903 (Figure 11). It extends off site, and that the off-site portion was filled for the development of the Stafford Meadows residential development project under DSL Removal-Fill Permit No. 61223-RF and U.S. Army Corps of Engineers (USACE) Permit No. NWP-2018-00268. Wetland E has a narrow scrub-shrub component along the fence boundaries of tax lots 1902 and 1903. Wetland E is classified as a PEM/PSS wetland under the Cowardin classification system (Cowardin et al. 1979) and as a slope wetland under the Oregon HGM classification system (Adamus 2001).

Dominant vegetation in the in the herbaceous portions of Wetland E includes various species of fescue, bentgrass, and bluegrass, along with creeping buttercup (FAC), common velvetgrass (FAC), white clover (FAC), and common dandelion (FACU). In the scrub-shrub components along the fence lines, wild rose (UPL to FAC), common hawthorn (FAC), and Himalayan blackberry (FAC) are present. The water regime of Wetland E was determined to be seasonally saturated, with overland flow, seasonal high water table, and direct precipitation being the primary hydrologic sources. Degraded drainage tile may lie underneath Wetland E, which could be a secondary hydrologic source.

Wetland E was not mapped in the City's 1999 LWI (Figure 9), but portions of it are shown in the location of Wetland 5 on the 2014 wetland inventory conducted by PHS (Figure 10). As indicated in Appendix D, Wetland E does not meet the City's criteria for adding wetlands to the SROZ.

4.2.6 Wetland F

Wetland F is a 996-square-foot (0.023)-acre) herbaceous wetland located in the northern portion of the agricultural field on tax lot 1800 (Figure 11). Wetland F is classified as a PEM wetland under the Cowardin classification system (Cowardin et al. 1979) and as a slope wetland under the Oregon HGM classification system (Adamus 2001).

Dominant vegetation in Wetland F includes toad rush (FACW), meadow foxtail (FAC), common velvetgrass (FAC), and sweet vernal grass (FACU). Creeping buttercup (FAC) and bentgrass (UPL to FACW) were also present but to a lesser degree. The water regime of Wetland F was determined to be seasonally saturated, with overland flow, seasonal high water table, and direct precipitation being the primary hydrologic sources.

Wetland F was not mapped in the City's 1999 LWI (Figure 9) but is shown in the location of Wetland 5 on the 2014 wetland inventory conducted by PHS (Figure 10). As indicated in Appendix D, Wetland F does not meet the City's criteria for adding wetlands to the SROZ.

4.2.7 Off-Site Willow Creek

The section of Willow Creek that occurs adjacent to the project site consists of a linear, intermittent stream channel with an average width of 6 feet wide that flows from north to south (Figure 11). The channel originates off site to the north and receives surface water from the surrounding pastures and agricultural fields. The stream channel is contained within the on-site and off-site boundaries of Wetland A. It flows onto tax lot 31W12D002202 and then exits that property through twin 18-inch concrete culverts under SW Boeckman Road and continues southward through a narrow forested/scrub-shrub riparian corridor surrounded by residential development, eventually entering a heavily forested riparian corridor before draining into the Willamette River. The stream channel substrate consists predominantly of fine silts with some medium to coarse sand.

Figure 11 shows the ordinary high water mark for Willow Creek, which was identified in the field by Anchor QEA.

4.3 Wildlife Habitat

The potential for the project site to provide habitat for wildlife was evaluated during the May 14, 15, and 16 and September 20, 2018 site visits. Table 3 provides a list of the wildlife species observed during those site visits and species that are likely to use the project site given the habitat currently present.

Table 3
Wildlife Observed or Likely to Occur on the Frog Pond Meadows Project Site

Wildlife Class	Common Name	Scientific Name	Observation Notes
Birds	Bewick's wren	*Thryomanes bewickii*	Observed or heard
	American bushtit	*Psaltriparus minimus*	Observed or heard
	Ruby-crowned kinglets	*Regulus calendula*	Observed or heard
	Golden-crowned kinglets	*Regulus satrapa*	Observed or heard
	Sapsuckers	*Sphyrapicus* spp.	Visible horizontal holes on trees
	European starling	*Sturnus vulgaris*	Observed or heard
	American goldfinch	*Carduelis tristis*	Observed or heard
	Brewer's blackbird	*Euphagus cyanocephalus*	Observed or heard
	White-crowned sparrow	*Zonotrichia leucophyrs*	Observed or heard
	Song sparrow	*Melospiza melodia*	Observed or heard
	Golden-crowned sparrow	*Zonotrichia atricapilla*	Observed or heard
	Western meadowlark	*Sturnella neglecta*	Observed or heard
	American robin	*Turdus migratorius*	Observed or heard
	Killdeer	*Charadrius vociferus*	Observed or heard
	Western bluebird	*Sialia mexicana*	Observed or heard
	Northern flicker	*Colaptes auratus*	Observed or heard
	Turkey vulture	*Cathartes aura*	Observed or heard
	California quail	*Callipepla californica*	Likely to occur
	Ring-necked pheasant	*Phasianus colchicus*	Likely to occur
	American kestrel	*Falco sparverius*	Observed or heard
	Red-tailed hawk	*Buteo jamaicensis*	Observed or heard
	Cooper's hawk	*Accipiter cooperii*	Observed or heard
	Barred owl	*Strix varia*	Likely to occur
	Great horned owl	*Bubo virginianus*	Likely to occur
	Barn owl	*Tyto alba*	Likely to occur
	Northwestern crow	*Corvus caurinus*	Observed or heard
	Common raven	*Corvus corax*	Observed or heard
	Hairy woodpecker	*Leuconotopicus villosus*	Observed or heard

Wildlife Class	Common Name	Scientific Name	Observation Notes
	Downy woodpecker	*Picoides pubescens*	Observed or heard
	Spotted towhee	*Pipilo maculatus*	Observed or heard
	Black-capped chickadee	*Poecile atricapillus*	Observed or heard
	Yellow-rumped warbler	*Dendroica coronata*	Observed or heard
	Other passerine birds	--	Likely to occur

Wildlife Class	Common Name	Scientific Name	Observation Notes
Mammals	Black-tailed deer	*Odocoileus hemionus*	Droppings, tracks, browse, and trails
	Douglas squirrel	*Tamiasciurus douglasii*	Likely to occur
	White-tailed deer	*Odocoileus virginianus*	Observed
	Coyote	*Canis latrans*	Observed droppings
	Townsend's mole	*Scapanus townsendii*	Molehills present
	Raccoon	*Procyon lotor*	Likely to occur
	Virginia opossum	*Didelphis virginiana*	Likely to occur
	Red fox	*Vulpes vulpes*	Likely to occur
	Brush rabbit	*Sylvilagus bachmani*	Likely to occur
	Striped skunk	*Mephitis*	Likely to occur
	Deer mouse	*Peromyscus maniculatus*	Likely to occur
	Long-tailed vole	*Microtus longicaudus*	Likely to occur
Amphibians	Pacific tree frog	*Pseudacris regilla*	Likely to occur
	Western toad	*Anaxyrus boreas*	Likely to occur
Reptiles	Common garter snake	*Thamnophis sirtalis*	Likely to occur

4.3.1 Wildlife Habitat Assessment

The following sections provide an assessment of the current wildlife habitat present on the project site in terms of wildlife habitat diversity, water quality protection, ecological integrity, connectivity, and uniqueness. This assessment was based on the best professional judgement and experience of an Anchor QEA wildlife biologist.

4.3.1.1 Wildlife Habitat Diversity

The project site primarily consists of maintained agriculture fields/yards with narrow scrub-shrub elements along fence-lines and one intact patch of forest with a scrub-shrub and herbaceous understory. The forested patch is large enough to provide foraging and shelter habitat for both small and large avian and mammal species but has little breeding habitat due to the patch size and limited understory density of shrubs. Willow Creek (which flanks the project site) and its associated wetland habitat, forested patches, and the off-site pasture habitats increase habitat suitability for some species by providing seasonal hydrology and availability for amphibian breeding. The agriculture and yard habitats throughout the project site provide some foraging area for wildlife, but seasonal mowing, harvesting, and other regularly occurring maintenance activities likely limit wildlife use. Overall, the project site contains a mosaic of mixed habitat types dominated by agriculture and maintained yards with increasing loss of habitat connectivity to the south due to a new residential development (Stafford Meadows) that is currently under construction.

4.3.1.2 Water Quality Protection

Most of the project site is vegetated with limited impervious surfaces associated with rural residential homes and driveways. Historic aerial photos show periodic till and seed agricultural use throughout much of the site, which may decrease water quality protection functions during a portion of the year until the disturbed soils revegetate. The maintained yards and other vegetated areas allow for natural infiltration of seasonal precipitation and minimize overland flow and erosion. Wetland A may have increased water quality protection function due to the scrub-shrub and forested habitats within the riparian corridor. The section of Willow Creek adjacent to the project site and downstream may also provide increased water quality protection due to the seasonality of surface hydrology within the creek, which allows for more storage and treatment of fall and winter precipitation and runoff.

4.3.1.3 Ecological Integrity

The project site has limited ecological integrity for wildlife habitat due to habitat fragmentation and disturbance associated with the presence of rural residences, new residential developments, persistent levels of agricultural and vegetation harvest practices, and the highly travelled paved roads that surround much of the project site. Although agricultural land uses do provide some habitat for various wildlife species, such areas typically offer only short-term ecological benefits and habitat due to the routine and seasonal disturbance of vegetation.

4.3.1.4 Connectivity

Existing wildlife habitat on the project site has limited connectivity to similar habitat types primarily because of the mixed land uses on each property within the project site. The closest areas of high to moderate habitat quality and well-connected forested habitats include the Boeckman Creek riparian corridor, which lies approximately 0.25 mile to the west, and a downstream portion of Willow Creek, which lies approximately 0.4 mile to the southeast of the project site on the other side of SW Boeckman Road. Although the agriculture land use areas within the project site may provide some connected habitat for smaller bird (e.g., raptors) and mammal species (e.g., mice, voles) and some amphibians, the quality and extent of that habitat connectivity is reduced by the presence of residential developments, roads, and seasonal land use practices (e.g., mowing).

4.3.1.5 Uniqueness

The project site does not provide any unique habitats or land features. The habitat types on site are patchy and similar to habitat types present in the surrounding areas and wider region. The nearest unique habitat type and land feature is the Willamette River, which is 1.2 miles south of the project site.

4.4 Riparian Corridor

The on-site riparian corridor along Willow Creek is currently dominated by herbaceous vegetation and PEM wetlands with minor forested components. Trees present in the corridor include Pacific willow, Scouler's willow, western red cedar, and Lombardy poplar. No shrubs are currently present in the corridor. Topography within 200 feet of the stream channel is relatively flat, with most slopes being less than 6%. Based on the descriptions of the generalized riparian corridor types in the Definitions section of the City’s SROZ Ordinance, the on-site Willow Creek riparian corridor most closely resembles Riparian Corridor Type NR-4, which is characterized by a PEM wetland in the corridor and a lack of adjacent steep slopes within 200 feet.

The following sections provide a brief assessment of the quality and condition of the on-site riparian corridor along off-site Willow Creek in regard to the presence of large woody debris, degree of stream shading, potential for erosion and sedimentation control, potential for water quality protection, presence of a functional floodplain, use of the floodplain by species listed under the Endangered Species Act (ESA), and connectivity with upstream or downstream significant wildlife habitat.

4.4.1 Presence and Abundance of Large Woody Debris in and Adjacent to the Stream

No large woody debris was observed within the Willow Creek riparian corridor on the project site. There are few trees adjacent to the off-site stream and no woody shrub cover, so the potential for large woody debris recruitment is very low. A large amount of small woody debris was observed in and around the stream following the nuisance vegetation removal needed to facilitate the tree survey. A very small number of downed branches were observed upstream and off site of the project site to the north. Given the limited flows carried by the stream, the movement of woody debris into the on-site riparian corridor of Willow Creek is unlikely.

4.4.2 Degree of Tree/Shrub Canopy Shading Adjacent to the Stream

There are few trees and no shrub patches within the on-site riparian corridor along Willow Creek that provide shading for the intermittent stream. The limited trees are confined to a 5- to 10-foot-wide area spanning the stream centerline and likely provide minimal shading.

4.4.3 Degree to Which Riparian Vegetation Controls Erosion and Sedimentation

The existing vegetation in the on-site riparian area along Willow Creek provides moderate erosion control due to the low gradient of the stream channel and the relatively flat topography of the adjacent areas.

4.4.4 Degree to Which Riparian Vegetation Provides Water Quality Protection

The existing vegetation in the on-site riparian area along Willow Creek is primarily herbaceous with little dense woody stem or broadleaf cover. The lack of rigid stems and leaf cover may increase sediment mobilization and runoff to the stream. The existing vegetation provides low to moderate water quality protection from nutrients or sediment.

4.4.5 Presence of a Functional Floodplain (Inundated Annually)

Based on historic aerial photography and observations made during the site visits, the on-site riparian corridor along Willow Creek appears to provide only a limited functioning floodplain outside of the PFO/PEM wetland that is directly adjacent to the stream channel. During a wet year, a large storm event may cause the adjacent riparian area to function as floodplain, but it is unlikely to be an annual occurrence.

4.4.6 Type and Condition of Functional Floodplain Vegetation

The existing vegetation present in the portion of the on-site Willow Creek riparian corridor that could function as a functional floodplain consists of approximately 80% grasses and forbs and 20% trees. Vegetation condition is somewhat degraded due to recent clearing for the tree survey.

4.4.7 Use of Floodplain by Endangered Species Act-Listed Species

Based on historic aerial photography and observations made during the site visits, the investigators found no evidence to suggest that the functional floodplain portions of the on-site riparian corridor along Willow Creek or any adjacent area are used by ESA-listed species.

4.4.8 Role of Riparian Corridor in Connecting Significant Wildlife Habitat Areas

Although the on-site Willow Creek riparian corridor does provide a seasonal hydrology habitat connection between upstream and downstream wetland and stream habitats, it does not provide a connection between significant wildlife habitat areas.

5 Proposed Significant Resource Overlay Zone Map Refinement

As stated in Section 3.8.2, although the City's 2009 SROZ map (City of Wilsonville 2009) does not show any mapped SROZs on the project site, the 2017 Master Plan identifies a potential SROZ along the Willow Creek riparian corridor on tax lot 2200 (Figure 11). That SROZ extends approximately between SW Boeckman Road and the southern boundary of tax lot 31W12D001500 north of the project site. At the time this SROZ was identified, the City assigned it a preliminary vegetated corridor width of 50 feet extending from either side of the Willow Creek channel centerline.

Following wetland and riparian delineation field work conducted by Anchor QEA in December 2017 for the Stafford Meadows residential development (tax lots 31W12D002001 [Killinger property], 31W12D002100 [Wehler property], 31W12D002201 [Kreilkamp property], and 31W12D002202 [Pike property]), Anchor QEA prepared a January 2018 report entitled *Significant Resource Impact Report and Significant Resource Overlay Zone Map Refinement Request* (Anchor QEA 2018) consistent with Section 4.139.00 of the City's SROZ Ordinance for the proposed development. In that report, the project applicant (West Hills Land Development) requested a refinement to the City's preliminary SROZ mapping along Willow Creek to reduce the vegetated corridor width of the proposed SROZ along Willow Creek from 50 to 15 feet on either side of the channel. In an email correspondence between Mr. Kerry Rappold (City) and Ms. Julie Fox (Anchor QEA) dated March 15, 2018, Mr. Rappold concurred with Anchor QEA's findings that designated Willow Creek as a Secondary Protected Water Feature and therefore would receive a 15-foot buffer (Rappold 2018b).

Based on field data collected by Anchor QEA wetland scientists during the 2018 wetland delineation and an assessment of the existing wildlife habitat and riparian corridor conditions present on the project site, the project applicant (West Hills Land Development) is requesting a refinement to the City's preliminary SROZ mapping along Willow Creek. Specifically, the applicant is requesting that the vegetated corridor width of the proposed SROZ along Willow Creek be reduced from 50 to 15 feet on either side of the channel. This requested refinement is based on the following observations of Willow Creek and its associated riparian corridor:

- Willow Creek is a non-fish bearing, intermittent stream draining less than 100 acres.
- Adjacent slopes within 200 feet of Willow Creek are less than 25%.
- Wetlands adjacent to Willow Creek are limited to primarily emergent wetlands with minor forested components, are less than 0.5 acre in size, and are not considered to be locally significant.
- Neither Willow Creek nor its associated riparian corridor are mapped as a Title 3 Water Quality Resource Area under Metro's UGFMP.
- Willow Creek and its associated riparian corridor do not warrant a Goal 5 safe harbor boundary.

According to Table NR-1 of the City's SROZ Ordinance, the flow duration (i.e., intermittent) and drainage area (i.e., between 50 to 100 acres) identified for Willow Creek meet the definition of a Secondary Protected Water Feature. Secondary Protected Water Features that have adjacent slopes of less than 25% are assigned a vegetated corridor width of 15 feet. Because the adjacent wetland and riparian corridor are not considered significant resources or Title 3 Water Quality Resource

Areas, the starting point for measuring the vegetated corridor width is the edge of the bankfull stage or 2-year storm level in Willow Creek.

Figure 11 shows the proposed SROZ and its associated 25-foot-wide impact area based on the listed refinements.

6 Proposed Project

The project site is the proposed location of the Frog Pond Meadows residential development project, a 68-lot single-family detached home and four-lot duplex home residential development (Figure 12). The proposed development will include residential building lots, streets, pedestrian connections, utilities, landscaping, open space, and water quality facilities. The project has been designed to be consistent with the recently adopted Master Plan, with development occurring in the following four of the 13 land use subdistricts identified in that plan:

- **Subdistrict 2** – Designated for medium lot, single-family development with an average lot size of 7,000 net square feet (zoning code R-7); minimum of 20 dwelling units/maximum of 25 dwelling units
- **Subdistrict 5** – Designated for medium lot, single-family development with an average lot size of 7,000 net square feet (zoning code R-7); minimum of 27 dwelling units/maximum of 33 dwelling units
- **Subdistrict 6** – Designated for small lot, single-family development with an average lot size of 5,000 net square feet (zoning code R-5); minimum of 74 dwelling units/maximum of 93 dwelling units
- **Subdistrict 12** – Designated for medium lot, single-family development with an average lot size of 7,000 net square feet (zoning code Civic[4]); minimum of zero dwelling units/maximum of seven dwelling units

As shown in Figure 12, access to the project is proposed to occur off SW Stafford Road via a new east-west local street (Street F) as well as via a new north-south Collector-Gateway street (Willow Creek Drive) that will parallel the existing off-site drainage (Willow Creek), as specified in the transportation framework of the Master Plan. According to the Master Plan, the local street cross section consists of a 52-foot-wide right-of-way that contains a 28-foot-wide paved surface including two travel lanes with parking on either side, two 7-foot-wide planter/stormwater features, and two 5-foot-wide paved sidewalks. The local street right-of-way will also be bordered by a 6-foot-wide public utility easement on either side. The proposed Collector-Gateway street will consist of a 76-foot-wide right-of-way that contains two 12-foot-wide travel lanes. Adjacent to the outside edge of each travel lane there will be an 8-foot-wide buffered bike lane bordered by an 8-foot-wide

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[4] Per the Master Plan, these metrics apply to infill housing within the Community of Hope Church property, should the property owner choose to develop housing on the site. Housing in the Civic subdistrict is subject to the R-7 regulations.

planter or stormwater feature. A 6-foot-wide paved sidewalk will also be constructed between the planter/stormwater feature and the outer edge of the right-of-way. Eight-foot-wide public utility easements will border the outside edges of the proposed right-of way.

Proposed Local Street F will connect with partial Street F of the Stafford Meadows development to the south and will extend across the width of the project site to connect with Willow Creek Drive along the western site boundary. This connection will require encroachment into the riparian corridor of Willow Creek and its adjacent wetlands to accommodate a stub for the future extension of Street F to the west per the transportation framework of the Master Plan (Figure 12). A series of local streets (streets D, E, and G) will extend off the Street F to provide access to the Frog Pond Meadows development and to current and future development projects on adjacent sites.

Stormwater treatment and conveyance for the proposed project will be handled by a series of linked private Low-Impact Development Approaches (LIDA) stormwater basins on individual lots, public LIDA stormwater swales along the development's proposed roadways, and two rain gardens along Street F (Figure 12). The majority of the stormwater collected from LIDA basins and swales on the project site will be routed to rain gardens before being conveyed to the stormwater detention basin located in the south-central portion of the Stafford Meadows residential development to the south. Stormwater collected from LIDA basins and swales along Willow Creek Drive on the project site will be conveyed to the Willow Creek riparian corridor via two piped outfalls that will discharge onto small riprap pads.

6.1 Proposed Significant Resource Overlay Zone and Significant Resource Overlay Zone Impact Area Encroachments

To accommodate the construction of the proposed Frog Pond Meadows project in accordance with the Master Plan, encroachment into the SROZ and SROZ Impact Area will be required. Proposed encroachments will result from construction of Willow Creek Drive, Street F, and the proposed stormwater outfalls and riprap pads. These activities will result in impacts to the wetlands adjacent to Willow Creek (Wetland A) and upland portions of its riparian corridor. The SROZ Impact Area would also be affected. Impacts to non-significant wetlands (Wetlands B, C, D, E, and F) will also be required to construct lots, local streets, and improvement work along SW Stafford Road. A brief description of each of the proposed impacts to SROZ resources and the SROZ Impact Area is provided in the following sections. Table 4 provides a summary of the proposed project impacts on SROZ resources and the SROZ Impact Area.

Table 4
Proposed Project Impacts on the Significant Resource Overlay Zone and Significant Resource Overlay Zone Impact Area

	SROZ Impacts				SROZ Impact Area Impacts		Total	
	Wetland		Upland Riparian Corridor					
Proposed Activity	Square Feet	Acre	Square Feet	Acre	Square Feet	Acre	Square Feet	Acre
Willow Creek Drive and Street F Construction	1,510	0.04	1,000	0.02	555	0.01	3,065	0.07
Stormwater Outfalls	0	0	250	0.005	0	0	250	0.005
Grading	2,552	0.06	5,675	0.13	629	0.02	8,856	0.21
Total	**4,062**	**0.10**	**6,925**	**0.16**	**1,184**	**0.03**	**12,171**	**0.29**

6.1.1 Willow Creek Drive and Street F Construction

Construction of Willow Creek Drive and Street F will require some minor grading encroachment into the SROZ Impact Area for the construction of curbs, sidewalks, and LIDA swales consistent with the proposed cross sections of the Collector-Gateway and Local Street street types (Table 4; Figure 12). Encroachments are required to accommodate a section of Willow Creek Drive that connects with a section of Willow Creek Drive to the south of the project site and a Collector-Internal street to the north of the site and to accommodate the intersection of Willow Creek Drive and Street F and a stub for future extension of Street F to the west. The road alignment is designed to be consistent with the transportation framework plans included in both the City's current *Wilsonville Transportation System Plan* (City of Wilsonville 2016) and the Master Plan (City of Wilsonville 2017). As such, these encroachments are exempt from the regulations of the SROZ ordinance per either of the following: 1) Section 4.139.04(.08), which pertains to the construction of new roads or pedestrian/bike paths in the SROZ where the purpose of the crossing is to provide access to or across a sensitive area and where the location of the crossing is consistent with the intent of the *City of Wilsonville Comprehensive Plan* (City of Wilsonville 2013); or 2) Section 4.139.04(.20), which allows the installation of public streets and utilities specifically mapped with a municipal utility master plan, the *Wilsonville Transportation System Plan*, or a capital improvement plan. Encroachment of Willow Creek Drive and Street F construction into the SROZ Resource Area and SROZ Impact Area has been minimized to the extent practicable based on the City's roadway design standards.

6.1.2 Stormwater Outfalls

The stormwater conveyance plan for a portion of the proposed development requires outfalls to a surface water on the western portion of the project site. To access Willow Creek, which is the only surface water on the site, these outfalls will need to extend through the SROZ Impact Area (Figure 12). Because the stormwater conveyance system is dependent on gravity, these outfalls need to be in the lowest portion of the site to function correctly. As such, there are no other practicable locations for these features.

Construction of the proposed stormwater outfalls will require trenching through the SROZ Impact Area to allow the installation of piping (Table 4). Once the pipes have been installed, the trenches will be backfilled and topped with native soil that will be graded to support the construction of Willow Creek Drive and Street F. Riprap pads will be installed at the end of each outfall to dissipate flow and prevent erosion.

Proposed project encroachments into the SROZ Impact Area for installation of the stormwater piping and outfalls are an exempt activity per Section 4.139.04(.18) of the SROZ Ordinance, which allows for private or public-sector service connection laterals and service utility extensions.

6.2 Resource Effects

Direct project effects on SROZ resources include permanent disturbance of degraded herbaceous wetland and upland habitats in the riparian corridor. Overall, impacts on these resources are expected to be minor given their degraded condition. Project impacts on wetland and upland riparian areas and habitat would primarily result in the removal of degraded herbaceous areas and potentially a few trees located in the SROZ. Project impacts would not adversely affect the limited level of function and value currently provided by these resources. Once the project has been constructed, the increased levels of noise and human presence associated with residential development could temporarily displace wildlife from nearby habitats. However, because rural and urban development disturbance currently occurs on and around the project site, some level of habituation by wildlife to noise and human activity has occurred. Consequently, indirect impacts to wildlife from disturbance and displacement are expected to be minor.

7 Proposed Significant Resource Overlay Zone Mitigation and Enhancement

Proposed permanent project impacts on the wetlands associated with Willow Creek will be compensated for by purchasing wetland mitigation credits from an approved wetland mitigation bank serving the project site (e.g., Mud Slough Mitigation Bank). This mitigation will be coordinated through the USACE and DSL permitting processes.

Proposed permanent project impacts on the upland portions of the SROZ will be mitigated by enhancing the remaining areas of upland riparian corridor within the SROZ boundaries through the planting of native trees and shrubs (Figure 13). Plant species selection, density, and spacing will be in accordance with the planting requirements specified in Section 4.139.07(.02)(E) of the City's SROZ Ordinance, which requires the planting of five trees and 25 shrubs for every 500 feet of disturbance area at a spacing of 8 to 12 feet on center for trees and 4 to 5 feet on center for shrubs. Proposed plant species and numbers are shown in Table 5.

Once the enhancement plantings have been installed, the applicant will monitor the mitigation area for a period of 5 years to maintain plant survivorship and control invasive species. Per the plant survival standards of Section 4.139.07(.02)(E)(7) of the SROZ Ordinance, trees and shrubs that die will be replaced in kind to the extent necessary to maintain a minimum of 80% of the total number of plants installed, or approximately 95 trees (80% of 119 trees planted) and 478 shrubs (80% of 597 shrubs planted), by the fifth anniversary of the date that the mitigation plantings were installed.

Table 5
Proposed Planting Treatment for Area of Remaining Upland Riparian Corridor in the SROZ

Scientific Name	Common Name	On Center Spacing (feet)	Plant Numbers
Trees (Based on City SROZ Mitigation Standards of 0.01 Tree/Square Foot)[1,2]			
Alnus rubra	Red alder	8 to 12	29
Acer macrophyllum	Bigleaf maple	8 to 12	24
Pseudotsuga menziesii	Douglas fir	8 to 12	30
Prunus emarginata	Bitter cherry	8 to 12	6
Rhamnus purshiana	Cascara buckthorn	8 to 12	6
Thuja plicata	Western red cedar	8 to 12	24
Tree Subtotal			**119**
Shrubs (Based on City SROZ Mitigation Standards of 0.05 Shrub/Square Foot)[1,2]			
Amelanchier alnifolia	Pacific serviceberry	4 to 5	90
Holodiscus discolor	Oceanspray	4 to 5	60
Mahonia nervosa	Cascade Oregon-grape	4 to 5	54
Sambucus racemosa	Red elderberry	4 to 5	90
Lonicera involucrata	Twinberry honeysuckle	4 to 5	6
Oemleria cerasiformiscruciform	Indian plum	4 to 5	90
Symphoricarpos albusalbas	Snowberry	4 to 5	87
Ribes sanguineum	Red-flowering currant	4 to 5	60
Rosa nutkana	Nootka rose	4 to 5	30
Rosa pisocarpa	Cluster rose	4 to 5	30
Shrub Subtotal			**597**
Total Plants			**716**

Notes:

1. Planting area based on 11,913 square feet (0.27 acre) of remaining upland riparian corridor in the SROZ.
2. Plants (especially shrubs) should be clumped to mimic natural conditions with not more than four species to a clump.

Final species quantities are dependent upon availability.

8 Compliance with Significant Resource Impact Report Review Criteria

The following sections document the proposed project's required compliance with the SRIR review criteria of Section 4.139.06.03 of the City's SROZ Ordinance.

A. **Except as specifically authorized by this code, development shall be permitted only within the Area of Limited Conflicting Use found within the SROZ.**

Proposed project encroachments into the refined Willow Creek SROZ and its associated SROZ Impact Area would result from the construction of Willow Creek Drive, Street F, and the proposed stormwater outfalls. These activities will require impacts on the wetland adjacent to off-site Willow Creek and associated riparian corridor, and the installation of stormwater piping and two outfalls in the SROZ Impact Area.

The proposed road-related impacts are exempt from the regulations of the SROZ Ordinance per either Section 4.139.04(.08), which pertains to the construction of new roads or pedestrian/bike paths in the SROZ where the purpose of the crossing is to provide access to or across a sensitive area and where the location of the crossing is consistent with the intent of the *City of Wilsonville Comprehensive Plan* (City of Wilsonville 2013), or Section 4.139.04(.20), which allows the installation of public streets and utilities specifically mapped with a municipal utility master plan, the *Wilsonville Transportation System Plan* (City of Wilsonville 2016), or a capital improvement plan. The intent of the proposed road work is to provide vehicular, bike, and pedestrian connectivity within the Frog Pond Meadows development and future surrounding developments, and all these roads are public roads identified in both the City's current *Wilsonville Transportation System Plan* and the Master Plan (City of Wilsonville 2017). As such, the proposed crossing meets the criteria required for these exemptions.

Project encroachments into the SROZ Impact Area from the proposed stormwater piping and outfalls are also an exempt activity per Section 4.139.04(.18) of the SROZ Ordinance, which allows for private or public-sector service connection laterals and service utility extensions.

B. **Except as specifically authorized by this code, no development is permitted within Metro's Urban Growth Management Functional Plan Title 3 Water Quality Resource Area boundary.**

No development activities are proposed to occur within areas mapped as Metro UGMFP Title 3 Water Quality Resource Areas. Although the downstream (off-site) portion of Willow Creek is mapped as a Title 3 Water Quality Resource Area, this mapping ends at SW Boeckman Road and does not extend onto the project site. As such, it would not be impacted by the proposed Frog Pond Meadows project.

C. **No more than five (5) percent of the Area of Limited Conflicting Use located on a property may be impacted by a development proposal. On properties that are large enough to include Areas of Limited Conflicting Use on both sides of a waterway, no more than five (5) percent of the Area of Limited Conflicting Use on each side of the riparian corridor may be impacted by a development proposal. This condition is cumulative to any successive development proposals on the subject property such that the total impact on the property shall not exceed five (5) percent.**

The SROZ riparian corridor type present on the project site (Riparian Corridor Type NR-4) does not include an Area of Limiting Conflicting Use. As such, this criterion is not applicable to the Frog Pond Meadows project.

D. **Mitigation of the area to be impacted shall be consistent with Section 4.139.06 of this code and shall occur in accordance with the provisions of this Section.**

The mitigation standards contained in Section 4.139.07 of the City's SROZ Ordinance are applicable to project encroachments into the Area of Conflicting Uses of significant wildlife habitat resources areas. Mitigation for project activities that would affect wetlands and other waters regulated by USACE and DSL or riparian corridors, such as those proposed for the Frog Pond Meadows project, are to be mitigated in accordance with state and federal mitigation requirements.

As described under Criteria J, the applicant intends obtain a Clean Water Act Section 404 Permit from USACE and an Oregon Removal-Fill Permit from DSL to excavate material from and place fill material into Wetlands A through F to facilitate construction of the proposed project. Mitigation for these wetland impacts will be achieved by purchasing wetland mitigation credits from an approved wetland mitigation bank serving the project site (e.g., Mud Slough Mitigation Bank). Mitigation for permanent project impacts on the upland portions of the SROZ will be achieved by enhancing the remaining areas of upland riparian corridor within the SROZ boundaries through the planting of native trees and shrubs.

E. **The impact on the Significant Resource is minimized by limiting the degree or magnitude of the action, by using appropriate technology or by taking affirmative steps to avoid, reduce or mitigate impacts.**

Project impacts on the SROZ around Willow Creek have been minimized by reducing the width of the proposed local street from the 52 feet specified in the Master Plan for Local Streets to 31 feet. This is accomplished by removing the roadside parking and planter/stormwater features from the proposed road and maximizing slopes to reduce impact area.

Project impacts on the SROZ Impact Area from the installation of stormwater piping, two outfalls, and small riprap pads will be permanent impacts.

F. **The impacts to the Significant Resources will be rectified by restoring, rehabilitating, or creating enhanced resource values within the "replacement area" (see definitions) on the site or, where mitigation is not practical on site, mitigation may occur in another location approved by the City.**

Permitted impacts to the upland riparian corridor resources within the Willow Creek SROZ will be mitigated by enhancing the remaining portions of the upland riparian corridor within the SROZ by planting native trees and shrubs in accordance with the plant spacing and diversity standards contained in Section 4.139.07(.02)(E)(3) and (4) of the City's SROZ Ordinance.

G. **Non-structural fill used within the SROZ area shall primarily consist of natural materials similar to the soil types found on the site.**

Most of the fill that will be placed in the SROZ Resource Area and SROZ Impact Area for the construction of the proposed Willow Creek Drive and Street F and the installation of the stormwater lines and outfalls will be structural fill. Final grading around the road crossing and the upper portions of backfill in the stormwater line installation trenches will be accomplished using native soil. Small areas of riprap will be required below each stormwater outfall to serve as energy dissipation pads.

H. **The amount of fill used shall be the minimum required to practically achieve the project purpose.**

The amount of fill material proposed for the construction of the Willow Creek Drive and Street F and stormwater lines has been minimized to the extent practicable to allow construction of these features to City development standards.

I. **Other than measures taken to minimize turbidity during construction, stream turbidity shall not be significantly increased by any proposed development or alteration of the site.**

Stream turbidity will not be significantly increased by the proposed project or any other alterations of the project site. Aside from the erosion and sedimentation control measures that would be implemented during construction, long-term measures to protect the water quality of the stream include enhancing the upland riparian portion of the SROZ along Willow Creek with native trees and shrubs planted in accordance with the plant spacing and diversity standards contained in Section 4.139.07(.02)(E)(3) and (4) of the City's SROZ Ordinance. In addition, stormwater from the proposed development would be treated using stormwater planters and rain gardens adjacent to the future roadways prior to being discharged to the stormwater detention basin located in the south-central portion of the Stafford Meadows residential development or to the SROZ through controlled outlets.

J. **Appropriate federal and state permits shall be obtained prior to the initiation of any activities regulated by the U.S. Army Corps of Engineers and the Oregon Division of State Lands in any jurisdictional wetlands or water of the United States or State of Oregon, respectively.**

The applicant intends to obtain a Clean Water Act Section 404 Permit from USACE and an Oregon Removal-Fill Permit from DSL for the construction of Willow Creek Drive and Street F across Wetland A, and for the placement of fill material into Wetlands B through F for the construction of residential lots and streets. Compensatory mitigation for these impacts will be achieved through the purchase of wetland mitigation credits from an approved wetland mitigation bank serving the project site (e.g., Mud Slough Mitigation Bank).

9 Qualifications of Preparers

9.1 Julie Fox

Julie Fox has 10 years of experience as a biologist and natural resource scientist specializing in environmental surveying and sampling, including vegetation inventory and habitat assessments, water quality monitoring, and soil and sediment sampling. Ms. Fox is certified in wetland delineations and experienced in ordinary high water mark mapping; wetland functions and values assessments; compensatory wetland and vegetated corridor mitigation planning; mitigation compliance monitoring; and compliance with Section 404 of the Clean Water Act, the ESA, and state and local requirements and regulations. Ms. Fox is skilled in Trimble GPS field data collection and processing; ArcGIS suite for spatial analysis and mapping; preparing reports; writing purpose and needs statements; preparing alternatives analyses; assessing project impacts; coordinating with local, state, and federal regulatory agencies; and preparing Joint Section 404/Removal-Fill Permit Applications.

9.2 Matt Kuziensky

Matt Kuziensky is a certified Professional Wetland Scientist with more than 25 years of experience in wetland delineation, permitting, functions and values assessment, natural resource assessment, compensatory mitigation planning, mitigation compliance monitoring, and National Environmental Policy Act and Washington State Environmental Policy Act technical analysis. He has managed wetland- and vegetation-related natural resource work for a variety of activities, including residential, commercial, and industrial developments; landfills; mining operations; utility installations; highway and railway projects; and marine terminal facilities. He is experienced in using multiple wetland functions and values assessment methods, including the Oregon HGM classification system (Adamus 2001), Oregon Rapid Wetland Assessment Protocol, OFWAM, and the Washington State

Wetland Ratings System for both western and eastern Washington. He also has experience in using the preliminary version of the Stream Function Assessment Method being developed by DSL, USACE Portland District, Region 10 of the U.S. Environmental Protection Agency, and the Willamette Partnership to assess project impacts on a stream.

9.3 Joseph Pursley

Joseph Pursley is a natural resource scientist, certified arborist, and environmental permitting specialist with 19 years of experience in wetland science, habitat mapping, wildlife biology, avian ecology, stream ecology, ecological restoration, botanical surveys, and environmental monitoring. Mr. Pursley has worked in all phases of project planning, field monitoring, mitigation, and construction and has project experience in initial site assessment, resource delineation, design review, best management practice installation and review, water quality sampling, and environmental compliance coordination and communication. Mr. Pursley specializes in wildlife ecology, wildlife habitat mapping, and assessment of avian species. He has organized, managed, and led several multi-week, large-scale field efforts for wildlife surveys, wetland delineations, ordinary high water mark mapping, and jurisdictional resource determinations.

9.4 Greg Summers

Greg Summers is a National Environmental Policy Act/regulatory specialist and professional wetland scientist. He oversees the preparation of Environmental Impact Statements, Environmental Assessments, Biological Assessments, Biological Evaluations, wetland projects of all varieties, and threatened and endangered species compliance. Mr. Summers has more than 25 years of experience working in the Pacific Northwest and extensive restoration, assessment, construction oversight, and monitoring experience in a variety of ecosystems.

He manages projects in support of land-use planning, Section 404 permit applications, and state and local wetland enforcement activities, including the Land Conservation and Development Commission. Mr. Summers has provided expert testimony at public land-use hearings for wetland law. His responsibilities also include marketing, project budgeting, scheduling, quality assurance, and quality control. He has worked in the United Sates in Oregon, Washington, Montana, Alaska, Idaho, Wyoming, Utah, California, Wisconsin, North Dakota, Illinois, Virginia, Kentucky, Tennessee, Georgia, Mississippi, and in the Canadian Provinces of British Columbia, Alberta, Northwest Territories, and Ontario.

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Figures

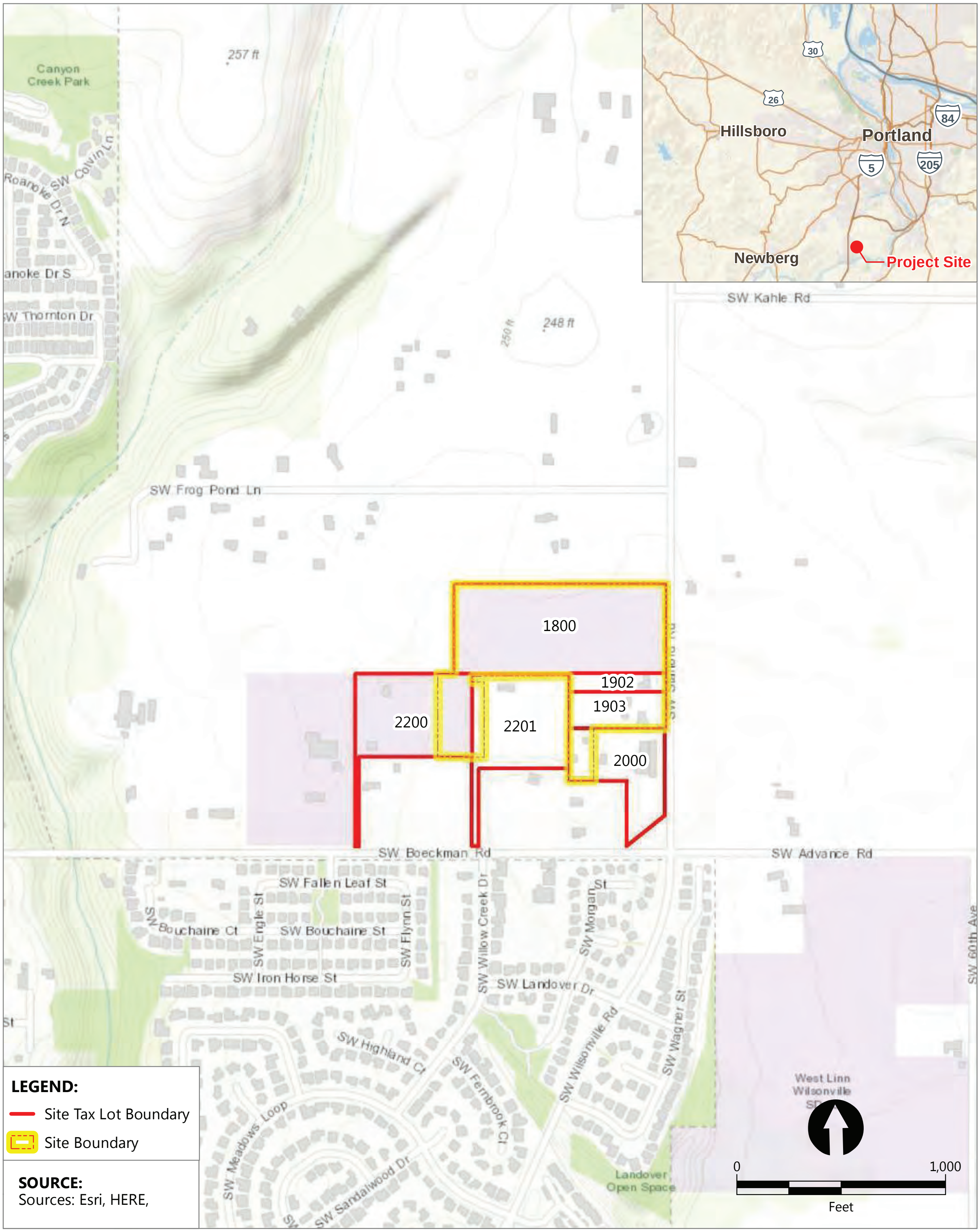

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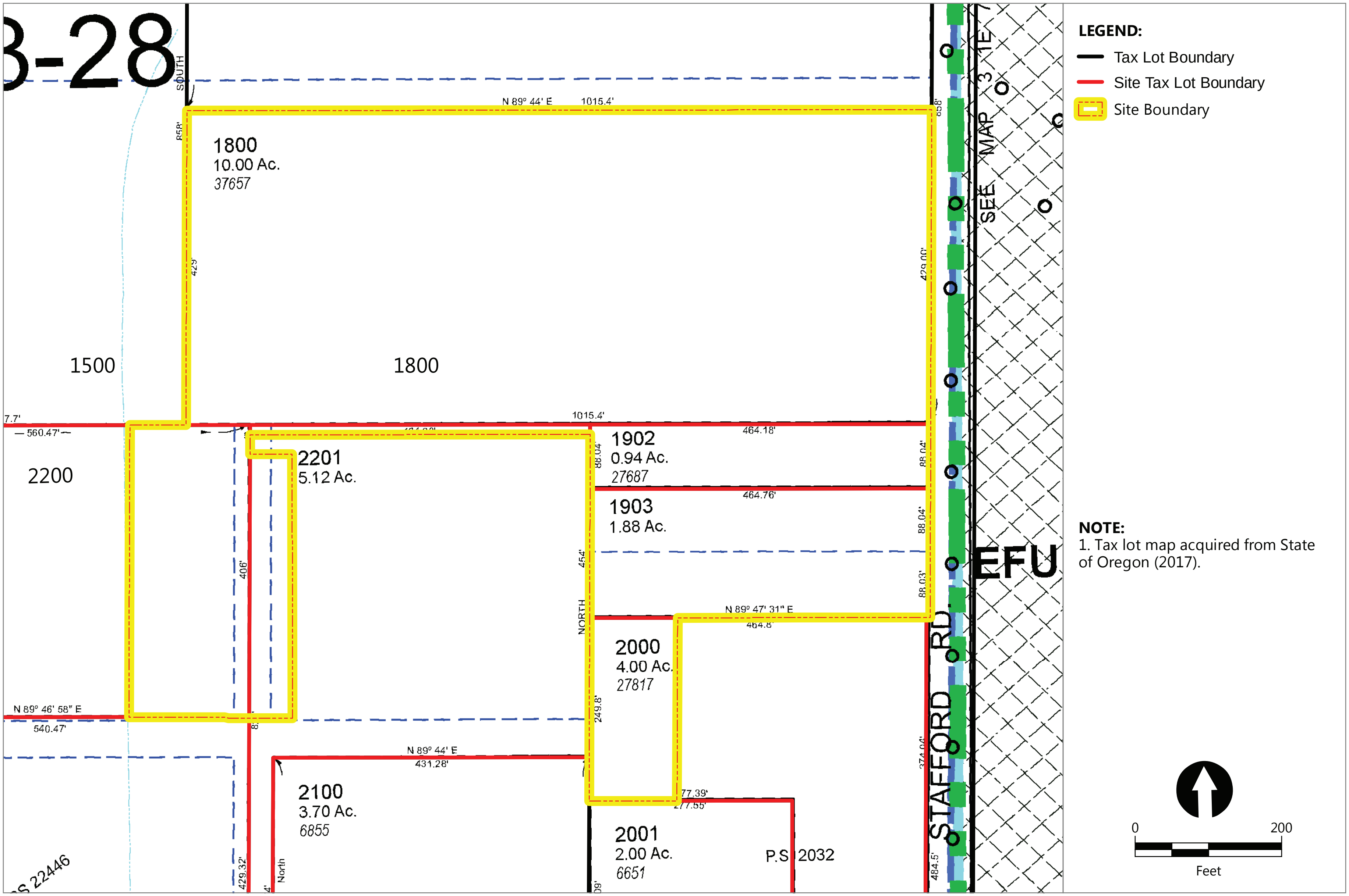
Figure 1
Site Location Map
Significant Resource Impact Report
West Hills Land Development: Frog Pond Meadows



LEGEND:

- ▬ Tax Lot Boundary
- 🟥 Site Tax Lot Boundary
- 🟨 Site Boundary

NOTE:
1. Tax lot map acquired from State of Oregon (2017).

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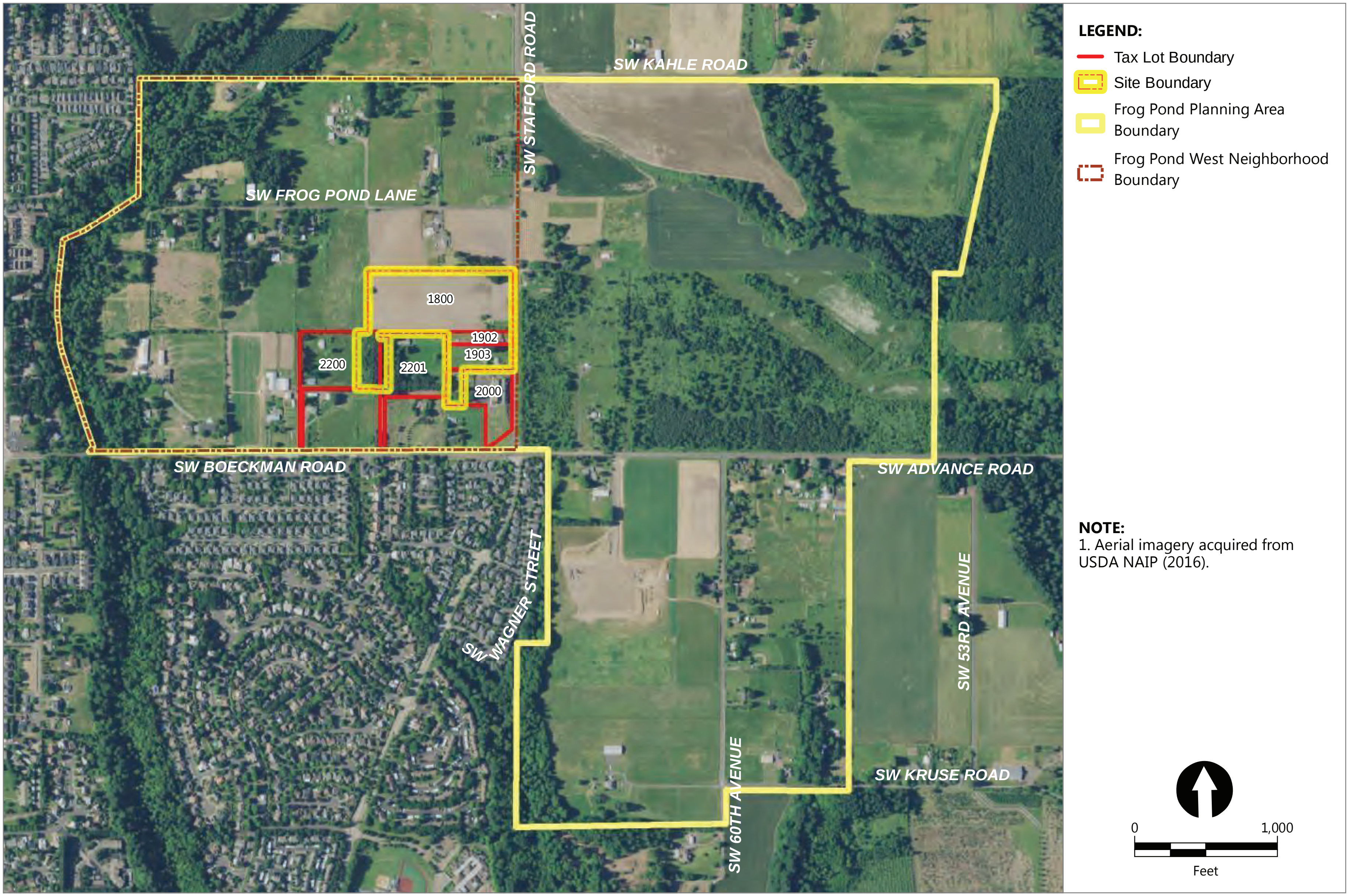
Figure 2
Tax Lot 31W12D Map
Significant Resource Impact Report
West Hills Land Development: Frog Pond Meadows



NOTE:
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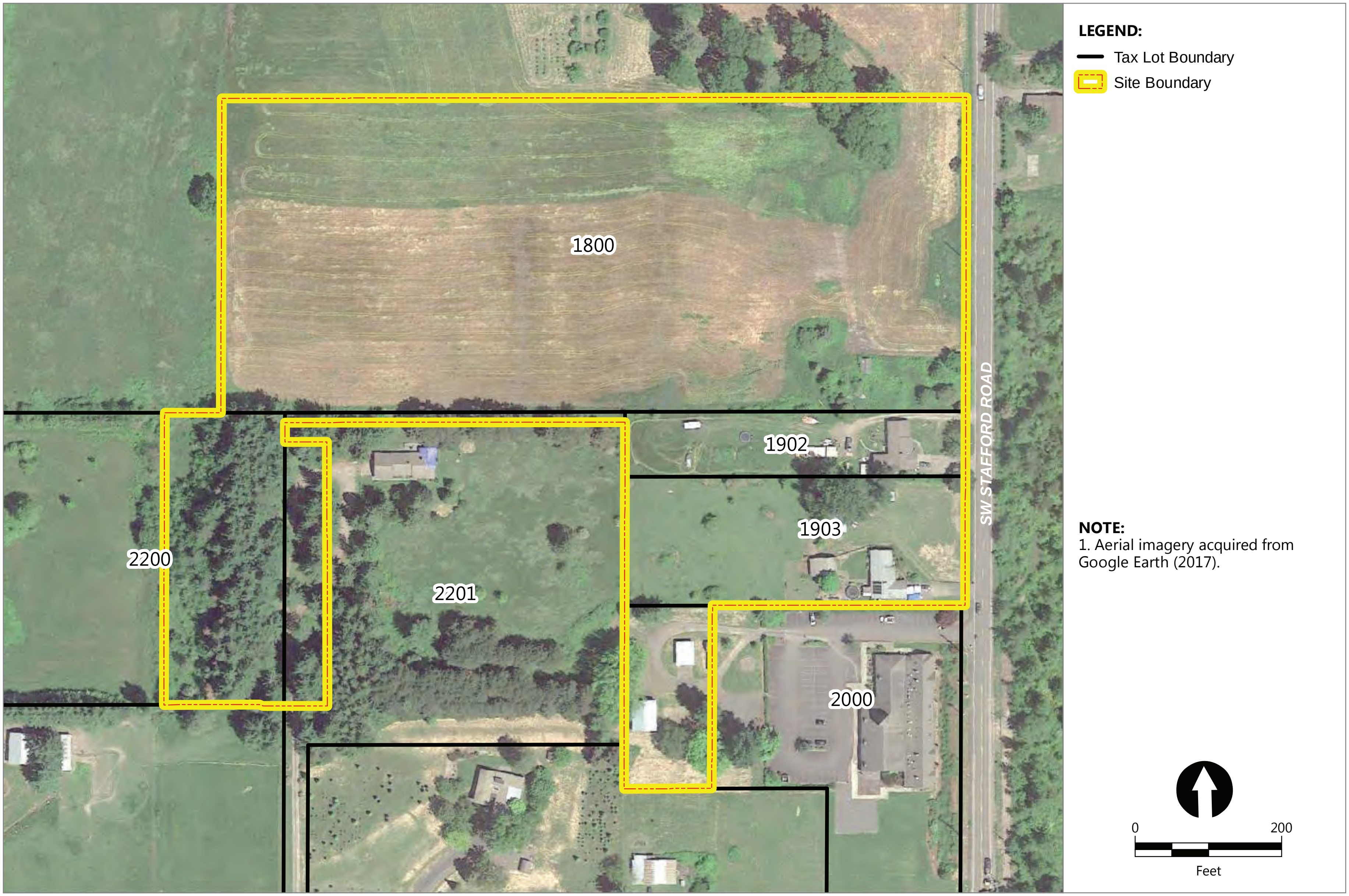
Figure 3

Frog Pond Area and Frog Pond West Neighborhood Planning Area Map

Significant Resource Impact Report
West Hills Land Development: Frog Pond Meadows



NOTE:
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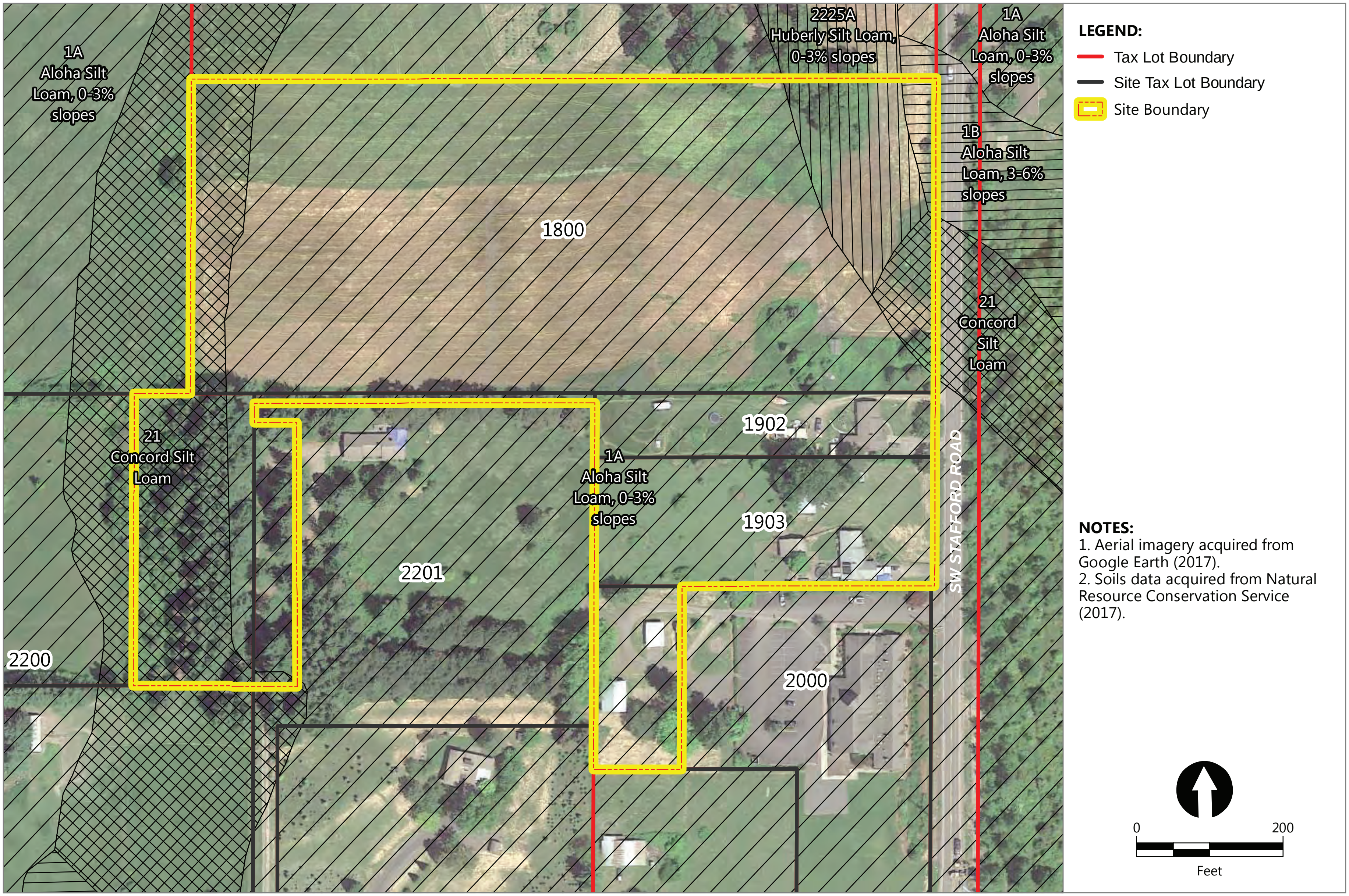
Figure 4

2017 Aerial Overview Map

Significant Resource Impact Report
West Hills Land Development: Frog Pond Meadows



NOTES:
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2. Soils data acquired from Natural Resource Conservation Service (2017).

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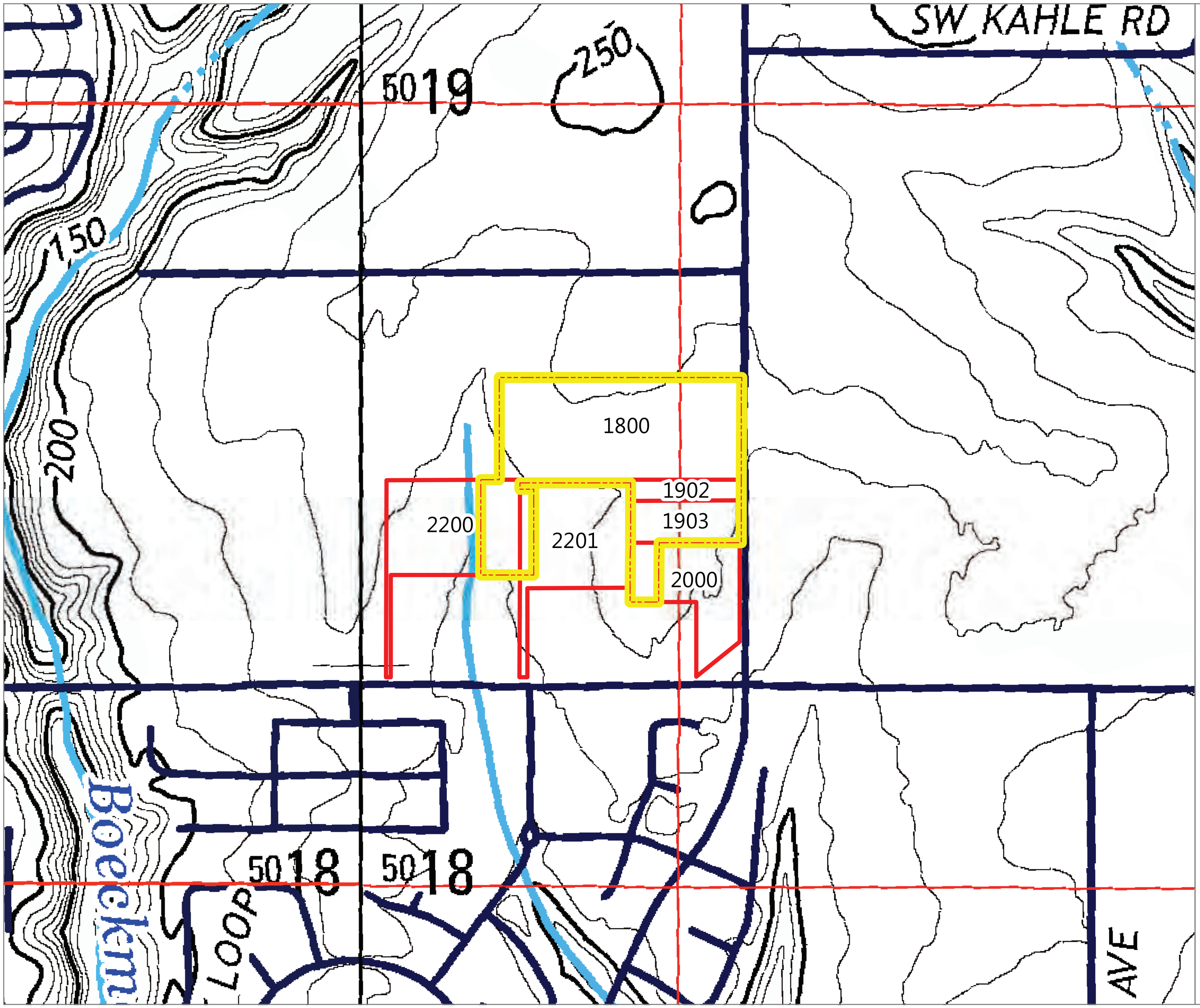
Figure 5
Soils Map
Significant Resource Impact Report
West Hills Land Development: Frog Pond Meadows



LEGEND:

🟥 Tax Lot Boundary

🟨 Site Boundary

NOTE:

1. Topographic maps acquired from US Geological Survey: Canby Quadrangle Oregon 7.5-minute Series (2017) and Sherwood Quadrangle Oregon 7.5-minute Series (2017).

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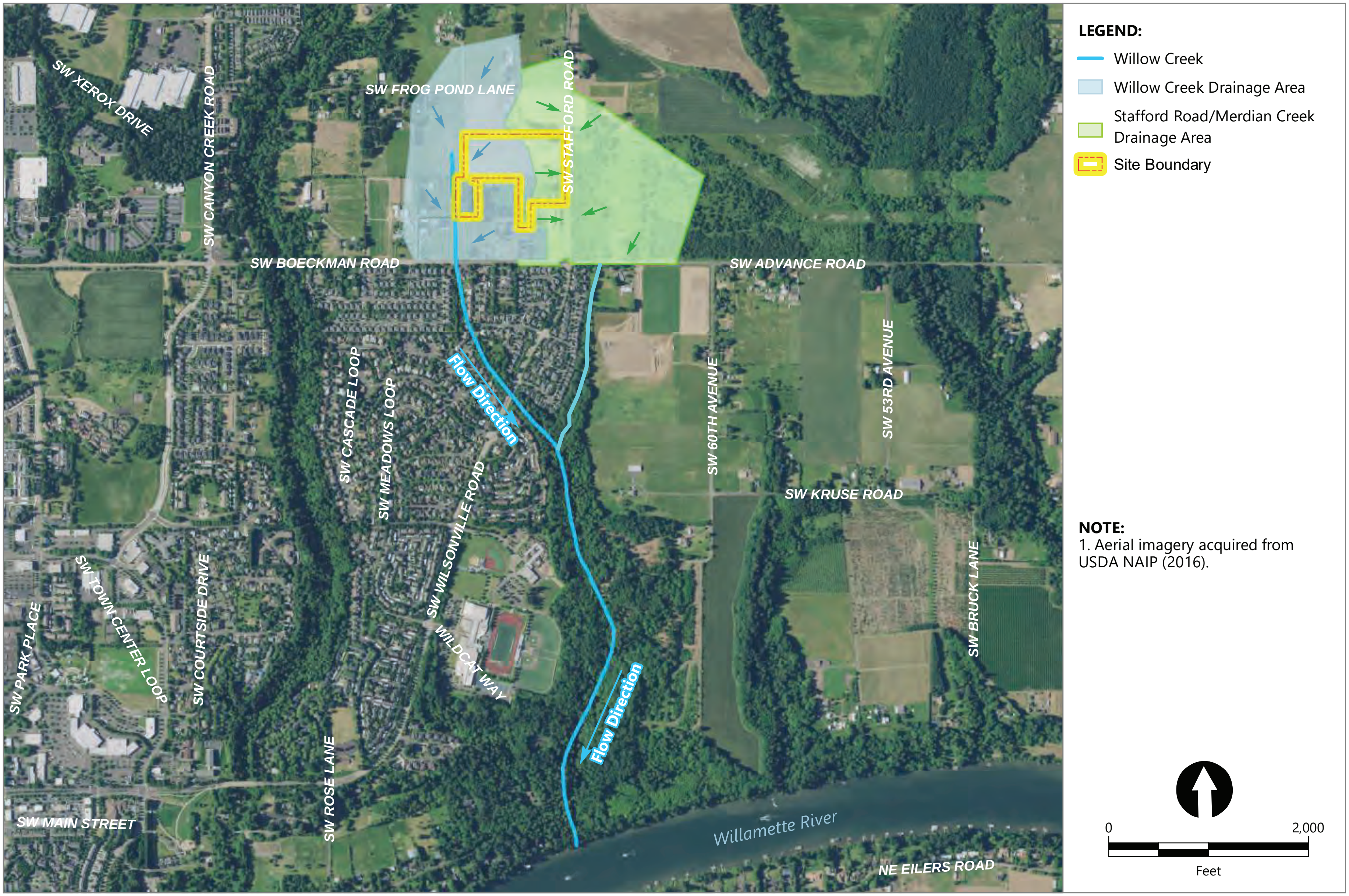
Figure 6

USGS Topographic Map

Significant Resource Impact Report
West Hills Land Development: Frog Pond Meadows



NOTE:
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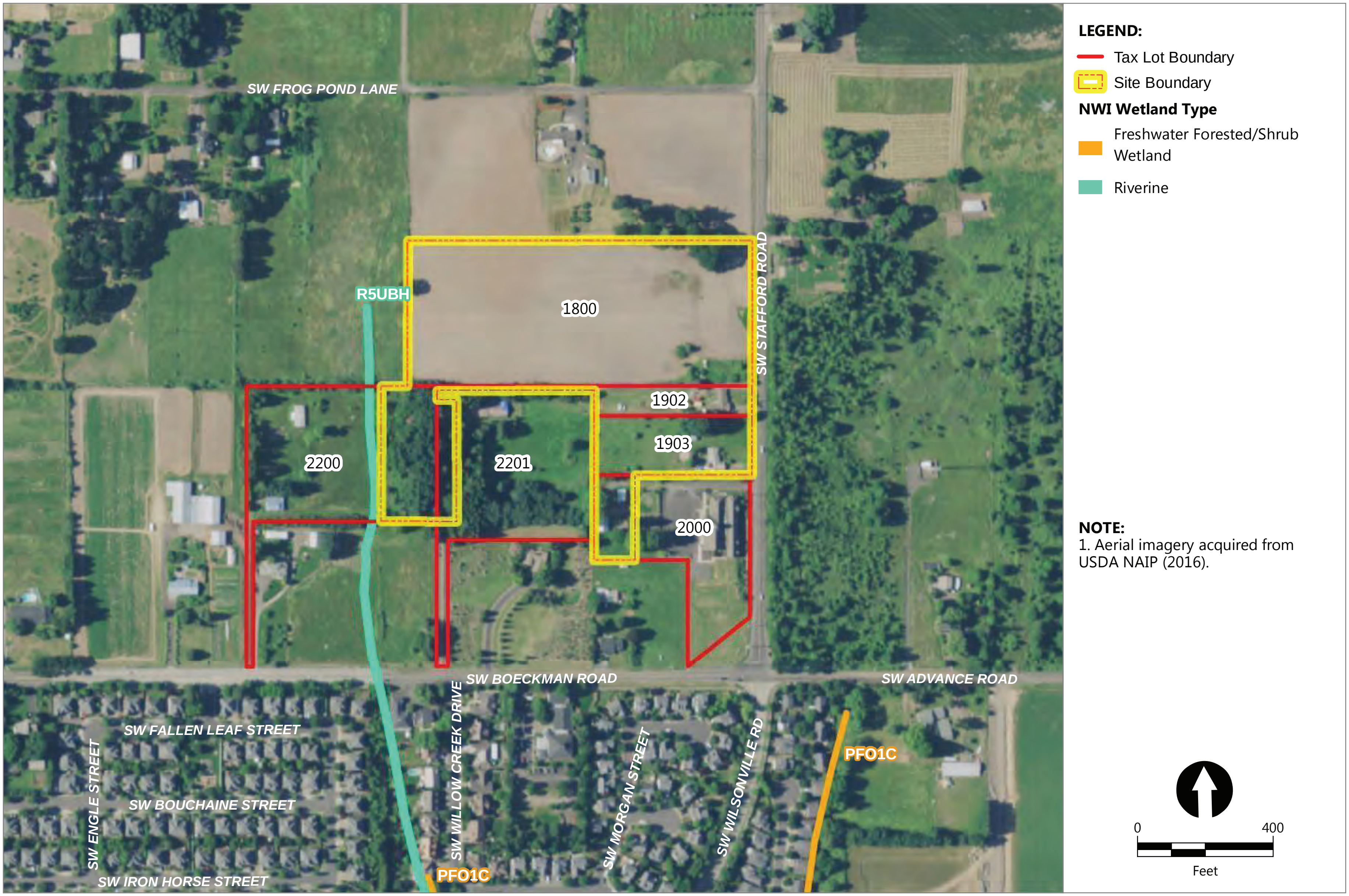
Figure 7
Willow Creek Drainage Map
Significant Resource Impact Report
West Hills Land Development: Frog Pond Meadows



LEGEND:

🟥 Tax Lot Boundary

🟨 Site Boundary

NWI Wetland Type

🟧 Freshwater Forested/Shrub Wetland

🟩 Riverine

NOTE:
1. Aerial imagery acquired from USDA NAIP (2016).

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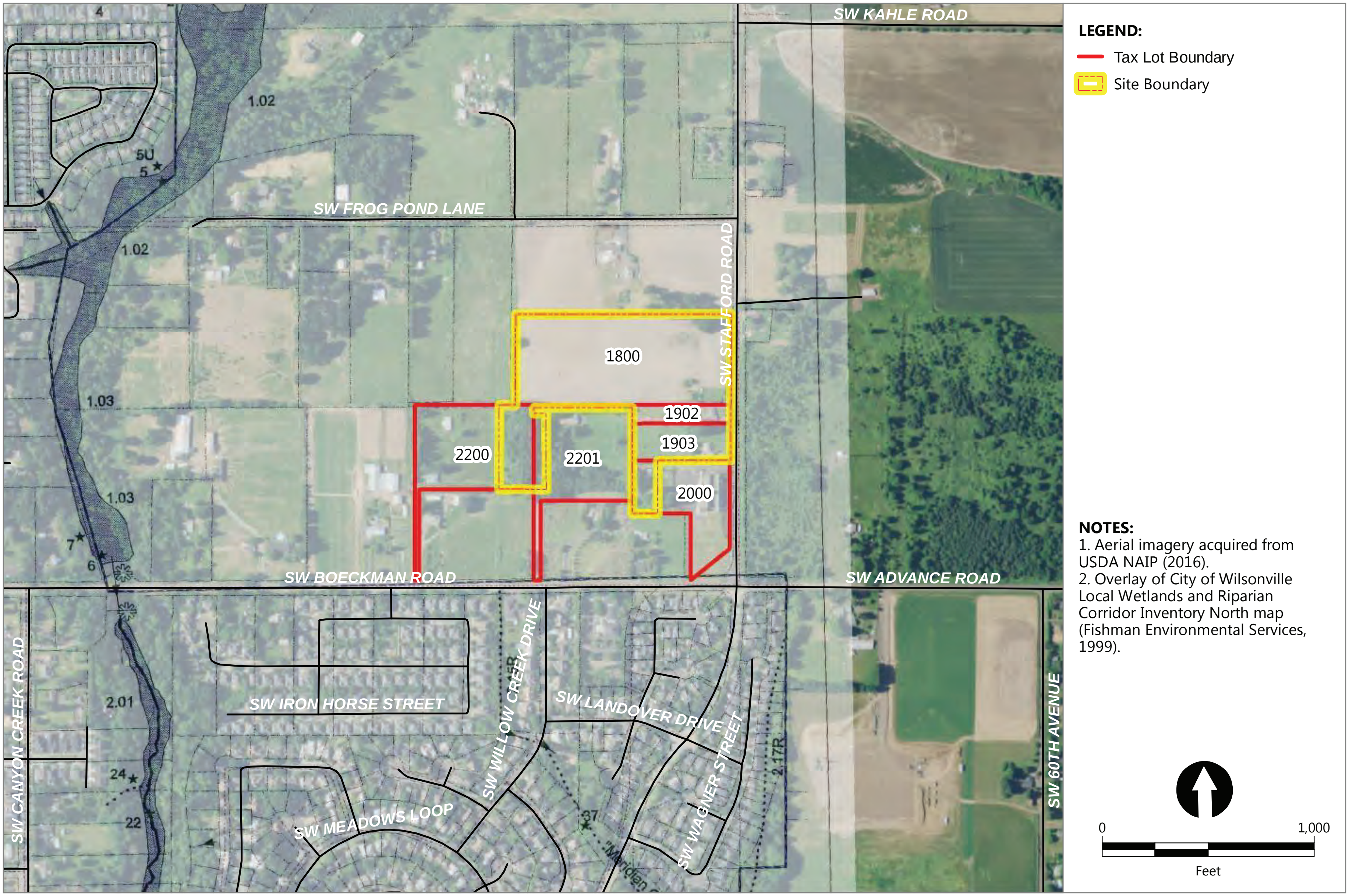
Figure 8
National Wetlands Inventory Map
Significant Resource Impact Report
West Hills Land Development: Frog Pond Meadows



NOTES:
1. Aerial imagery acquired from USDA NAIP (2016).
2. Overlay of City of Wilsonville Local Wetlands and Riparian Corridor Inventory North map (Fishman Environmental Services, 1999).

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Figure 9
Local Wetlands Inventory Map
Significant Resource Impact Report
West Hills Land Development: Frog Pond Meadows

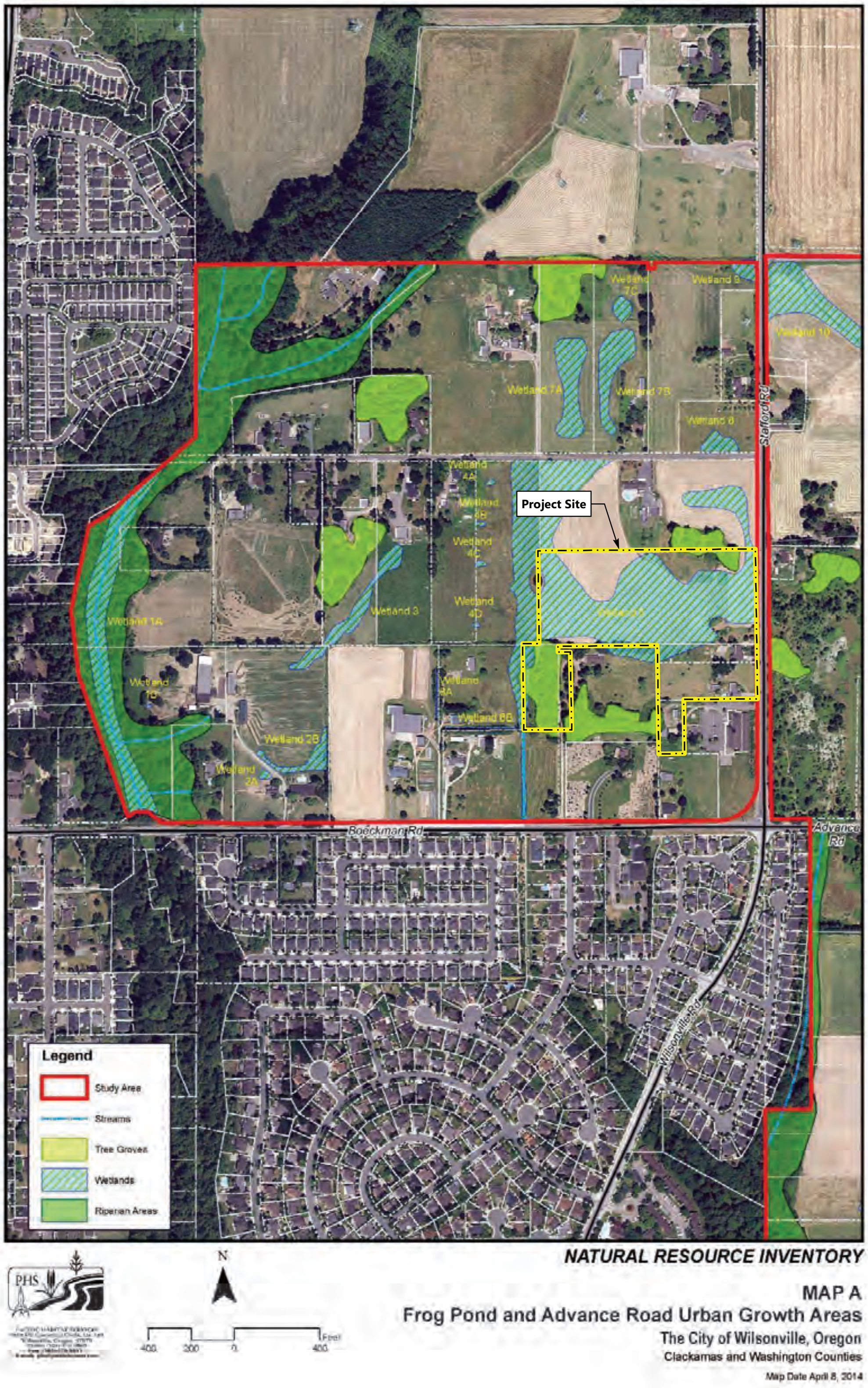

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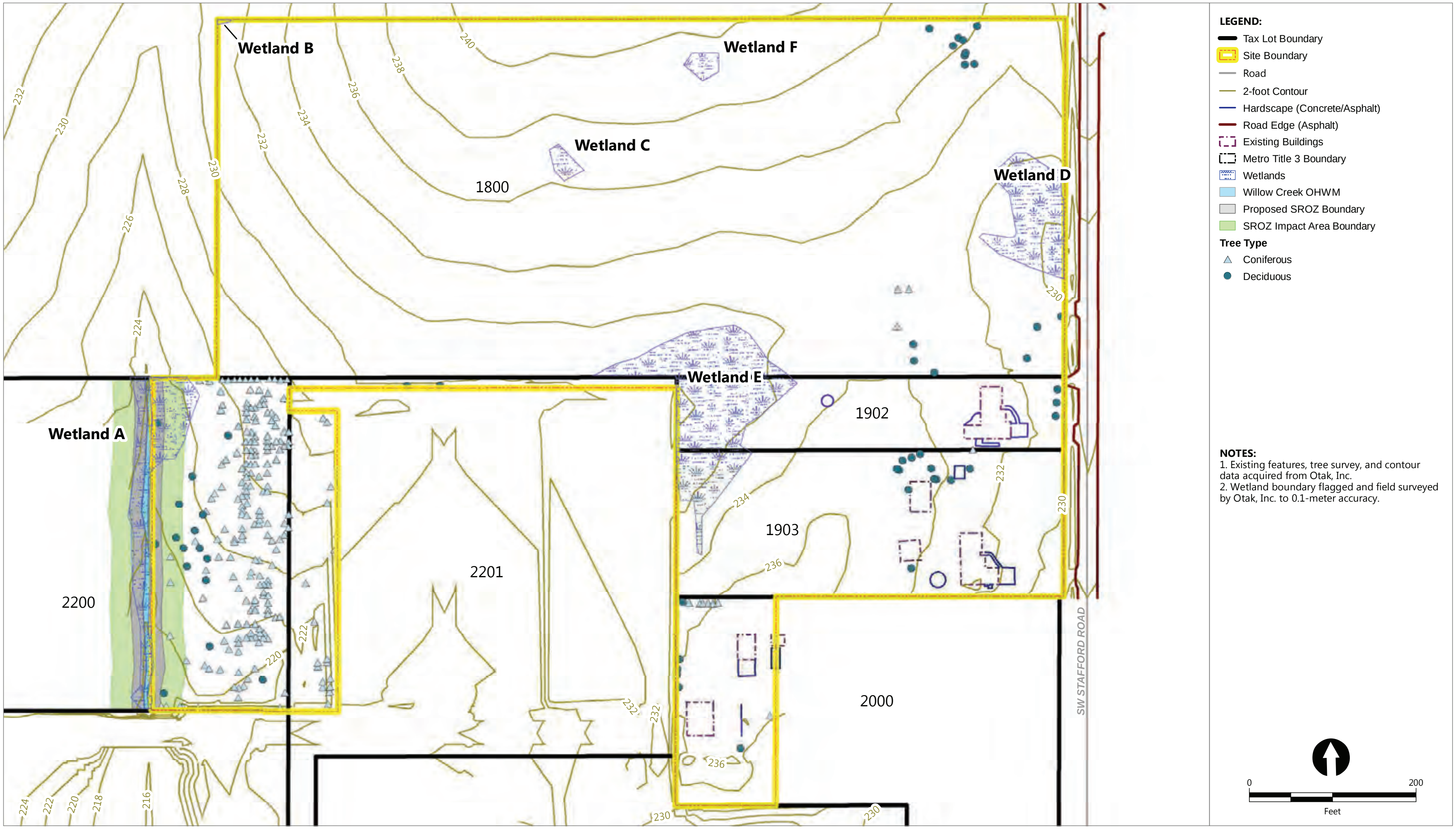
Figure 10
2014 Pacific Habitat Services, Inc. Wetland Inventory Map
Significant Resource Impact Report
West Hills Land Development: Frog Pond Meadows



NOTES:
1. Existing features, tree survey, and contour data acquired from Otak, Inc.
2. Wetland boundary flagged and field surveyed by Otak, Inc. to 0.1-meter accuracy.

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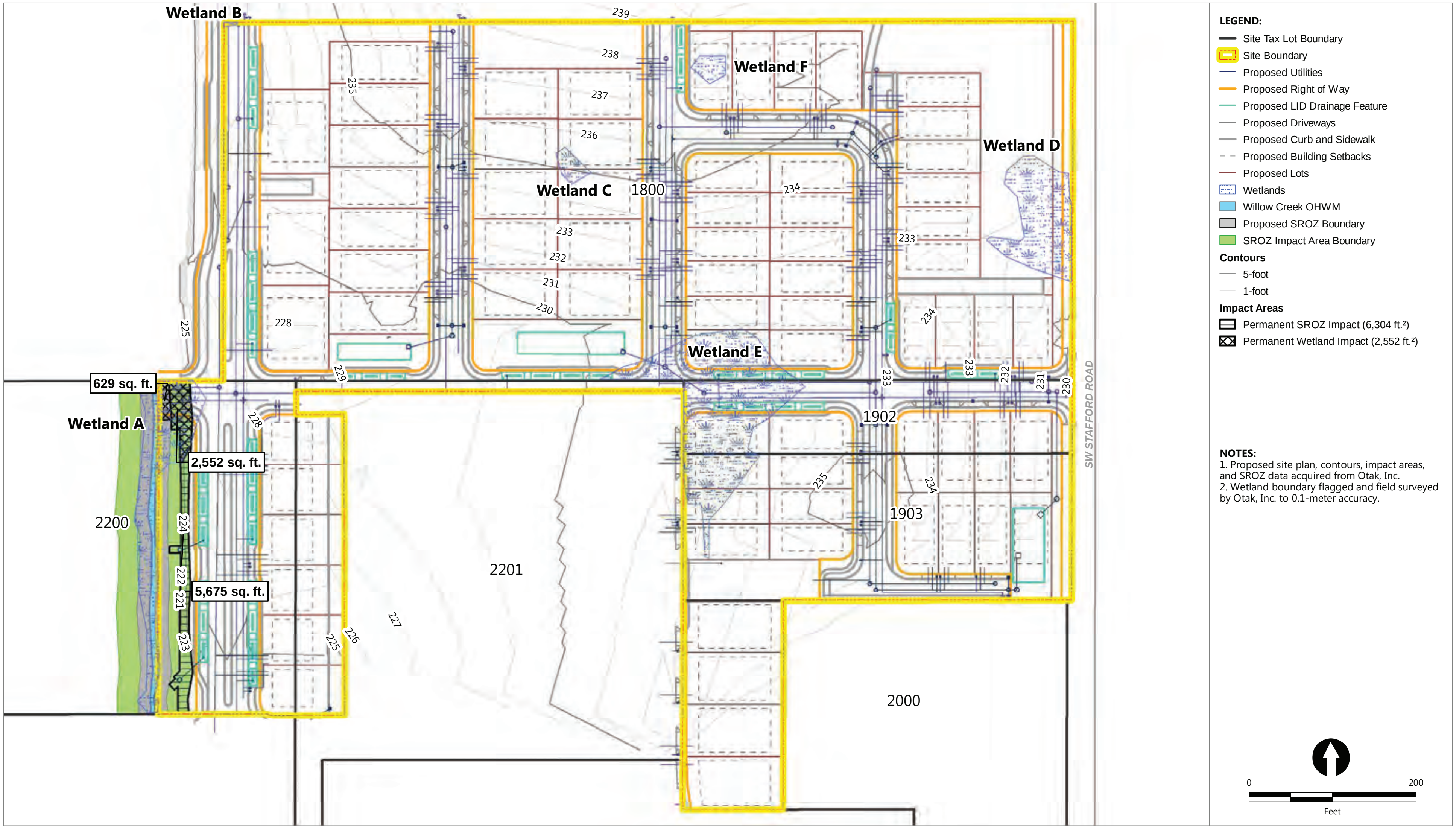
Figure 11
Existing Conditions Map
Significant Resource Impact Report
West Hills Land Development: Frog Pond Meadows



NOTES:
1. Proposed site plan, contours, impact areas, and SROZ data acquired from Otak, Inc.
2. Wetland boundary flagged and field surveyed by Otak, Inc. to 0.1-meter accuracy.

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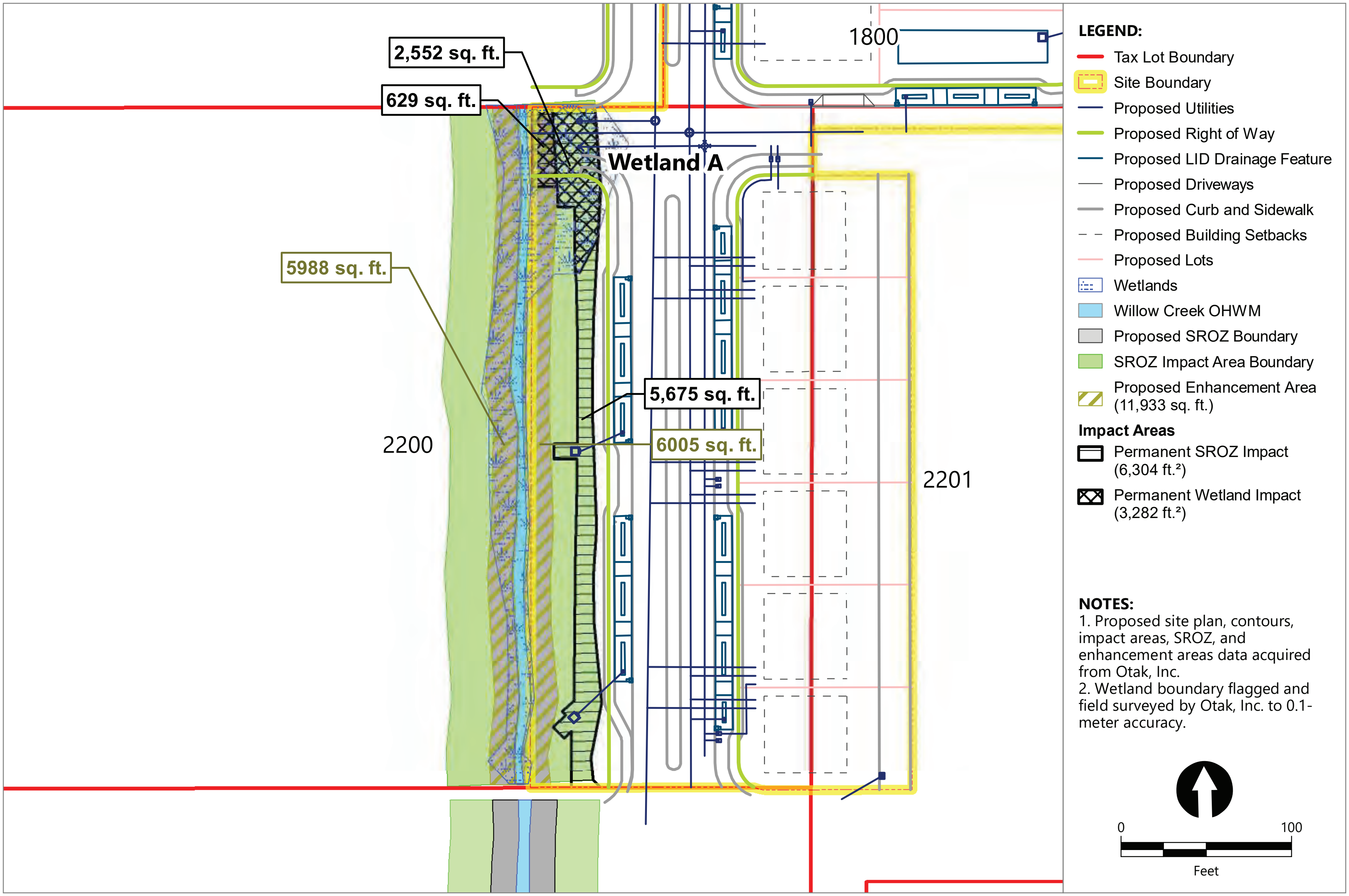
Figure 12
Proposed Development Map
Significant Resource Impact Report
West Hills Land Development: Frog Pond Meadows



NOTES:

1. Proposed site plan, contours, impact areas, SROZ, and enhancement areas data acquired from Otak, Inc.
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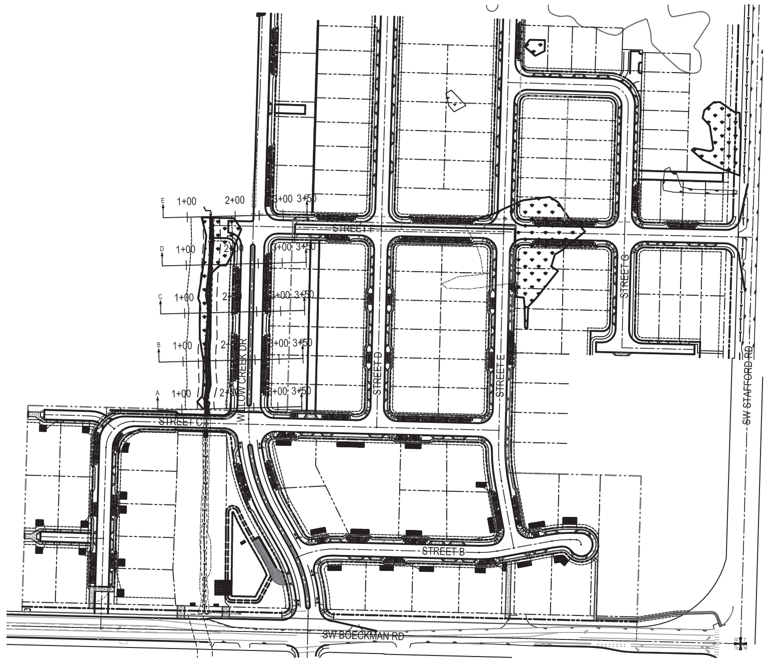
Figure 13
Proposed Restoration Plan Map
Significant Resource Impact Report
West Hills Land Development: Frog Pond Meadows

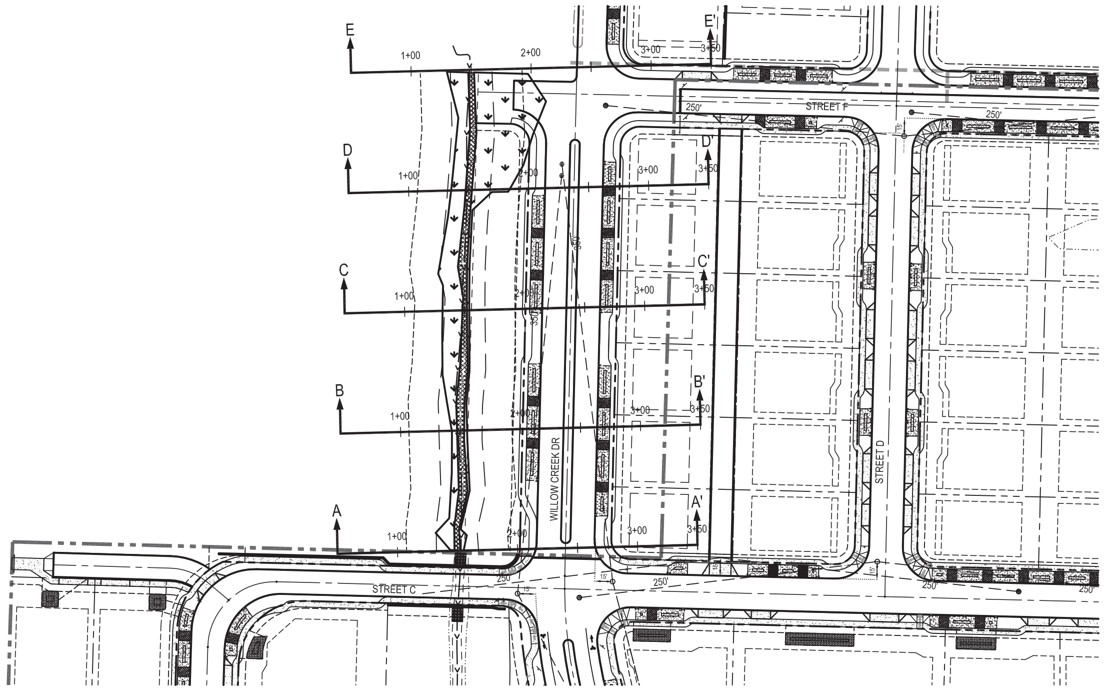
Appendix A

Stream Slope Cross Sections



OVERALL SITE PLAN

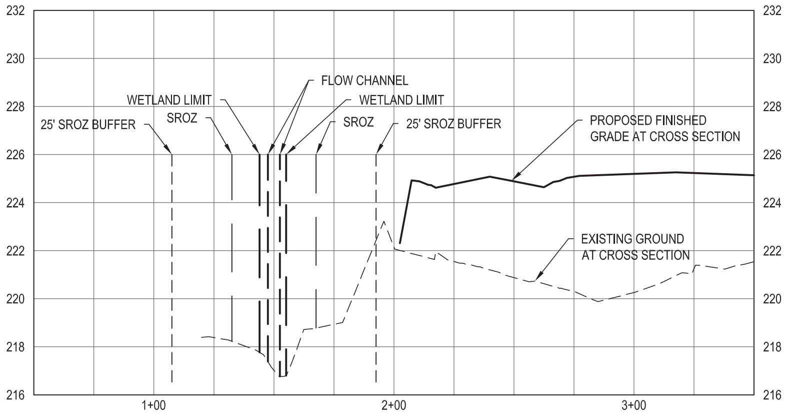
N.T.S.



SECTION PLAN VIEW SROZ

SCALE: 1"=80'

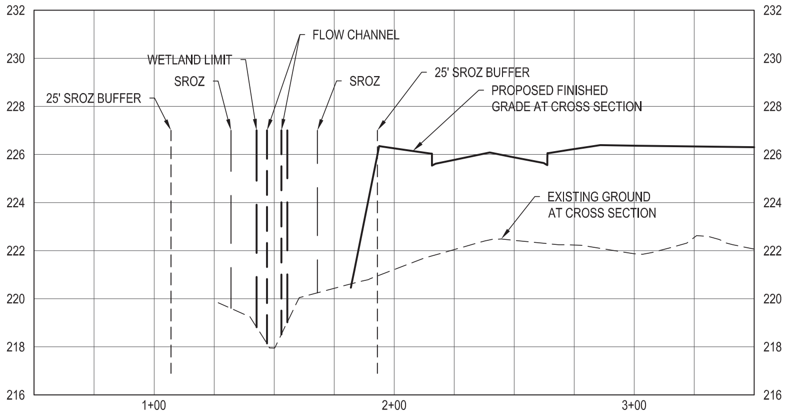
80' 0' 80'



SECTION A - A' SROZ

SCALE H:1"=40'
V:1"=4'

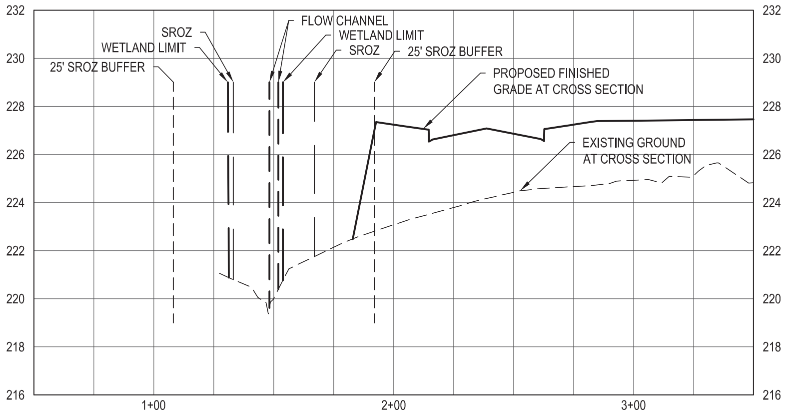
40' 0' 40'



SECTION B - B' SROZ

SCALE H:1"=40'

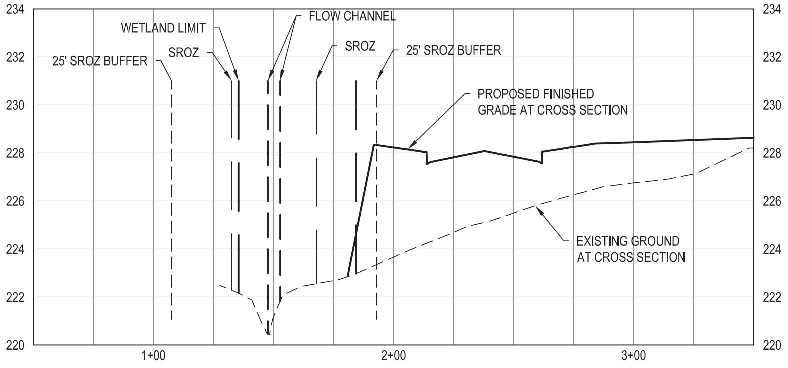
40' 0' 40'



SECTION C - C' SROZ

SCALE H:1"=40'

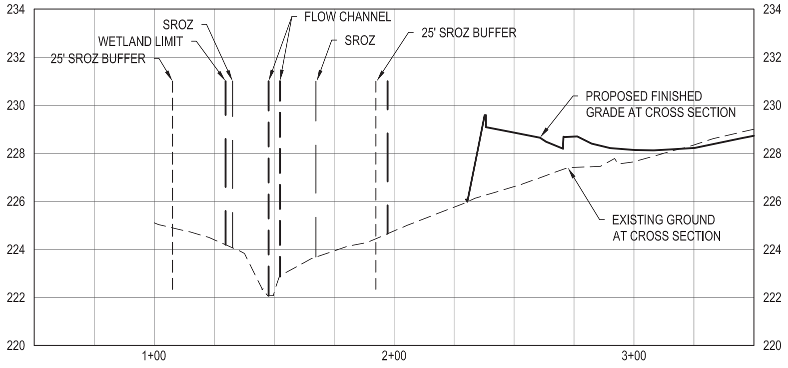
40' 0' 40'



SECTION D - D' SROZ

SCALE H:1"=40'

40' 0' 40'



SECTION E - E' SROZ

SCALE H:1"=40'

40' 0' 40'

Plotted: Oct 10, 2018 - 1:31pm L:\Project\18900\18968\CADD\ACAD\Dwg\Exhibits\Stafford Meadows 2-3_Wetland-SROZ sections.dwg Layout Name: EX 01

Otak, Inc.
808 SW Third Avenue, Ste. 300
Portland, OR 97204
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FROG POND MEADOWS

WILLSONVILLE, OREGON

SROZ PLAND AND PROFILES

TITLE

#	DATE	DESCRIPTION

REVISIONS

OB
DRAWN BY

MRK
CHECKED BY

STATUS

09-28-2018
DATE

18806
PROJECT NUMBER

EX 01

Appendix B

Project Site Photographs

P1: Southeastern portion of tax lot 1800, looking north

P2: Eastern portion of tax lot 1800, looking west

P3: Southern portion of tax lot 1800, looking northwest

P4: Northwestern portion of tax lot 1800 and Wetland B, looking south

Photographs 1 through 4

Overview of Tax Lot 1800 (West Linn/Wilsonville School District Property) and Wetland B

P5: Northwest portion of riparian corridor and Wetland A, looking east

P6: Northwest portion of riparian corridor and Wetland A, looking southeast

P7: Southwest portion of riparian corridor and Wetland A, looking northeast

P8: Forested patch on tax lot 2200, looking south

Photographs 5 through 8

Overview of Tax Lot 2200 (West Linn/Wilsonville School District Property), Wetland A, Riparian Corridor, and Forested Patch

P9: North central portion of tax lot 1800 and Wetland C, looking south

P10: North portion of tax lot 1800 and Wetland F, looking northwest

P11: Southeast portion of tax lot 1800 and Wetland D, looking north

P12: East boundary of tax lot 1800, Wetland D, and roadside ditch, looking north

Filepath: \\pdx1\portland\Projects\West_Hills_Development\01_Active_Projects\Frog_Pond_Meadows\Deliverables\WDR\05_Appendix_C_Site_Photographs\Individuals\Frog_Pond_SRIR_Photo_Appendix_P9-P12.docx

Photographs 9 through 12

Overview of Tax Lot 1800 (West Linn/Wilsonville School District Property), Wetland C, Wetland D, and Wetland F

P13: Central portion of tax lot 1800 and Wetland E, looking south

P14: North boundary of tax lot 1902 and Wetland E, looking west

P15: West portion of tax lot 1903 and Wetland E, looking north

P16: Southwest boundary of tax lot 1902 and Wetland E, looking south toward Community of Hope Church Property

Photographs 13 through 16

Overview of Tax Lots 1902 and 1903 (Eaton Properties), Wetland E, and Tax Lot 2000 (Community of Hope Church Property)

Appendix C

Plant Species Observed on the Frog Pond Meadows Project Site

Table C-1
Plant Species Observed on the Frog Pond Meadows Project Site

Scientific Name	Common Name	Wetland Indicator Status[1]	Native Status[2]	Tax Lot				
				1800	2200	1902	1903	2000
Herbaceous Layer								
Agrostis spp.	Bentgrass species	UPL to FACW	Introduced	X	X	X	X	X
Alopecurus pratensis	Meadow foxtail	FAC	Introduced	X	X	X	X	X
Anthoxanthum odoratum	Sweet vernal grass	FACU	Introduced	X	X	X	X	X
Athyrium filix-femina	Northern lady fern	FAC	Native	X	X			
Carex deweyana	Dewey sedge	FAC	Native		X	X		
Carex obnupta	Slough sedge	OBL	Native	X	X	X		
Centaurium erythraea	European centaury	FAC	Introduced	X				
Cirsium arvense	Canada thistle	FAC	Invasive	X	X	X	X	X
Convolvulus arvensis	Field bindweed	NOL	Invasive	X	X	X		
Daucus carota	Queen Anne's lace	FACU	Invasive	X	X	X	X	X
Epilobium ciliatum	Fringed willowherb	FACW	Native	X	X			
Festuca rubra	Red fescue	FAC	Native	X	X	X	X	X
Geranium dissectum	Cutleaf geranium	NOL	Introduced	X		X	X	
Holcus lanatus	Common velvetgrass	FAC	Introduced	X	X	X	X	X
Hypochaeris radicata	Hairy cat's ear	FACU	Invasive	X	X	X	X	X
Jacobaea vulgaris	Tansy ragwort	FACU	Invasive	X				
Juncus bufonius	Toad rush	FACW	Native	X	X	X	X	
Juncus effusus	Soft rush	FACW	Native	X	X			
Leucanthemum vulgare	Ox-eye daisy	FACU	Introduced	X				
Lupinus spp.	Lupine	FACU to FAC	Native	X		X	X	
Madia glomerata	Mountain tarweed	FACU	Native	X				
Matricaria discoidea	Pineappleweed	FACU	Introduced	X	X	X	X	X

Table C-1
Plant Species Observed on the Frog Pond Meadows Project Site

Scientific Name	Common Name	Wetland Indicator Status[1]	Native Status[2]	Tax Lot				
				1800	2200	1902	1903	2000
Medicago lupulina	Black medick	FACU	Introduced	X	X	X	X	X
Medicago sativa	Alfalfa	UPL	Introduced	X				
Phalaris arundinacea	Reed canarygrass	FACW	Invasive	X	X			
Phleum pratense	Timothy grass	FAC	Introduced	X	X			
Plantago lanceolata	English plantain	FACU	Introduced	X		X	X	X
Plantago major	Common plantain	FAC	Introduced					
Poa spp.	Bluegrass species	FACU to OBL	Native/Introduced	X	X	X	X	X
Polystichum munitum	Western swordfern	FACU	Native		X			
Ranunculus repens	Creeping buttercup	FAC	Introduced	X	X	X	X	
Rumex acetosella	Common sheep's sorrel	FACU	Introduced	X				
Rumex crispus	Curly dock	FAC	Introduced		X	X		
Rumex occidentalis	Western dock	FACW	Native		X			
Schedonorus arundinaceus	Tall fescue	FAC	Introduced	X	X	X	X	X
Scirpus microcarpus	Small-fruited bulrush	OBL	Native		X			
Stachys chamissonis var. *cooleyae*	Coastal hedge-nettle	FACW	Native		X			
Taraxacum officinale	Common dandelion	FACU	Introduced	X	X	X	X	X
Tellima grandiflora	Fringecup	FACU	Native		X			
Trifolium campestre	Field clover	NOL	Introduced	X				
Trifolium pratense	Red clover	FACU	Introduced	X				
Trifolium repens	White clover	FAC	Introduced	X		X	X	
Various genera	Mustard species	--	Introduced	X	X	X	X	X
Vicia americana	American vetch	FAC	Native	X	X	X	X	
Vicia sativa	Common vetch	UPL	Introduced	X				

Table C-1
Plant Species Observed on the Frog Pond Meadows Project Site

Scientific Name	Common Name	Wetland Indicator Status[1]	Native Status[2]	Tax Lot				
				1800	2200	1902	1903	2000
Shrub/Sapling Layer								
Corylus cornuta	Beaked hazelnut	FACU	Native		X	X		
Crataegus monogyna	Common hawthorn	FAC	Invasive	X	X	X	X	
Frangula purshiana	Cascara false buckthorn	FAC	Native		X			
Fraxinus latifolia	Oregon ash	FACW	Native	X	X			
Hedera helix	English ivy	FACU	Introduced		X			
Ilex aquifolium	English holly	FACU	Introduced	X	X			
Malus sp.	Cultivated apple tree	NOL	Introduced	X	X			
Oemleria cerasiformis	Indian plum	FACU	Native		X			
Prunus avens	Bing cherry	NOL	Introduced	X	X			
Prunus emarginatus	Bitter cherry	FACU	Native		X			
Rhododendron macrophyllum	Pacific rhododendron	FACU	Native		X			
Robinia pseudoacacia	Black locust	FACU	Native		X			
Rosa spp.	Wild rose	UPL to FAC	Native and Introduced	X	X	X	X	
Rubus armeniacus	Himalayan blackberry	FAC	Invasive	X	X	X	X	X
Rubus ursinus	Trailing blackberry	FACU	Native		X			
Salix scouleriana	Scouler's willow	FAC	Native		X			
Spiraea douglasii	Douglas' spirea	FACW	Native	X	X			
Symphoricarpos albus	Common snowberry	FACU	Native		X			
Thuja plicata	Western red cedar	FAC	Native	X	X			
Toxicodendron diversilobum	Pacific poison oak	FAC	Native		X			

Table C-1
Plant Species Observed on the Frog Pond Meadows Project Site

Scientific Name	Common Name	Wetland Indicator Status[1]	Native Status[2]	Tax Lot				
				1800	2200	1902	1903	2000
Tree Layer								
Betula papyrifera	Paper birch	FAC	Introduced		X			
Crataegus monogyna	Common hawthorn	FAC	Invasive	X	X	X	X	
Picea abies	Norway spruce	NOL	Introduced		X			
Pinus ponderosa	Ponderosa pine	FACU	Native		X			
Picea pungens	Colorado blue spruce	FAC	Introduced	X				
Pinus resinosa	Red pine	NI	Introduced			X	X	
Pinus sylvestris	Scots pine	NOL	Introduced	X				
Populus balsamifera ssp. *Trichocarpa*	Black cottonwood	FAC	Native				X	X
Populus nigra L.	Lombardy poplar	NOL	Introduced		X			
Pseudotsuga menziesii	Douglas fir	FACU	Native		X			X
Quercus garryana	Oregon white oak	FACU	Native	X				
Robinia pseudoacacia	Black locust	FACU	Native		X			
Salix lasiandra	Pacific willow	FACW	Native		X			
Salix scouleriana	Scouler's willow	FAC	Native		X			
Sequoiadendron giganteum	Giant sequoia	NOL	Introduced		X			
Tilia spp.	Linden tree	--	Introduced	X				

Table C-1
Plant Species Observed on the Frog Pond Meadows Project Site

Notes:
1. Wetland indicator status based on the National Wetland Plant List: 2016 Wetland Ratings (Lichvar et al. 2016).
2. Native/introduced status determined using U.S. Department of Agriculture PLANTS database (USDA 2018); invasive status determined using Clackamas County Weed List from Clackamas Soil and Water Conservation District (Clackamas SWCD 2018)
--: not applicable
FAC: facultative
FACU: facultative upland
FACW: facultative wetland
NI: no indicator status
NOL: not on list (species is not listed on the 2016 National Wetland Plant List)
OBL: obligate
UPL: upland

Appendix D

Additional Wetlands Criteria

Table D-1

Additional Wetlands Criteria

Criterion	Wetland A	Wetland B
A. The wetland is fed by surface flows, sheet flows or precipitation, and has evidence of flooding during the growing season, and has 60 percent or greater vegetated cover, and is over 0.5 acre in size; or the wetland qualifies as having intact water quality function under the 1996 OFWAM.	No – Wetland A is fed by surface flow, sheet flow, and precipitation and has evidence of some limited flooding during the growing season. It does not have over 60% vegetated cover, is not greater than 0.5 acre in size, nor is it likely to qualify as having intact water quality function under OFWAM.	No – Wetland B is fed by surface flow, sheet flow, and precipitation; it does not receive water from overbank flooding. It has over 60% vegetated cover but is not greater than 0.5 acre in size, nor is it likely to qualify as having intact water quality function under OFWAM.
B. The wetland is in the Metro Title 3 Flood Management Area as corrected by the most current FEMA Flood Insurance Rate Maps, and has evidence of flooding during the growing season, and is five acres or more in size, and has a restricted outlet or no outlet; or the wetland qualifies as having intact hydrologic control function under the 1996 OFWAM.	No – Wetland A is not in a Metro Title 3 Flood Management Area. It has evidence of some limited flooding during the growing season but is less than 5 acres in size. It has a restricted outlet at SW Boeckman and is not likely to qualify as having intact hydrologic control function under OFWAM.	No – Wetland B is not in a Metro Title 3 Flood Management Area. It does not have evidence of flooding during the growing season and is less than 5 acres in size. It has a restricted outlet and is not likely to qualify as having intact hydrologic control function under OFWAM.
C. The wetland or a portion of the wetland is within a horizontal distance of less than one - fourth mile from a water body which meets the Department of Environmental Quality definition of water quality limited water body in OAR Chapter 340, Division 41 (1996).	No – Wetland A is greater than 0.25 mile from the Willamette River, the closest water-quality limited water body.	No – Wetland B is greater than 0.25 mile from the Willamette River, the closest water-quality limited water body.
D. Created or restored wetlands that meet the requirements of Section 4.139.10(.02) shall be added to the Significant Resource Overlay Zone. [added by Ord. No. 674 November 16, 2009].	No – Wetland A is not a created or restored wetland.	No – Wetland B is not a created or restored wetland.

Table D-1
Additional Wetlands Criteria

Criterion	Wetland C	Wetland D
A. The wetland is fed by surface flows, sheet flows or precipitation, and has evidence of flooding during the growing season, and has 60 percent or greater vegetated cover, and is over 0.5 acre in size; or the wetland qualifies as having intact water quality function under the 1996 OFWAM.	No – Wetland C is fed by surface flow, sheet flow, and precipitation; it does not receive water from overbank flooding. It has over 60% vegetated cover but is not greater than 0.5 acre in size, nor is it likely to qualify as having intact water quality function under OFWAM.	No – Wetland D is fed by surface flow, sheet flow, and precipitation; it does not receive water from overbank flooding. It has over 60% vegetated cover but is not greater than 0.5 acre in size, nor is it likely to qualify as having intact water quality function under OFWAM.
B. The wetland is in the Metro Title 3 Flood Management Area as corrected by the most current FEMA Flood Insurance Rate Maps, and has evidence of flooding during the growing season, and is five acres or more in size, and has a restricted outlet or no outlet; or the wetland qualifies as having intact hydrologic control function under the 1996 OFWAM.	No – Wetland C is not in a Metro Title 3 Flood Management Area. It does not have evidence of flooding during the growing season and is less than 5 acres in size. It has a restricted outlet and is not likely to qualify as having intact hydrologic control function under OFWAM.	No – Wetland D is not in a Metro Title 3 Flood Management Area. It does not have evidence of flooding during the growing season and is less than 5 acres in size. It has a restricted outlet and is not likely to qualify as having intact hydrologic control function under OFWAM.
C. The wetland or a portion of the wetland is within a horizontal distance of less than one - fourth mile from a water body which meets the Department of Environmental Quality definition of water quality limited water body in OAR Chapter 340, Division 41 (1996).	No – Wetland C is greater than 0.25 mile from the Willamette River, the closest water-quality limited water body.	No – Wetland D is greater than 0.25 mile from the Willamette River, the closest water-quality limited water body.
D. Created or restored wetlands that meet the requirements of Section 4.139.10(.02) shall be added to the Significant Resource Overlay Zone. [added by Ord. No. 674 November 16, 2009].	No – Wetland C is not a created or restored wetland.	No – Wetland D is not a created or restored wetland.

Table D-1
Additional Wetlands Criteria

Criterion	Wetland E	Wetland F
A. The wetland is fed by surface flows, sheet flows or precipitation, and has evidence of flooding during the growing season, and has 60 percent or greater vegetated cover, and is over 0.5 acre in size; or the wetland qualifies as having intact water quality function under the 1996 OFWAM.	No – Wetland E is fed by surface flow, sheet flow, and precipitation; it has over 60% vegetated cover and is greater than 0.5 acre in size, but it does not receive water from overbank flooding and it is not likely to qualify as having intact water quality function under OFWAM.	No – Wetland F is fed by surface flow, sheet flow, and precipitation; it does not receive water from overbank flooding. It has over 60% vegetated cover but is not greater than 0.5 acre in size, nor is it likely to qualify as having intact water quality function under OFWAM.
B. The wetland is in the Metro Title 3 Flood Management Area as corrected by the most current FEMA Flood Insurance Rate Maps, and has evidence of flooding during the growing season, and is five acres or more in size, and has a restricted outlet or no outlet; or the wetland qualifies as having intact hydrologic control function under the 1996 OFWAM.	No – Wetland E is not in a Metro Title 3 Flood Management Area. It does not have evidence of flooding during the growing season and is less than 5 acres in size. It has a restricted outlet and is not likely to qualify as having intact hydrologic control function under OFWAM.	No – Wetland F is not in a Metro Title 3 Flood Management Area. It does not have evidence of flooding during the growing season and is less than 5 acres in size. It has a restricted outlet and is not likely to qualify as having intact hydrologic control function under OFWAM.
C. The wetland or a portion of the wetland is within a horizontal distance of less than one - fourth mile from a water body which meets the Department of Environmental Quality definition of water quality limited water body in OAR Chapter 340, Division 41 (1996).	No – Wetland E is greater than 0.25 mile from the Willamette River, the closest water-quality limited water body.	No – Wetland F is greater than 0.25 mile from the Willamette River, the closest water-quality limited water body.
D. Created or restored wetlands that meet the requirements of Section 4.139.10(.02) shall be added to the Significant Resource Overlay Zone. [added by Ord. No. 674 November 16, 2009].	No – Wetland E is not a created or restored wetland.	No – Wetland F is not a created or restored wetland.

Appendix F

Tree Plan

Tree 56916

I visited tree 56916 (T56916) at Frog Pond Meadows at 12:15 p.m. on January 10, 2019 to perform a basic inspection of the tree and make recommendations for constructing a road east of the tree. The data collected for the tree in the original tree survey was estimated due to an overgrowth of blackberry around the base of the tree. I cut through the blackberries and cleared about three feet around the trunk using a Swedish axe, arborist's handsaw, and hand-snips. I then measured the trunk using a diameter tape and measured the distance from the center of the trunk to the drip-edge.

- I found T56916 to be a 34-inch DBH Oregon white oak *(Quercus garryana).*
- The radius to the drip edge to the east is 22 ft., measured from the center of the trunk.
- There are no indications of root disease, the crown is free of mistletoe, and I found no cavities in the trunk or any of the multiple stems.
- The base of the tree is solid and has strong root flares.

T56916 is an open grown tree and has a well-formed, symmetrical crown. T56916 is in excellent condition and a good candidate for preservation.

My recommendations for the preservation of T56916 are as follows:

- T56916 will be assigned a root protection zone (RPZ) of 22 ft., measured from the center of the trunk.
- Tree protection fence (TPF) will be installed at a 22-foot radius from the center of the trunk before construction begins in this area.
- Work within the RPZ will be supervised by an ISA Certified arborist.
- The RPZ will remain free of personnel, equipment, tools, stockpiled materials, and debris.

It is crucial that the native grade inside the assigned RPZ of T56916 be preserved to avoid injury to the root system and improve survivability during construction. For this reason, I recommend that the blackberry be cut to the ground using hand held tools such as weed trimmers or chainsaws. A hydraulic mowing or brush mulching attachment on a piece of equipment must not be used. This type of equipment will disturb the grade and potentially damage the root system or the trunk of the tree. The blackberry removal can be done pre-construction or post-construction. I also recommend pruning the tree to clean the crown of dead branches and raise the eastern crown to 12 ft. over the future road. Most of the eastern side of the tree is already about 15 ft. high, so only minor pruning will be needed to gain appropriate clearance over the road.

Cutting through the overgrowth of blackberry was necessary to take precise measurements.

The eastern drip-edge of Tree 56916 is 22 feet, measured from the center of the trunk.

The eastern drip-edge is marked with an orange surveyor's vest in this photo.

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1. Client warrants any legal description provided to the Consultant is correct and titles and ownerships to property are good and marketable. Consultant shall not be responsible for incorrect information provided by Client.

2. Consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

3. The Consultant shall not be required to give testimony or attend court or hearings unless subsequent contractual arrangements are made, including additional fees.

4. The report and any values expressed therein represent the opinion of the Consultant, and the Consultant's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.

5. Sketches, drawings and photographs in the report are intended as visual aids and may not be to scale. The reproduction of information generated by others will be for coordination and ease of reference. Inclusion of such information does not warrant the sufficiency or accuracy of the information by the Consultant.

6. Unless expressed otherwise, information in the report covers only items that were examined and reflects the condition at the time of inspection. The inspection is limited to visual examination of accessible items without laboratory analysis, dissection, excavation, probing, or coring, unless otherwise stated.

7. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the plants or property in question may not arise in the future.

8. The report is the completed work product. Any additional work, including production of a site plan, addenda and revisions, construction of tree protection measures, tree work, or inspection of tree protection measures, for example, must be contracted separately.

9. Loss or alteration of any part of the report invalidates the entire report.

Ryan Neumann

ISA Certified Arborist PN-5539A TRAQ Qualified

Tag	Species	DBH	Rating	Cr. D	Remarks	RPZ	Action
1	Douglas fir	18	0	0	dead; added	12	REMOVE
2	grand fir	8	0	0	dead; added	0	REMOVE
3	grand fir	6	0	0	dead; added	0	REMOVE
4	grand fir	13	0	0	dead; added	0	REMOVE
5	grand fir	10	0	0	dead; added	0	REMOVE
6	grand fir	7	0	0	dead; added	0	REMOVE
7	grand fir	6	0	0	dead; added	0	REMOVE
8	grand fir	12	0	0	dead; added	0	REMOVE
9	grand fir	11	0	0	dead; added	0	REMOVE
10	grand fir	11	0	0	dead	0	REMOVE
11	grand fir	21	0	0	dead; added	0	REMOVE
12	Douglas fir	11	2	8	low LCR; windthrow	8	REMOVE
13	grand fir	13	0	0	dead	0	REMOVE
14	grand fir	16	0	0	dead	0	REMOVE
15	Douglas fir	10	0	0	dead; added	0	REMOVE
55334	western white pine	33	2	18	viable; 90% LCR; codominant @ 25'; multiple tops	20	REMOVE
55335	**apple**	15	2	12	orchard pruned	10	PROTECT
55336	**silver maple**	34	1	32	codominant @ 6'; flagging in top	22	PROTECT
55337	English walnut	22	2	18	viable	14	REMOVE
55351	silver maple	52	1	40	root crown damage; 5' grading cut @ 12' from base; co-dominant from base	34	REMOVE
55412	Pacific yew	5	0	0	dead	0	REMOVE
55413	Pacific yew	7	0	0	dead	0	REMOVE
55414	Pacific yew	9	0	0	dead	0	REMOVE

Tag	Species	DBH	Rating	Cr. D	Remarks	RPZ	Action
55415	silver maple	36	1	40	root crown damage; 5' grading cut @ 12' from base	24	REMOVE
55416	gone	0	0	0	stump dug out	0	REMOVE
55417	Scouler willow	6	1	16	trunk decay; dead top	8	REMOVE
55418	Douglas fir	7	1	16	low vigor; hedgerow	8	REMOVE
55419	Douglas fir	14	2	16	viable; hedgerow	10	REMOVE
55420	Douglas fir	10	2	12	viable; hedgerow	10	REMOVE
55421	Douglas fir	9	2	10	viable; hedgerow	10	REMOVE
55422	Douglas fir	12	2	16	viable; hedgerow	10	REMOVE
55423	Douglas fir	19	2	20	viable; hedgerow	10	REMOVE
55843	Ponderosa pine	35	2	36	viable; western gall rust	28	PROTECT OFF SITE
55844	Ponderosa pine	33	2	28	viable	22	PROTECT OFF SITE
55845	0regon white oak	23	2	32	viable	18	PROTECT OFF SITE

Tag	**Species**	**DBH**	**Rating**	**Cr. D**	**Remarks**	**RPZ**	**Action**
55847	Oregon white oak	32	2	36	viable	22	PROTECT OFF SITE
55848	Oregon white oak	27	2	26	viable	18	PROTECT OFF SITE
55852	Oregon white oak	42	3	52	viable	30	PROTECT OFF SITE
55853	Oregon white oak	34	2	40	viable	23	PROTECT OFF SITE
55854	**Oregon white oak**	41	2	38	viable; co-dominant from 8'; inclusion	28	PROTECT
55855	**Oregon white oak**	31	2	36	viable	22	PROTECT
55856	**Oregon white oak**	27	2	38	viable; edge of stand	20	PROTECT
55857	**Oregon white oak**	26	2	38	viable; edge of stand	20	PROTECT
55858	**Oregon white oak**	32	1	40	viable; edge of stand; trunk decay; large cavity; large low limb near ground	30	PROTECT
55859	**Oregon white oak**	19	2	30	viable; edge of stand	18	PROTECT
55860	**Oregon white oak**	16	2	16	viable; small wound on trunk @ 3'	12	PROTECT
55861	**Oregon white oak**	41	2	36	viable; co-dominant from 3'	28	PROTECT
55862	**Oregon white oak**	40	3	42	viable; edge of stand	28	PROTECT

Tag	Species	DBH	Rating	Cr. D	Remarks	RPZ	Action
56644	**Oregon white oak**	18	2	16	viable; pruned for high voltage wires	12	PROTECT
56650	**Oregon white oak**	6	2	10	viable; grows under high voltage wires; size estimated	8	PROTECT
56723	linden	14	2	20	pruned for high voltage	12	REMOVE
56724	linden	10	2	16	blackberry; size estimated	8	REMOVE
56727	English holly	18	2	12	size estimated; invasive species	0	REMOVE
56728	English hawthorn	8	2	14	size estimated; multiple stems; invasive species	0	REMOVE
56818	English hawthorn	21	2	18	invasive species	0	REMOVE
56821	Port-Orford cedar	8	1	8	root disease; blackberry; size estimated	0	REMOVE
56827	apple	12	1	16	blackberry; cavity	0	REMOVE
56828	pine	16	1	20	consumed by blackberry; size estimated	14	REMOVE
56830	blue spruce	12	1	16	consumed by blackberry; size estimated	8	REMOVE
56831	apricot	12	1	16	blackberry; size estimated	0	REMOVE
56961	Oregon white oak	34	3	38	viable; size estimated due to blackberry; nice tree	24	PROTECT
58198	Norway maple	13	2	24	viable; in backyard	12	REMOVE
58308	black cottonwood	13	2	20	viable	12	REMOVE
58309	black cottonwood	8	2	14	viable	8	REMOVE
58310	black cottonwood	15	2	18	lean to south	12	REMOVE
58311	black cottonwood	12	2	24	lean to south	12	REMOVE
58312	black cottonwood	43	2	48	co-dominant at 8'; measured with Biltmore stick	28	REMOVE

Tag	Species	DBH	Rating	Cr. D	Remarks	RPZ	Action
58313	black cottonwood	13	2	20	viable	12	REMOVE
58314	black cottonwood	15	2	24	viable	12	REMOVE
58321	black cottonwood	7	2	12	viable	8	REMOVE
58322	black cottonwood	7	2	8	viable	8	REMOVE
58323	black cottonwood	7	2	12	viable	8	REMOVE
58324	black cottonwood	11	2	14	viable; within 1' of shop	10	REMOVE
58594	**Scots pine**	33	1	30	topped for high voltage wires	20	PROTECT
58595	black cottonwood	21	2	32	viable	16	REMOVE
58596	pine	22	0	0	dead	0	REMOVE
58597	plum	22	1	18	basal decay; stump suckers	0	REMOVE
58598	black hawthorn	9	1	14	terminal decline	0	REMOVE
58599	plum	8	1	10	decline	0	REMOVE
58859	western redcedar	18	1	20	wood borers; decline; offsite	12	REMOVE
58859	western redcedar	29	1	26	dead top; terminal decline; wood borers	20	REMOVE
58863	shore pine	14	2	16	viable; offsite	12	REMOVE
58864	shore pine	14	1	16	chlorotic; offsite	12	REMOVE
58865	Oregon white oak	7	2	10	viable	8	REMOVE
58866	Oregon white oak	9	2	12	viable	10	REMOVE
59166	Norway maple	15	0	0	dead	0	REMOVE
59167	cherry	10	0	0	dead	0	REMOVE
59169	bigleaf maple	12	0	0	dead	8	REMOVE
59170	bigleaf maple	18	1	20	decline	12	REMOVE
59171	bird cherry	16	1	28	terminal decline; dead tops and scaffolds; size estimated	10	REMOVE

Tag	Species	DBH	Rating	Cr. D	Remarks	RPZ	Action
59812	white willow	20	2	30	viable	14	PROTECT
59813	Douglas fir	14	2	16	viable	8	REMOVE
59814	cascara	6	2	12	viable	8	REMOVE
59815	cascara	6	2	12	viable	8	REMOVE
59816	giant sequoia	15	2	16	viable	10	REMOVE
59817	Douglas fir	17	2	22	viable; hedgerow	16	REMOVE
59818	Douglas fir	10	2	20	viable; hedgerow	8	REMOVE
59819	Douglas fir	12	2	20	viable; hedgerow	8	REMOVE
59820	Douglas fir	15	2	18	viable; hedgerow	10	REMOVE
59821	Douglas fir	7	2	8	viable; hedgerow	8	REMOVE
59822	Douglas fir	14	2	20	viable; hedgerow	8	REMOVE
59823	Douglas fir	7	2	14	viable; hedgerow	8	REMOVE
59824	Douglas fir	14	2	18	viable; hedgerow	8	REMOVE
59825	Douglas fir	10	2	16	viable; hedgerow	8	REMOVE
59826	Douglas fir	10	2	16	viable; hedgerow	8	REMOVE
59827	Douglas fir	19	2	28	viable; hedgerow	12	REMOVE
59831	Douglas fir	19	2	24	viable	12	REMOVE
59832	Douglas fir	20	2	24	viable	14	REMOVE

Tag	Species	DBH	Rating	Cr. D	Remarks	RPZ	Action
59836	Douglas fir	10	2	10	low LCR; windthrow; poison oak	8	REMOVE
59837	Douglas fir	6	0	0	dead	0	REMOVE
59838	Douglas fir	13	2	18	low LCR; windthrow; poison oak	8	REMOVE
59838	Douglas fir	10	2	10	low LCR; windthrow; poison oak	8	REMOVE
59839	Sitka spruce	10	2	16	viable	8	REMOVE
59840	black hawthorn	6	2	8	viable	8	REMOVE
59841	Ponderosa pine	20	2	30	viable	14	REMOVE
59842	Douglas fir	14	2	22	low LCR; windthrow; poison oak	8	REMOVE
59843	Douglas fir	14	1	24	crook in stem; poison oak	8	REMOVE
59844	Douglas fir	16	1	18	viable; trunk swoop; mechanical damage to base	10	REMOVE
59845	Douglas fir	12	1	8	low LCR; windthrow; poison oak	8	REMOVE
59846	Douglas fir	14	2	14	low LCR; windthrow; poison oak	8	REMOVE
59847	Douglas fir	8	1	6	low LCR; windthrow; poison oak	8	REMOVE
59848	Douglas fir	13	1	8	low LCR; windthrow; poison oak	8	REMOVE
59849	Douglas fir	16	2	18	viable	10	REMOVE
59850	Douglas fir	14	2	10	low LCR; windthrow; poison oak	8	REMOVE
59851	Douglas fir	13	2	10	low LCR; windthrow; poison oak	8	REMOVE
59852	Douglas fir	16	2	10	viable; poison oak	10	REMOVE
59853	Douglas fir	20	2	22	viable; poison oak	14	REMOVE
59854	Douglas fir	14	2	20	viable; poison oak	8	REMOVE
59855	Douglas fir	23	2	24	viable; poison oak	16	REMOVE
59856	Douglas fir	7	1	8	low LCR; windthrow; poison oak	8	REMOVE
59857	Douglas fir	10	2	8	low LCR; windthrow; poison oak	8	REMOVE

Tag	Species	DBH	Rating	Cr. D	Remarks	RPZ	Action
59858	Douglas fir	14	2	8	low LCR; windthrow; poison oak	8	REMOVE
59859	Douglas fir	12	1	8	low LCR; windthrow; poison oak	8	REMOVE
59860	Douglas fir	12	1	10	low LCR; windthrow; poison oak	8	REMOVE
59861	Douglas fir	8	1	6	low LCR; windthrow; poison oak	8	REMOVE
59862	Douglas fir	8	1	8	low LCR; windthrow; poison oak	8	REMOVE
59863	Douglas fir	8	1	8	low LCR; windthrow; poison oak	8	REMOVE
59864	Douglas fir	12	1	6	low LCR; windthrow; poison oak	8	REMOVE
59865	Douglas fir	12	2	12	low LCR; windthrow; poison oak	8	REMOVE
59866	Douglas fir	12	2	10	low LCR; windthrow; poison oak	8	REMOVE
59867	Douglas fir	10	2	12	low LCR; windthrow; poison oak	8	REMOVE
59868	Douglas fir	24	2	26	viable	16	REMOVE
59869	bird cherry	7	2	16	invasive species	8	REMOVE
59870	Douglas fir	16	2	14	viable	10	REMOVE
59871	Douglas fir	10	1	6	low LCR; windthrow; poison oak	8	REMOVE
59872	Douglas fir	8	1	6	low LCR; windthrow; poison oak	8	REMOVE
59873	Douglas fir	6	1	6	low LCR; windthrow; poison oak	8	REMOVE
59874	Douglas fir	14	2	10	low LCR; windthrow; poison oak	8	REMOVE
59875	Douglas fir	10	2	10	low LCR; windthrow; poison oak	8	REMOVE
59876	Douglas fir	8	1	6	low LCR; windthrow; poison oak	8	REMOVE
59877	Douglas fir	14	2	16	viable; poison oak	8	REMOVE
59878	Ponderosa pine	10	2	14	viable	8	REMOVE
59879	grand fir	19	0	0	dead	0	REMOVE
59880	grand fir	14	0	0	dead	0	REMOVE

Tag	Species	DBH	Rating	Cr. D	Remarks	RPZ	Action
59881	Douglas fir	13	2	10	low LCR; windthrow; poison oak	8	REMOVE
59882	Douglas fir	18	2	14	viable	12	REMOVE
59883	Douglas fir	11	2	8	low LCR; windthrow; poison oak	8	REMOVE
59884	Douglas fir	10	2	8	low LCR; windthrow; poison oak	8	REMOVE
59885	Douglas fir	13	2	10	low LCR; windthrow; poison oak	8	REMOVE
59886	Douglas fir	21	2	68	co-dominant stems from 3'	14	REMOVE
59887	Douglas fir	17	2	16	low LCR windthrow; poison oak	12	REMOVE
59888	Douglas fir	12	2	8	low LCR windthrow; poison oak	8	REMOVE
59889	Douglas fir	6	1	6	low LCR windthrow; poison oak	8	REMOVE
59889	Douglas fir	7	1	6	low LCR windthrow; poison oak	8	REMOVE
59890	Douglas fir	8	2	6	low LCR windthrow; poison oak	8	REMOVE
59890	Douglas fir	11	1	8	low LCR windthrow; poison oak	8	REMOVE
59891	Douglas fir	8	2	8	low LCR windthrow; poison oak	8	REMOVE
59891	Douglas fir	9	1	8	low LCR windthrow; poison oak	8	REMOVE
59892	Douglas fir	18	2	22	viable; poison oak	12	REMOVE
59893	Douglas fir	14	2	10	low LCR; windthrow; poison oak	10	REMOVE
59894	Douglas fir	10	2	8	low LCR; windthrow; poison oak	8	REMOVE
59895	Douglas fir	10	2	18	viable; poison oak	8	REMOVE
59896	Douglas fir	19	2	8	low LCR windthrow; poison oak	12	REMOVE
59897	Douglas fir	18	2	18	viable; poison oak	12	REMOVE
59898	Douglas fir	8	2	8	low LCR; windthrow; poison oak	8	REMOVE
59899	Douglas fir	10	2	8	low LCR; windthrow; poison oak	8	REMOVE
59900	Douglas fir	15	2	18	viable; poison oak	10	REMOVE

Tag	Species	DBH	Rating	Cr. D	Remarks	RPZ	Action
59901	Douglas fir	12	2	8	low LCR; windthrow; poison oak	8	REMOVE
59902	Douglas fir	10	2	8	low LCR; windthrow; poison oak	8	REMOVE
59903	Douglas fir	12	2	14	low LCR; poison oak	8	REMOVE
59904	Douglas fir	13	2	14	low LCR; poison oak	10	REMOVE
59905	Douglas fir	18	2	22	viable; poison oak	8	REMOVE
59906	Douglas fir	14	2	14	low LCR; poison oak	12	REMOVE
59907	Douglas fir	13	2	14	low LCR; windthrow; poison oak	10	REMOVE
59908	Douglas fir	11	2	12	low LCR; windthrow; poison oak	10	REMOVE
59909	Douglas fir	10	2	8	low LCR; windthrow; poison oak	8	REMOVE
59910	Douglas fir	10	2	8	low LCR; windthrow; poison oak	8	REMOVE
59911	Douglas fir	16	2	14	low LCR; windthrow; poison oak	10	REMOVE
59912	Douglas fir	23	2	26	viable; co-dominant; poison oak	16	REMOVE
59913	Douglas fir	19	2	26	viable; co-dominant; poison oak	12	REMOVE
59914	Douglas fir	14	2	18	viable; poison oak	10	REMOVE
59915	Douglas fir	14	2	12	low LCR; windthrow; poison oak	10	REMOVE
59916	Douglas fir	16	2	22	viable; poison oak	10	REMOVE
59917	Douglas fir	16	2	22	viable; poison oak	10	REMOVE
59918	Douglas fir	15	2	16	low LCR; windthrow	10	REMOVE
59919	Douglas fir	23	2	26	viable; poison oak	16	REMOVE
59921	Douglas fir	28	2	34	viable; co-dominant from 3'	18	REMOVE
59922	bird cherry	10	2	18	invasive species	8	REMOVE
59923	**Oregon white oak**	11	2	20	viable	8	PROTECT
59924	cascara	5	2	10	undersize	0	REMOVE

Fieldwork on 9/20/2018 and 9/25/2018

0/dead or hazard 1/decline 2/average 3/excellent

Tag	**Species**	**DBH**	**Rating**	**Cr. D**	**Remarks**	**RPZ**	**Action**
59925	bird cherry	10	2	22	invasive species; multiple stems	0	REMOVE
59926	Douglas fir	22	2	36	viable	14	REMOVE
59927	Ponderosa pine	25	2	36	viable	16	REMOVE
59928	bird cherry	9	1	16	invasive species; broken top	0	REMOVE
59929	Douglas fir	18	2	18	low LCR; windthrow	12	REMOVE
59970	**Scouler willow**	18	1	32	trunk and stem decay; 5 stems from base between 14" and 18" diameter	12	PROTECT
59971	English hawthorn	6	2	12	invasive species	0	REMOVE
59972	black hawthorn	6	2	14	leans to south	8	REMOVE
59973	black locust	14	2	28	invasive species	10	REMOVE
59974	**Douglas fir**	8	2	8	viable	8	PROTECT
59975	**Douglas fir**	7	2	10	trunk swoop @ base	8	PROTECT
59976	black locust	9	2	18	invasive species	8	REMOVE
59977	black locust	6	2	10	invasive species	8	REMOVE
59978	Douglas fir	14	2	24	viable	10	REMOVE
59979	cascara	5	1	12	undersize	0	REMOVE
59980	grand fir	15	0	0	dead	0	REMOVE
59981	Douglas fir	13	2	16	viable; minor mechanical damage to truck	8	REMOVE
59982	grand fir	13	0	0	dead	0	REMOVE
59983	Douglas fir	6	2	8	suppressed	8	REMOVE
59984	Douglas fir	21	2	22	viable; poison oak	14	REMOVE
59985	Douglas fir	17	2	28	viable; poison oak	12	REMOVE
59986	Douglas fir	15	2	20	low LCR; windthrow; poison oak	10	REMOVE
59987	Douglas fir	24	2	26	viable; grading in root zone	16	REMOVE

Tag	Species	DBH	Rating	Cr. D	Remarks	RPZ	Action
59988	Douglas fir	12	2	14	low LCR; windthrow	8	REMOVE
59989	Douglas fir	19	2	22	viable; poison oak	12	REMOVE
59990	Douglas fir	21	2	24	invasive species	14	REMOVE
59991	Douglas fir	6	2	6	low LCR; windthrow	9	REMOVE
59992	bird cherry	10	2	18	invasive species	10	REMOVE
59993	Ponderosa pine	23	2	26	viable	16	REMOVE
59994	Douglas fir	6	2	8	viable	8	REMOVE
59995	Douglas fir	13	1	14	listed; mechanical damage to buttress roots	8	REMOVE
59996	Douglas fir	18	2	22	viable	12	REMOVE
59997	Douglas fir	12	2	12	viable; poison oak	8	REMOVE
59998	Douglas fir	16	2	6	viable; poison oak; windthrow	10	REMOVE
59999	Douglas fir	16	2	18	viable; poison oak	10	REMOVE
60000	Douglas fir	6	2	6	viable; poison oak; windthrow	8	REMOVE
60001	Douglas fir	14	2	12	viable; poison oak; windthrow	10	REMOVE
60002	Douglas fir	25	2	26	viable	16	REMOVE
60003	bird cherry	5	2	8	invasive species	0	REMOVE
60004	western hemlock	6	2	14	viable	8	REMOVE
60005	Douglas fir	18	2	18	viable	12	REMOVE
60006	Douglas fir	12	2	12	low LCR; windthrow	8	REMOVE
60007	Douglas fir	13	2	12	low LCR; windthrow	8	REMOVE
60008	Douglas fir	14	2	8	low LCR; windthrow	8	REMOVE
60009	Douglas fir	12	2	8	low LCR; windthrow	8	REMOVE
60010	Douglas fir	9	2	8	low LCR; windthrow	8	REMOVE

Tag	Species	DBH	Rating	Cr. D	Remarks	RPZ	Action
60011	Douglas fir	10	2	8	low LCR; windthrow	8	REMOVE
60012	Douglas fir	16	2	18	viable	10	REMOVE
60013	Douglas fir	13	2	12	low LCR; windthrow	8	REMOVE
60014	Douglas fir	14	2	12	low LCR; windthrow	10	REMOVE
60015	Douglas fir	15	2	14	viable	10	REMOVE
60016	Douglas fir	13	2	14	viable	8	REMOVE
60017	Douglas fir	18	2	24	viable; grading in root zone	12	REMOVE
60018	Douglas fir	18	2	20	viable	12	REMOVE
60019	Douglas fir	13	2	16	viable	8	REMOVE
60020	Douglas fir	16	2	18	viable	10	REMOVE
60021	Douglas fir	10	2	10	low LCR; windthrow	8	REMOVE
60022	Ponderosa pine	17	2	13	viable; dead branches	12	REMOVE
60023	Douglas fir	8	2	8	windthrow	8	REMOVE
60024	Douglas fir	10	2	8	low LCR; windthrow	8	REMOVE
60025	Douglas fir	11	2	8	windthrow	8	REMOVE
60026	Douglas fir	6	2	12	suppressed	8	REMOVE
60027	Douglas fir	12	2	13	low LCR; windthrow	8	REMOVE
60028	Douglas fir	8	2	13	low LCR; windthrow	8	REMOVE
60029	Douglas fir	11	2	8	low LCR; windthrow	8	REMOVE
60030	Douglas fir	18	2	24	viable	12	REMOVE
60031	Douglas fir	15	2	18	viable	10	REMOVE
60032	Douglas fir	13	2	14	viable	8	REMOVE
60033	Douglas fir	15	2	20	viable	10	REMOVE

Tag	Species	DBH	Rating	Cr. D	Remarks	RPZ	Action
60034	Douglas fir	14	2	16	viable	10	REMOVE
60035	Ponderosa pine	23	2	22	viable; hanger	16	REMOVE
60036	Ponderosa pine	23	2	24	viable	16	REMOVE
60037	bird cherry	8	2	18	viable; invasive species	8	REMOVE
60038	**Norway spruce**	11	2	16	viable; broken low branches	8	PROTECT
60039	Ponderosa pine	14	2	18	viable	10	REMOVE
60040	Douglas fir	6	2	10	viable	8	REMOVE
60041	grand fir	13	0	0	dead	0	REMOVE
60042	Douglas fir	13	2	16	viable	8	REMOVE
60043	Douglas fir	18	2	22	viable	12	REMOVE
60044	Douglas fir	22	2	24	viable	14	REMOVE
60045	cascara	7	2	10	viable; dead branches	8	REMOVE
60047	Douglas fir	21	2	20	grading 4' from base; some root damage	14	REMOVE
60048	Douglas fir	19	2	22	viable	12	REMOVE
60049	Douglas fir	11	2	16	viable	8	REMOVE
60050	Douglas fir	11	2	16	viable	8	REMOVE
60051	Douglas fir	21	2	24	viable	14	REMOVE
60053	Douglas fir	8	2	10	viable; hedgerow	8	REMOVE
60054	Douglas fir	7	2	8	viable; hedgerow	8	REMOVE
60055	Douglas fir	6	2	8	viable; hedgerow	8	REMOVE
60056	**Douglas fir**	8	2	8	viable; hedgerow	8	PROTECT
60057	**Scots pine**	11	2	16	viable; hedgerow	8	PROTECT

Tag	Species	DBH	Rating	Cr. D	Remarks	RPZ	Action
60058	**river birch**	8	2	22	viable	8	PROTECT
60064	Douglas fir	24	2	26	grading 4' from base; some root damge	16	REMOVE

RPZ means Root Protection Zone, a circle radius measured in feet

DBH means Diameter at Breast Height for all trees.

A brush grinding piece of equipment (i.e. brush hog or flail) has been used to mow the overgrowth in the southwest portion of the site. Some trees have had their low branches damaged during mowing. These branches should be pruned off if the trees are to be preserved. The damaged branches are mainly on trees 60180 through 60257. This is a hedgerow of western redcedars.

Trees numbered in the 1s and 10s were added to the survey. Locations are estimated on the field map.

Trees with poison oak or blackberry vines were measured with a Biltmore stick.

Species

0regon white oak- Quercus garryana
apple- Malus sp.
apricot- Prunus sp.
bigleaf maple- Acer macrophyllum
bird cherry- Prunus avium
black cottonwood- Populus trichocarpa
black hawthorn- Crataegus douglasii
black locust- Robinia pseudoacacia
blue spruce- Picea pungens
Scots Pine- Pinus sylvestris
Scouler willow- Salix scouleriana
Shore pine- Pinus contorta
Silver maple- Acer sacharinum
linden- Tilia cordata
Norway maple- Acer platanoides
Norway spruce- Picea abies
pear- Pyrus sp.
pine- Pinus sp.
plum- Prunus sp.
Ponderosa pine- Pinus ponderosa
Port-Orford cedar- Chamaecyparis lawsoniana
river birch- Betula nigra
Sitka spruce- Picea sitchensis
Western hemlock- Tsuga heterphylla
Western Redcedar- Thuja plicata
White Willow- Salix alba
cascara- Rhamnus purshiana
cherry- Prunus sp.
crab apple- Prunus sp.
Douglas fir- Peudotsuga menziesii
English holly- Ilex aquifolium
English walnut- Juglans regia
giant sequoia- Sequioadendron giganteum
grand fir- Abies grandis

Frog Pond Meadows Tree Plan

This Tree Plan is required by Section 4.610.40. Type C Permit as part of the site development application for the Frog Pond Meadows subdivision in Wilsonville, Oregon. Trees were measured and inventoried by an ISA Certified Arborist. The attached Tree Table includes all trees that are 6 inches in diameter and larger. There are 286 trees and the Tree Table delineates those to be protected and those to be removed. Root protection zones (RPZs) for protected trees will be the dripline of the tree (crown diameter) plus a minimum of 5 ft. All protected trees have been tagged with metal tags that must remain in place throughout the development. Tag numbers are keyed to the tree survey map and the attached Tree Table.

The twenty-two trees being preserved during development will be cordoned off with fencing built at the edge of root protection zones before construction activity begins. Seven off-site trees will also be protected in this manner. Fencing will consist of 6-foot high metal chain link secured with 8-foot metal posts. Without authorization, none of the following is allowed within a root protection zone:

1. New buildings;
2. Grade change or cut and fill, during or after construction;
3. New impervious surfaces;
4. Utility or drainage field placement;
5. Staging or storage of materials and equipment during construction;
6. Vehicle maneuvering during construction.

Section 4.620.00. requires that each removed tree be replaced with a 2-inch caliper tree within one year of removal. Replacement trees shall be chosen for the site from an approved tree species list supplied by the City, and shall be state Department of Agriculture Nursery Grade No. 1 or better. The trees must be staked, fertilized and mulched, and shall be guaranteed by the permit grantee for two years after the planting date. The species and locations will be determined by the landscape designer. There is insufficient space at the site to plant all 264 required trees. The owner is invoking Section 4.629.00.(06.) and will pay into the City Tree Fund the value of the replacement trees that cannot be planted at the site.

The goal of this Tree Plan is to meet the requirements of the tree preservation code and to observe all laws, rules, and regulations. All trees to be removed should be verified and marked and all tree protection measures should be inspected and approved before any clearing or grading work begins. It is the owner's responsibility to implement this tree plan and to monitor the construction process to its conclusion. Deviations can result in tree damage, liability, and violations of the City Code.

Portland Tree Consulting PO Box 19042 Portland, OR 97280
503.421.3883 info@pdxtreeconsulting.com CCB 154349

1. Client warrants any legal description provided to the Consultant is correct and titles and ownerships to property are good and marketable. Consultant shall not be responsible for incorrect information provided by Client.

2. Consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

3. The Consultant shall not be required to give testimony or attend court or hearings unless subsequent contractual arrangements are made, including additional fees.

4. The report and any values expressed therein represent the opinion of the Consultant, and the Consultant's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported.

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6. Unless expressed otherwise, information in the report covers only items that were examined and reflects the condition at the time of inspection. The inspection is limited to visual examination of accessible items without laboratory analysis, dissection, excavation, probing, or coring, unless otherwise stated.

7. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the plants or property in question may not arise in the future.

8. The report is the completed work product. Any additional work, including production of a site plan, addenda and revisions, construction of tree protection measures, tree work, or inspection of tree protection measures, for example, must be contracted separately.

9. Loss or alteration of any part of the report invalidates the entire report.

Ryan Neumann

ISA Certified Arborist PN-5539A TRAQ Qualified

Appendix G

Geotechnical Reports

Otak

HGSI HARDMAN GEOTECHNICAL SERVICES INC.
Practical, Cost-Effective Geotechnical Solutions

July 31, 2018
HGSI Project No. 18-2349

Dan Grimberg / Kristi Hosea
West Hills Land Development
3330 NW Yeon Avenue, Suite 200
Portland, Oregon 97210

Via e-mail (pdf format); hard copies can be mailed on request

Subject: **GEOTECHNICAL ENGINEERING REPORT**
COMMUNITY OF HOPE PROPERTY SECTION
27817 SW STAFFORD ROAD - PARTIAL
WILSONVILLE, CLACKAMAS COUNTY, OREGON

This report presents the results of a geotechnical engineering study conducted by Hardman Geotechnical Services Inc. (HGSI) for a portion of the Community of Hope Property that is involved in a potential property exchange (Figure 1). The address of the overall site is 27817 SW Stafford Road; the study area is in the northwest corner of the overall church property (Figure 2). The purpose of this study was to evaluate subsurface conditions at the site and to provide geotechnical recommendations for site development.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The site comprises a 0.7 acre portion in the northwest corner of the overall church property, at 27817 SW Stafford Road property in Wilsonville, Clackamas County, Oregon. The study area or “site” contains two storage barns and a large water tank, wellhouse and drainfield system. These existing facilities will be removed as part of site development. The site is mostly a circular driveway, with a few trees and some lawn. Site slopes are gentle, generally down toward the east.

A grading plan has not been finalized and should be reviewed by HGSI when completed. Underground utilities and onsite stormwater systems are also planned. HGSI should review the grading plan when available to verify consistency with the geotechnical recommendations, and to provide any supplemental or revised input to the design needed based on geotechnical considerations.

REGIONAL GEOLOGY AND SEISMIC SETTING

The subject site lies within the Portland Basin, a broad structural depression situated between the Coast Range on the west and the Cascade Range on the east. The Portland Basin is a northwest-southwest trending structural basin produced by broad regional downwarping of the area. The Portland Basin is approximately 20 miles wide and 45 miles long and is filled with consolidated and unconsolidated sedimentary rocks of late Miocene, Pliocene and Pleistocene age.

The subject site is underlain by Quaternary age (last 1.6 million years) loess, a windblown silt deposit that mantles older deposits and basalt bedrock in the Portland Hills (Madin, 1990). The loess generally consists of massive silt deposited following repeated catastrophic flooding events in the Willamette Valley, the last of which occurred about 10,000 years ago. In localized areas, the loess includes buried paleosols that developed between depositional events. Regionally, the total thickness of loess ranges from 5 feet to greater than 100 feet.

The loess is underlain by residual soil formed by in place weathering of the underlying Columbia River Basalt Formation (Madin, 1990). The Miocene aged (about 14.5 to 16.5 million years ago) Columbia River Basalts are a thick sequence of lava flows which form the crystalline basement of the Tualatin Valley. The basalts are composed of dense, finely crystalline rock that is commonly fractured along blocky and columnar vertical joints. Individual basalt flow units typically range from 25 to 125 feet thick and interflow zones are typically vesicular, scoriaceous, brecciated, and sometimes include sedimentary rocks.

At least three major fault zones capable of generating damaging earthquakes are known to exist in the region. These include the Portland Hills Fault Zone, Gales Creek-Newberg-Mt. Angel Structural Zone, and the Cascadia Subduction Zone. These potential earthquake source zones are included in the determination of seismic design values for structures, as presented in the *Seismic Design* section. None of the known faults extend beneath the site.

FIELD EXPLORATION – HAND AUGER BORINGS

The site-specific exploration for this study was conducted on July 25, 2018 and consisted of three hand auger borings (designated HA-1 through HA-3) excavated to maximum depths of approximately 6 feet below ground surface (bgs) at the approximate locations shown on Figure 2. It should be noted that exploration locations were determined in the field by pacing or taping distances from apparent property corners and other site features shown on the plans provided. As such, the locations of the explorations should be considered approximate.

Explorations were conducted under the full-time observation of HGSI personnel. Soil samples obtained from the borings were classified in the field and representative portions were placed in relatively air-tight plastic bags. These soil samples were then returned to the laboratory for further examination. Pertinent information including soil sample depths, stratigraphy, soil engineering characteristics, and groundwater occurrence was recorded. Soils were classified in general accordance with the Unified Soil Classification System.

Summary exploration logs are attached to this report. The stratigraphic contacts shown on the individual borehole logs represent the approximate boundaries between soil types. The actual transitions may be more gradual. The soil and groundwater conditions depicted are only for the specific dates and locations reported, and therefore, are not necessarily representative of other locations and times.

SUBSURFACE CONDITIONS

The following discussion is a summary of subsurface conditions encountered in our explorations. For more detailed information regarding subsurface conditions at specific exploration locations, refer to the attached hand auger logs. Also, please note that subsurface conditions can vary between exploration locations, as discussed in the *Uncertainty and Limitations* section below.

Soil

On-site soils are anticipated to consist of topsoil, clayey silt, and clay, as described below. HA-1 encountered these soils, while HA-2 and HA-3 reached refusal near the surface in a layer of crushed rock under the grass.

> ***Topsoil –*** From the ground surface, all explorations encountered 0.5 to 1 foot of topsoil, comprised of moist silt. Soils here were dry, with roots and organics.

> ***Desiccated Silt –*** Beneath the topsoil in the hand augers, we encountered stiff, desiccated, light brown silt, to a depth of about 2.5 to 3 feet bgs.
>
> ***Clayey Silt*** – Beneath the desiccated silt layer was a stiff to very stiff, slightly moist, brown clayey silt with orange and grey mottling, to a maximum explored depth of 6 feet.

Groundwater

During the field exploration, no static groundwater table or seepage was encountered to the maximum depth of exploration at 6 feet bgs. However, please note that this study was performed during the dry summer months. Perched groundwater conditions often occur over fine-grained native deposits such as those beneath the site, particularly during the wet season. It is anticipated that groundwater conditions will vary depending on the season, local subsurface conditions, changes in site utilization, and other factors. The groundwater conditions reported above are for the specific date and locations indicated, and therefore may not necessarily be indicative of other times and/or locations.

CONCLUSIONS AND RECOMMENDATIONS

Results of this study indicate that the proposed development is geotechnically feasible, provided that the recommendations of this report are incorporated into the design and construction phases of the project. Recommendations are presented below regarding site preparation and undocumented fill removal, engineered fill, wet weather earthwork, spread footing foundations, below grade structural retaining walls, concrete slabs-on-grade, perimeter footing drains, seismic design, excavating conditions and utility trench backfill, and erosion control considerations.

Site Preparation and Undocumented Fill Removal

The areas of the site to be graded should first be cleared of vegetation, undocumented fill, and any loose debris; and debris from clearing should be removed from the site. Organic-rich topsoil should then be removed to competent native soils. We anticipate that the average depth of topsoil stripping will be about 12 inches over most of the site, however deeper stripping may be needed in localized areas. The final depth of stripping removal may vary depending on local subsurface conditions and the contractor’s methods, and should be determined on the basis of site observations after the initial stripping has been performed. Stripped organic soil should be stockpiled only in designated areas or removed from the site and stripping operations should be observed and documented by HGSI. Existing subsurface structures (tile drains, old utility lines, septic leach fields, etc.) beneath areas of proposed structures and pavement should be removed and the excavations backfilled with engineered fill.

There is potential for old fills to be present on site in areas beyond our explorations. Although not encountered in the hand auger borings, undocumented fill may occur beneath the site and should be anticipated in the area of the septic drain field, which we believe is a raised sand bed type system. Where encountered beneath proposed structures, pavements, or other settlement-sensitive improvements, undocumented fill should be removed down to firm inorganic native soils and the removal area backfilled with engineered fill (see below). HGSI should observe removal excavations (if any) prior to fill placement to verify that overexcavations are adequate and an appropriate bearing stratum is exposed.

In construction areas, once stripping has been verified, the area should be ripped or tilled to a depth of 12 inches, moisture conditioned, and compacted in-place prior to the placement of engineered fill. Exposed subgrade soils should be evaluated by HGSI. For large areas, this evaluation is normally performed by proof-rolling the exposed subgrade with a fully loaded scraper or dump truck. For smaller areas where access is restricted, the subgrade should be evaluated by probing the soil with a steel probe. Soft/loose soils identified during subgrade preparation should be compacted to a firm and unyielding condition or over-excavated and replaced with engineered fill, as described below. The depth of overexcavation, if required, should be evaluated by HGSI at the time of construction.

Engineered Fill

In general, we anticipate that on-site soils will be suitable for use as engineered fill in dry weather conditions, provided they are relatively free of organics and are properly moisture conditioned for compaction. Imported fill material must be approved by the geotechnical engineer prior to being imported to the site. Oversize material greater than 6 inches in size should not be used within 3 feet of foundation footings, and material greater than 12 inches in diameter should not be used in engineered fill.

Engineered fill should be compacted in horizontal lifts not exceeding 8 inches using standard compaction equipment. We recommend that engineered fill be compacted to at least 90 percent of the maximum dry density determined by ASTM D1557 (Modified Proctor) or equivalent. On-site soils may be wet or dry of optimum; therefore, we anticipate that moisture conditioning of native soil will be necessary for compaction operations.

Proper test frequency and earthwork documentation usually requires daily observation and testing during stripping, rough grading, and placement of engineered fill. Field density testing should conform to ASTM D2922 and D3017, or D1556. Engineered fill should be periodically observed and tested by the project geotechnical engineer or his representative. Typically, one density test is performed for at least every 2 vertical feet of fill placed or every 500 yd^3, whichever requires more testing.

Wet Weather Earthwork

The on-site soils are moisture sensitive and may be difficult to handle or traverse with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. Earthwork performed during the wet-weather season will probably require expensive measures such as cement treatment or imported granular material to compact fill to the recommended engineering specifications. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions when soil moisture content is difficult to control, the following recommendations should be incorporated into the contract specifications.

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soils should be followed promptly by the placement and compaction of clean engineered fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance. Under some circumstances, it may be necessary to excavate soils with a backhoe to minimize subgrade disturbance caused by equipment traffic;
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;
- Material used as engineered fill should consist of clean, granular soil containing less than about 7 percent fines. The fines should be non-plastic. Alternatively, cement treatment of on-site soils may be performed to facilitate wet weather placement;
- The ground surface within the construction area should be sealed by a smooth drum vibratory roller, or equivalent, and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials;
- Excavation and placement of fill should be observed by the geotechnical engineer to verify that all unsuitable materials are removed and suitable compaction and site drainage is achieved; and
- Bales of straw and/or geotextile silt fences should be strategically located to control erosion.

If cement or lime treatment is used to facilitate wet weather construction, HGSI should be contacted to provide additional recommendations and field monitoring.

Spread Footing Foundations

Shallow, conventional isolated or continuous spread footings may be used to support the proposed structures, provided they are founded on competent native soils, or compacted engineered fill placed directly upon the competent native soils. We recommend a maximum allowable bearing pressure of 2,000 pounds per square foot (psf) for designing spread footings bearing on undisturbed native soils or engineered fill. The recommended maximum allowable bearing pressure may be increased by a factor of 1.33 for short term transient conditions such as wind and seismic loading. Exterior footings should be founded at least 18 inches below the lowest adjacent finished grade. Minimum footing widths should be determined by the project engineer/architect in accordance with applicable design codes.

Assuming construction is accomplished as recommended herein, and for the foundation loads anticipated, we estimate total settlement of spread foundations of less than about 1 inch and differential settlement between two adjacent load-bearing components supported on competent soil of less than about ½ inch. We anticipate that the majority of the estimated settlement will occur during construction, as loads are applied.

Wind, earthquakes, and unbalanced earth loads will subject the proposed structure to lateral forces. Lateral forces on a structure will be resisted by a combination of sliding resistance of its base or footing on the underlying soil and passive earth pressure against the buried portions of the structure. For use in design, a coefficient of friction of 0.5 may be assumed along the interface between the base of the footing and subgrade soils. Passive earth pressure for buried portions of structures may be calculated using an equivalent fluid weight of 390 pounds per cubic foot (pcf), assuming footings are cast against dense, natural soils or engineered fill. The recommended coefficient of friction and passive earth pressure values do not include a safety factor. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

Footing excavations should be trimmed neat and the bottom of the excavation should be carefully prepared. Loose, wet or otherwise softened soil should be removed from the footing excavation prior to placing reinforcing steel bars. HGSI should observe foundation excavations prior to placing crushed rock, to verify that adequate bearing soils have been reached. Due to the high moisture sensitivity of on-site soils, construction during wet weather may require overexcavation of footings and backfill with compacted, crushed aggregate.

Below-Grade Structural Retaining Walls

Lateral earth pressures against below-grade retaining walls will depend upon the inclination of any adjacent slopes, type of backfill, degree of wall restraint, method of backfill placement, degree of backfill compaction, drainage provisions, and magnitude and location of any adjacent surcharge loads. At-rest soil pressure is exerted on a retaining wall when it is restrained against rotation. In contrast, active soil pressure will be exerted on a wall if its top is allowed to rotate or yield a distance of roughly 0.001 times its height or greater. If the subject retaining walls will be free to rotate at the top, they should be designed for an active earth pressure equivalent to that generated by a fluid weighing 35 pcf for level backfill against the wall. For restrained walls, an at-reset equivalent fluid pressure of 54 pcf should be used in design, again assuming level backfill against the wall. These values assume that the recommended drainage provisions are incorporated, and hydrostatic pressures are not allowed to develop against the wall.

During a seismic event, lateral earth pressures acting on below-grade structural walls will increase by an incremental amount that corresponds to the earthquake loading. Based on the Mononobe-Okabe equation and peak horizontal accelerations appropriate for the site location, seismic loading should be modeled using the active or at-rest earth pressures recommended above, plus an incremental rectangular-shaped seismic load of magnitude 5H, where H is the total height of the wall.

We assume relatively level ground surface below the base of the walls. As such, we recommend passive earth pressure of 390 pcf for use in design, assuming wall footings are cast against competent native soils or engineered fill. If the ground surface slopes down and away from the base of any of the walls, a lower passive earth pressure should be used and HGSI should be contacted for additional recommendations.

A coefficient of friction of 0.5 may be assumed along the interface between the base of the wall footing and subgrade soils. The recommended coefficient of friction and passive earth pressure values do not include a safety factor, and an appropriate safety factor should be included in design. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

The above recommendations for lateral earth pressures assume that the backfill behind the subsurface walls will consist of properly compacted structural fill, and no adjacent surcharge loading. If the walls will be subjected to the influence of surcharge loading within a horizontal distance equal to or less than the height of the wall, the walls should be designed for the additional horizontal pressure. For uniform surcharge pressures, a uniformly distributed lateral pressure of 0.3 times the surcharge pressure should be added.

The recommended equivalent fluid densities assume a free-draining condition behind the walls so that hydrostatic pressures do not build up. This can be accomplished by placing a 12-inch wide zone of crushed drain rock containing less than 5 percent fines against the walls. A 3-inch minimum diameter perforated, plastic drain pipe should be installed at the base of the walls and connected to a sump to remove water from the crushed drain rock zone. The drain pipe should be wrapped in filter fabric (Mirafi 140N or other as approved by the geotechnical engineer) to minimize clogging. The above drainage measures are intended to remove water from behind the wall to prevent hydrostatic pressures from building up. Additional drainage measures may be specified by the project architect or structural engineer, for damp-proofing or other reasons.

HGSI should be contacted during construction to verify subgrade strength in wall keyway excavations, to verify that backslope soils are in accordance with our assumptions, and to take density tests on the wall backfill materials.

Concrete Slabs-on-Grade

Preparation of areas beneath concrete slab-on-grade floors should be performed as recommended in the *Site Preparation* section. Care should be taken during excavation for foundations and floor slabs, to avoid disturbing subgrade soils. If subgrade soils have been adversely impacted by wet weather or otherwise disturbed, the surficial soils should be scarified to a minimum depth of 8 inches, moisture conditioned to within about 3 percent of optimum moisture content, and compacted to engineered fill specifications. Alternatively, disturbed soils may be removed and the removal zone backfilled with additional crushed rock. For evaluation of the concrete slab-on-grade floors using the beam on elastic foundation method, a modulus of subgrade reaction of 200 kcf (115 pci) should be assumed for the soils anticipated at subgrade depth. This value assumes the concrete slab system is designed and constructed as recommended herein, with a minimum thickness of crushed rock of 8 inches beneath the slab.

Interior slab-on-grade floors should be provided with an adequate moisture break. The capillary break material should consist of ODOT open graded aggregate per ODOT Standard Specifications 02630-2. The minimum recommended thickness of capillary break materials on re-compacted soil subgrade is 8 inches. The total thickness of crushed aggregate will be dependent on the subgrade conditions at the time of construction, and should be verified visually by proof-rolling. Under-slab aggregate should be compacted to at least 90% of its maximum dry density as determined by ASTM D1557 or equivalent.

In areas where moisture will be detrimental to floor coverings or equipment inside the proposed structure, appropriate vapor barrier and damp-proofing measures should be implemented. A commonly applied vapor barrier system consists of a 10-mil polyethylene vapor barrier placed directly over the capillary break material. With this type of system, an approximately 2-inch thick layer of sand is often placed over the vapor barrier to protect it from damage, to aid in curing of the concrete, and also to help prevent cement from bleeding down into the underlying capillary break materials. Other damp/vapor barrier systems may also be feasible. Appropriate design professionals should be consulted regarding vapor barrier and damp proofing systems, ventilation, building material selection and mold prevention issues, which are outside HGSI's area of expertise.

Perimeter Footing Drains

Due to the potential for perched surface water above fine grained deposits such as those encountered at the site, we recommend the outside edge of perimeter footings be provided with a drainage system consisting of 3-inch minimum diameter perforated PVC pipe embedded in a minimum of 1 ft^3 per lineal foot of clean, free-draining sand and gravel or 1”- ¼” drain rock. The drain pipe and surrounding drain rock should be wrapped in non-woven geotextile (Mirafi 140N, or approved equivalent) to minimize the potential for clogging and/or ground loss due to piping. Water collected from the footing drains should be directed into the local storm drain system or other suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. The footing drains should include clean-outs to allow periodic maintenance and inspection.

Down spouts and roof drains should collect roof water in a system separate from the footing drains in order to reduce the potential for clogging. Roof drain water should be directed to an appropriate discharge point well away from structural foundations. Grades should be sloped downward and away from buildings to reduce the potential for ponded water near structures.

Seismic Design

Structures should be designed to resist earthquake loading in accordance with the methodology described in the 2012 International Building Code (IBC) with applicable 2014 Oregon Structural Specialty Code (OSSC) revisions. We recommend Site Class C be used for design per the OSSC, which references ASCE 7-10, Chapter 20, Table 20.3-1. Design values determined for the site using the USGS (United States Geological Survey) *Earthquake Ground Motion Parameters* utility are summarized on Table 1.

Table 1. Recommended Earthquake Ground Motion Parameters (2012 IBC / 2014 OSSC)

Parameter	Value
Location (Lat, Long), degrees	45.3175, -122.7481
Mapped Spectral Acceleration Values (MCE, Site Class B):	
Short Period, S_s	0.928 g
1.0 Sec Period, S_1	0.408 g
Soil Factors for Site Class D:	
F_a	1.129
F_v	1.592
$SD_s = 2/3 \times F_a \times S_s$	0.698 g
$SD_1 = 2/3 \times F_v \times S_1$	0.433 g

Potential seismic impacts also include secondary effects such as soil liquefaction, fault rupture potential, and other hazards as discussed below:

- **Soil Liquefaction Potential –** Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to earthquake shaking. Soil liquefaction is generally limited to loose, granular soils located below the water table. Following development, on-site soils will consist predominantly of engineered fill or stiff clayey native soils above the water table, which are not considered susceptible to liquefaction. Therefore, it is our opinion that special design or construction measures are not required to mitigate the effects of liquefaction.
- **Fault Rupture Potential** – Based on our review of available geologic literature, we are not aware of any mapped active (demonstrating movement in the last 10,000 years) faults on the site. During our field investigation, we did not observe any evidence of surface rupture or recent faulting. Therefore, we conclude that the potential for fault rupture on site is low.
- **Seismic Induced Landslide** – Topography in the vicinity of the subject site is generally flat to gently sloping. The potential for slope instability and seismic induced landslide on site is considered very low.
- **Effects of Local Geology and Topography** – In our opinion, no additional seismic hazard will occur due to local geology or topography. The site is expected to have no greater seismic hazard than surrounding properties and the Wilsonville area in general.

Excavating Conditions and Utility Trench Backfill

We anticipate that on-site soils can be excavated using conventional heavy equipment such as scrapers and trackhoes to a depth of 8 feet and likely greater. Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. Actual slope inclinations at the time of construction should be determined based on safety requirements and actual soil and groundwater conditions. All temporary cuts in excess of 4 feet in height should be sloped in accordance with U.S. Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926), or be shored. The existing native soils classify as Type B Soil and temporary excavation side slope inclinations as steep as 1H:1V may be assumed for planning purposes. This cut slope inclination is applicable to excavations above the water table only.

Perched groundwater conditions often occur over fine-grained native deposits such as those beneath the site, particularly during the wet season. If encountered, the contractor should be prepared to implement an appropriate dewatering system for installation of the utilities. At this time, we anticipate that dewatering systems consisting of ditches, sumps and pumps would be adequate for control of groundwater where encountered during construction conducted during the dry season. Regardless of the dewatering system used, it should be installed and operated such that in-place soils are prevented from being removed along with the groundwater.

Vibrations created by traffic and construction equipment may cause some caving and raveling of excavation walls. In such an event, lateral support for the excavation walls should be provided by the contractor to prevent loss of ground support and possible distress to existing or previously constructed structural improvements.

Utility trench backfill should consist of ¾”-0 crushed rock, compacted to at least 90% of the maximum dry density obtained by Modified Proctor (ASTM D1557) or equivalent. Initial backfill lift thick nesses for a

¾”-0 crushed aggregate base may need to be as great as 4 feet to reduce the risk of flattening underlying flexible pipe. Subsequent lift thickness should not exceed 1 foot. If imported granular fill material is used, then the lifts for large vibrating plate-compaction equipment (e.g. hoe compactor attachments) may be up to 2 feet, provided that proper compaction is being achieved and each lift is tested. Use of large vibrating compaction equipment should be carefully monitored near existing structures and improvements due to the potential for vibration-induced damage.

Adequate density testing should be performed during construction to verify that the recommended relative compaction is achieved. Typically, one density test is taken for every 4 vertical feet of backfill on each 200-lineal-foot section of trench.

Erosion Control Considerations

During our field exploration program, we did not observe soil types that would be considered highly susceptible to erosion. Erosion at the site during construction can be minimized by implementing the project erosion control plan, which should include judicious use of straw, bio-bags, silt fences, or other appropriate technology. Where used, erosion control devices should be in place and remain in place throughout site preparation and construction. Areas of exposed soil requiring immediate and/or temporary protection against exposure should be covered with either mulch or erosion control netting/blankets.

UNCERTAINTIES AND LIMITATIONS

We have prepared this report for the owner and his/her consultants for use in design of this project only. This report should be provided in its entirety to prospective contractors for bidding and estimating purposes; however, the conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, HGSI should be notified for review of the recommendations of this report, and revision of such if necessary.

Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. Recommendations for design changes will be provided should conditions revealed during construction differ from those anticipated, and to verify that the geotechnical aspects of construction comply with the contract plans and specifications.

Within the limitations of scope, schedule and budget, HGSI executed these services in accordance with generally accepted professional principles and practices in the field of geotechnical engineering at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

We appreciate this opportunity to be of service.

Sincerely,

HARDMAN GEOTECHNICAL SERVICES INC.

64,422PE
SEPTEMBER 26, 2000
SCOTT L. HARDMAN
7-31-18
EXPIRES: 06-30-2019

Scott L. Hardman, P.E., G.E.
Geotechnical Engineer

Attachments: References
Figure 1 – Vicinity Map
Figure 2 – Site Plan
Logs of Hand Auger Borings HA-1 through HA-3

REFERENCES

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Madin, I.P., 1990, Earthquake hazard geology maps of the Portland metropolitan area, Oregon: Oregon Department of Geology and Mineral Industries Open-File Report 0-90-2, scale 1:24,000, 22 p.

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Yeats, R.S., Graven, E.P., Werner, K.S., Goldfinger, C., and Popowski, T., 1996, Tectonics of the Willamette Valley, Oregon: in Assessing earthquake hazards and reducing risk in the Pacific Northwest, Vol. 1: U.S. Geological Survey Professional Paper 1560, P. 183-222, 5 plates, scale 1:100,000.

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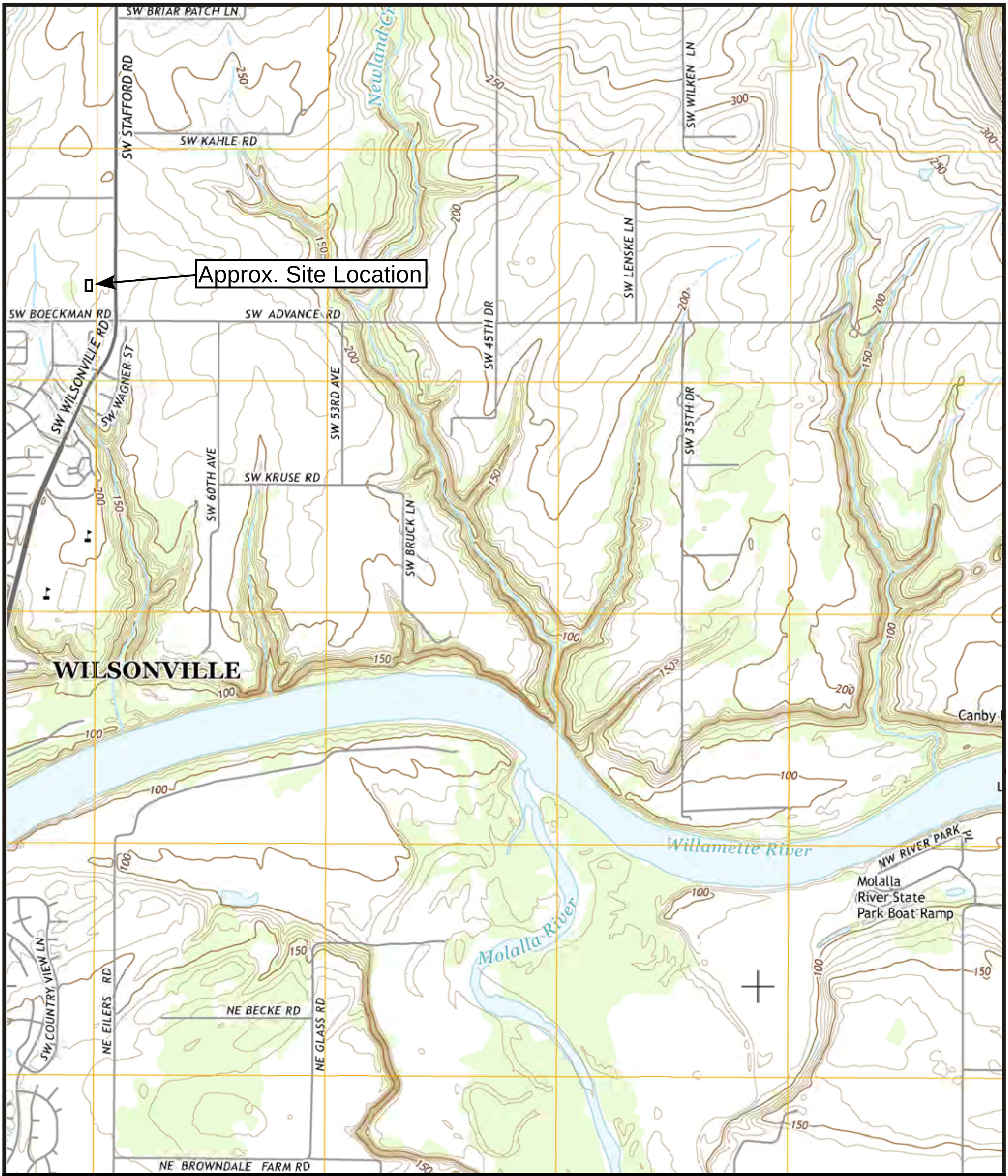
VICINITY MAP



Project: Frog Pond Church Property - Partial Wilsonville, Oregon	Project No. 18-2349	FIGURE 1

HARDMAN GEOTECHNICAL SERVICES INC.
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SITE MAP

Legend

HA-1 Hand Auger Designation and Approximate Location

☆ **Water Well**

⦶ **Septic Tank**

🟨 **Septic Field**

Base map from Google Earth

Project: Community of Hope Church Prop - Partial
Wilsonville, Oregon

Project No. 18-2349

FIGURE 2

HAND AUGER BORING LOG

Project: Community of Hope Church Prop - Partial Wilsonville, Oregon	Project No. 18-2349	Boring No. HA- 1

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft²)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT (OH), dark brown, moist (Topsoil)
1						Stiff, desiccated SILT, light brown
2						
3						Medium stiff, silty CLAY (CL),greyish brown with orange and gray mottling, slightly moist (Willamette Formation)
4						
5						
6						Boring terminated at 6 feet
7						
8						
9						
10						
11						
12						
13						
14						
15						

HGSI HARDMAN GEOTECHNICAL SERVICES INC.
Practical Cost-Effective Geotechnical Solutions

10110 SW Nimbus Avenue, Suite B-5
Portland, Oregon 97223
(503) 530-8076

LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 7/25/18

Logged By: EAH

HAND AUGER BORING LOG

Project: Community of Hope Church Prop - Partial
Wilsonville, Oregon

Project No. 18-2349

Boring No. HA- 2

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT (OH), dark brown, moist (Topsoil)
						3/4"-0" crushed rock with some desiccated silt.
1						Practical refusal at 1 foot Boring terminated at rocky material
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

HGSI HARDMAN GEOTECHNICAL SERVICES INC.
Practical Cost-Effective Geotechnical Solutions

10110 SW Nimbus Avenue, Suite B-5
Portland, Oregon 97223
(503) 530-8076

LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 7/25/18

Logged By: EAH

HAND AUGER BORING LOG

Project: Community of Hope Church Prop - Partial Wilsonville, Oregon	Project No. 18-2349	Boring No. HA- 3

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer ($tons/ft^2$)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT (OH), dark brown, moist (Topsoil)
						3/4"-0" crushed rock with some desiccated silt.
1						Practical refusal at 1 foot Boring terminated at rocky material
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

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Portland, Oregon 97223
(503) 530-8076

LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 7/25/18

Logged By: EAH

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July 2, 2018
HGSI Project No. 18-2319

Dan Grimberg / Kristi Hosea
West Hills Land Development
3330 NW Yeon Avenue, Suite 200
Portland, Oregon 97210

Via e-mail (pdf format); hard copies can be mailed on request

Subject: **GEOTECHNICAL ENGINEERING REPORT**
FROG POND – STAFFORD ROAD PROPERTIES
27767 AND 27687 SW STAFFORD ROAD
WILSONVILLE, CLACKAMAS COUNTY, OREGON

This report presents the results of a geotechnical engineering study conducted by Hardman Geotechnical Services Inc. (HGSI) for the 27687 and 27767 SW Stafford Road Properties (herein referred to as the "site"), at Tax Lots 31W12D 01902 and 31W12D 01903 respectively. The properties are located on the west side of Stafford Road in Wilsonville, Oregon (Figure 1). The purpose of this study was to evaluate subsurface conditions at the site and to provide geotechnical recommendations for site development. This geotechnical study was performed in accordance with HGSI Proposal No. 18-779, dated May 14, 2018, and your subsequent authorization of our proposal and *General Conditions for Geotechnical Services*.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The project totals about 2.8 acres, as summarized below. Please note that the parcel addresses and acreages were taken from the Clackamas County GIS website and may not be completely accurate.

Tax Lot No.	Property	Acreage	House Constructed Date
31W12D 01903	27767 SW Stafford Rd – Eaton Property	1.87	1971
31W12D 01902	27687 SW Stafford Rd – Molatore Property	0.94	1971

The project site is occupied by two homes, two barns, one small greenhouse, a small shed, one above ground oil storage tank, possible remnants of a former below-ground oil storage tank, two septic systems, two working water wells, and two septic drain fields. Site slopes are gentle, generally down toward the east. The site is within an area of rural residential properties.

A grading plan has not been finalized and should be reviewed by HGSI when completed. Underground utilities and onsite stormwater systems are also planned. HGSI should review the grading plan when available to verify consistency with the geotechnical recommendations, and to provide any supplemental or revised input to the design needed based on geotechnical considerations.

REGIONAL GEOLOGY AND SEISMIC SETTING

The subject site lies within the Portland Basin, a broad structural depression situated between the Coast Range on the west and the Cascade Range on the east. The Portland Basin is a northwest-southwest trending structural basin produced by broad regional downwarping of the area. The Portland Basin is approximately 20 miles wide and 45 miles long and is filled with consolidated and unconsolidated sedimentary rocks of late Miocene, Pliocene and Pleistocene age.

The subject site is underlain by Quaternary age (last 1.6 million years) loess, a windblown silt deposit that mantles older deposits and basalt bedrock in the Portland Hills (Madin, 1990). The loess generally consists of massive silt deposited following repeated catastrophic flooding events in the Willamette Valley, the last of which occurred about 10,000 years ago. In localized areas, the loess includes buried paleosols that developed between depositional events. Regionally, the total thickness of loess ranges from 5 feet to greater than 100 feet.

The loess is underlain by residual soil formed by in place weathering of the underlying Columbia River Basalt Formation (Madin, 1990). The Miocene aged (about 14.5 to 16.5 million years ago) Columbia River Basalts are a thick sequence of lava flows which form the crystalline basement of the Tualatin Valley. The basalts are composed of dense, finely crystalline rock that is commonly fractured along blocky and columnar vertical joints. Individual basalt flow units typically range from 25 to 125 feet thick and interflow zones are typically vesicular, scoriaceous, brecciated, and sometimes include sedimentary rocks.

At least three major fault zones capable of generating damaging earthquakes are known to exist in the region. These include the Portland Hills Fault Zone, Gales Creek-Newberg-Mt. Angel Structural Zone, and the Cascadia Subduction Zone. These potential earthquake source zones are included in the determination of seismic design values for structures, as presented in the *Seismic Design* section. None of the known faults extend beneath the site.

FIELD EXPLORATION – HAND AUGER BORINGS

The site-specific exploration for this study was conducted on June 14, 2018 and consisted of eight hand auger borings (designated HA-1 through HA-8) excavated to maximum depths of approximately 8 feet below ground surface (bgs) at the approximate locations shown on Figure 2. It should be noted that exploration locations were determined in the field by pacing or taping distances from apparent property corners and other site features shown on the plans provided. As such, the locations of the explorations should be considered approximate.

Explorations were conducted under the full-time observation of HGSI personnel. Soil samples obtained from the borings were classified in the field and representative portions were placed in relatively air-tight plastic bags. These soil samples were then returned to the laboratory for further examination. Pertinent information including soil sample depths, stratigraphy, soil engineering characteristics, and groundwater occurrence was recorded. Soils were classified in general accordance with the Unified Soil Classification System.

Summary exploration logs are attached to this report. The stratigraphic contacts shown on the individual borehole logs represent the approximate boundaries between soil types. The actual transitions may be more gradual. The soil and groundwater conditions depicted are only for the specific dates and locations reported, and therefore, are not necessarily representative of other locations and times.

SUBSURFACE CONDITIONS

The following discussion is a summary of subsurface conditions encountered in our explorations. For more detailed information regarding subsurface conditions at specific exploration locations, refer to the attached hand auger logs. Also, please note that subsurface conditions can vary between exploration locations, as discussed in the *Uncertainty and Limitations* section below.

Soil

On-site soils are anticipated to consist of topsoil, clayey silt, and clay, as described below.

> ***Topsoil –*** From the ground surface, all explorations encountered 1.5 to 2 feet of topsoil, comprised of moist silt. The upper about 1 foot of the topsoil was highly organic. In most of the hand auger borings, the lower organic, deeper material included in the "topsoil" description appeared to be an old tilled zone.
>
> ***Clayey Silt to Silty Clay –*** Beneath the topsoil / tilled zone in the hand augers, we encountered stiff to very stiff, moist to wet, brown clayey silt to silty clay. The upper several feet of this unit exhibited orange and gray mottling. All of the explorations terminated in the clayey silt to silty clay unit, at maximum depth of about 8 feet bgs.

Groundwater

During the field exploration, no static groundwater table was encountered to the maximum depth of exploration at 8 feet bgs. Saturated soil zones / slight seepage were observed at depths of about 6, 7 and 7 feet bgs in hand augers HA-4, HA-6 and HA-7 respectively. Perched groundwater conditions often occur over fine-grained native deposits such as those beneath the site, particularly during the wet season. It is anticipated that groundwater conditions will vary depending on the season, local subsurface conditions, changes in site utilization, and other factors. The groundwater conditions reported above are for the specific date and locations indicated, and therefore may not necessarily be indicative of other times and/or locations.

CONCLUSIONS AND RECOMMENDATIONS

Results of this study indicate that the proposed development is geotechnically feasible, provided that the recommendations of this report are incorporated into the design and construction phases of the project. Recommendations are presented below regarding site preparation and undocumented fill removal, engineered fill, wet weather earthwork, spread footing foundations, below grade structural retaining walls, concrete slabs-on-grade, perimeter footing drains, seismic design, excavating conditions and utility trench backfill, and erosion control considerations.

Site Preparation and Undocumented Fill Removal

The areas of the site to be graded should first be cleared of vegetation, undocumented fill, and any loose debris; and debris from clearing should be removed from the site. Organic-rich topsoil should then be removed to competent native soils. We anticipate that the average depth of topsoil stripping will be about 12 inches over most of the site, however deeper stripping may be needed in localized areas. The final depth of stripping removal may vary depending on local subsurface conditions and the contractor's methods, and should be determined on the basis of site observations after the initial stripping has been performed. Stripped organic soil should be stockpiled only in designated areas or removed from the site and stripping operations should be observed and documented by HGSI. Existing subsurface structures (tile drains, old utility lines, septic leach fields, etc.) beneath areas of proposed structures and pavement should be removed and the excavations backfilled with engineered fill.

There is potential for old fills to be present on site in areas beyond our explorations. Where encountered beneath proposed structures, pavements, or other settlement-sensitive improvements, undocumented fill should be removed down to firm inorganic native soils and the removal area backfilled with engineered fill (see below). HGSI should observe removal excavations (if any) prior to fill placement to verify that overexcavations are adequate and an appropriate bearing stratum is exposed.

In construction areas, once stripping has been verified, the area should be ripped or tilled to a depth of 12 inches, moisture conditioned, and compacted in-place prior to the placement of engineered fill. Exposed subgrade soils should be evaluated by HGSI. For large areas, this evaluation is normally performed by proof-rolling the exposed subgrade with a fully loaded scraper or dump truck. For smaller areas where access is restricted, the subgrade should be evaluated by probing the soil with a steel probe. Soft/loose soils identified during subgrade preparation should be compacted to a firm and unyielding condition or over-excavated and replaced with engineered fill, as described below. The depth of overexcavation, if required, should be evaluated by HGSI at the time of construction.

Engineered Fill

In general, we anticipate that on-site soils will be suitable for use as engineered fill in dry weather conditions, provided they are relatively free of organics and are properly moisture conditioned for compaction. Imported fill material must be approved by the geotechnical engineer prior to being imported to the site. Oversize material greater than 6 inches in size should not be used within 3 feet of foundation footings, and material greater than 12 inches in diameter should not be used in engineered fill.

Engineered fill should be compacted in horizontal lifts not exceeding 8 inches using standard compaction equipment. We recommend that engineered fill be compacted to at least 90 percent of the maximum dry density determined by ASTM D1557 (Modified Proctor) or equivalent. On-site soils may be wet or dry of optimum; therefore, we anticipate that moisture conditioning of native soil will be necessary for compaction operations.

Proper test frequency and earthwork documentation usually requires daily observation and testing during stripping, rough grading, and placement of engineered fill. Field density testing should conform to ASTM D2922 and D3017, or D1556. Engineered fill should be periodically observed and tested by the project geotechnical engineer or his representative. Typically, one density test is performed for at least every 2 vertical feet of fill placed or every 500 yd^3, whichever requires more testing.

Wet Weather Earthwork

The on-site soils are moisture sensitive and may be difficult to handle or traverse with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. Earthwork performed during the wet-weather season will probably require expensive measures such as cement treatment or imported granular material to compact fill to the recommended engineering specifications. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions when soil moisture content is difficult to control, the following recommendations should be incorporated into the contract specifications.

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soils should be followed promptly by the placement and compaction of clean engineered fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance. Under some circumstances, it may be necessary to excavate soils with a backhoe to minimize subgrade disturbance caused by equipment traffic;
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;

- Material used as engineered fill should consist of clean, granular soil containing less than about 7 percent fines. The fines should be non-plastic. Alternatively, cement treatment of on-site soils may be performed to facilitate wet weather placement;
- The ground surface within the construction area should be sealed by a smooth drum vibratory roller, or equivalent, and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials;
- Excavation and placement of fill should be observed by the geotechnical engineer to verify that all unsuitable materials are removed and suitable compaction and site drainage is achieved; and
- Bales of straw and/or geotextile silt fences should be strategically located to control erosion.

If cement or lime treatment is used to facilitate wet weather construction, HGSI should be contacted to provide additional recommendations and field monitoring.

Spread Footing Foundations

Shallow, conventional isolated or continuous spread footings may be used to support the proposed structures, provided they are founded on competent native soils, or compacted engineered fill placed directly upon the competent native soils. We recommend a maximum allowable bearing pressure of 2,000 pounds per square foot (psf) for designing spread footings bearing on undisturbed native soils or engineered fill. The recommended maximum allowable bearing pressure may be increased by a factor of 1.33 for short term transient conditions such as wind and seismic loading. Exterior footings should be founded at least 18 inches below the lowest adjacent finished grade. Minimum footing widths should be determined by the project engineer/architect in accordance with applicable design codes.

Assuming construction is accomplished as recommended herein, and for the foundation loads anticipated, we estimate total settlement of spread foundations of less than about 1 inch and differential settlement between two adjacent load-bearing components supported on competent soil of less than about ½ inch. We anticipate that the majority of the estimated settlement will occur during construction, as loads are applied.

Wind, earthquakes, and unbalanced earth loads will subject the proposed structure to lateral forces. Lateral forces on a structure will be resisted by a combination of sliding resistance of its base or footing on the underlying soil and passive earth pressure against the buried portions of the structure. For use in design, a coefficient of friction of 0.5 may be assumed along the interface between the base of the footing and subgrade soils. Passive earth pressure for buried portions of structures may be calculated using an equivalent fluid weight of 390 pounds per cubic foot (pcf), assuming footings are cast against dense, natural soils or engineered fill. The recommended coefficient of friction and passive earth pressure values do not include a safety factor. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

Footing excavations should be trimmed neat and the bottom of the excavation should be carefully prepared. Loose, wet or otherwise softened soil should be removed from the footing excavation prior to placing reinforcing steel bars. HGSI should observe foundation excavations prior to placing crushed rock, to verify that adequate bearing soils have been reached. Due to the high moisture sensitivity of on-site soils, construction during wet weather may require overexcavation of footings and backfill with compacted, crushed aggregate.

Below-Grade Structural Retaining Walls

Lateral earth pressures against below-grade retaining walls will depend upon the inclination of any adjacent slopes, type of backfill, degree of wall restraint, method of backfill placement, degree of backfill compaction, drainage provisions, and magnitude and location of any adjacent surcharge loads. At-rest soil pressure is exerted on a retaining wall when it is restrained against rotation. In contrast, active soil pressure will be exerted on a wall if its top is allowed to rotate or yield a distance of roughly 0.001 times its height or greater. If the subject retaining walls will be free to rotate at the top, they should be designed for an active earth pressure equivalent to that generated by a fluid weighing 35 pcf for level backfill against the wall. For restrained walls, an at-reset equivalent fluid pressure of 54 pcf should be used in design, again assuming level backfill against the wall. These values assume that the recommended drainage provisions are incorporated, and hydrostatic pressures are not allowed to develop against the wall.

During a seismic event, lateral earth pressures acting on below-grade structural walls will increase by an incremental amount that corresponds to the earthquake loading. Based on the Mononobe-Okabe equation and peak horizontal accelerations appropriate for the site location, seismic loading should be modeled using the active or at-rest earth pressures recommended above, plus an incremental rectangular-shaped seismic load of magnitude 5H, where H is the total height of the wall.

We assume relatively level ground surface below the base of the walls. As such, we recommend passive earth pressure of 390 pcf for use in design, assuming wall footings are cast against competent native soils or engineered fill. If the ground surface slopes down and away from the base of any of the walls, a lower passive earth pressure should be used and HGSI should be contacted for additional recommendations.

A coefficient of friction of 0.5 may be assumed along the interface between the base of the wall footing and subgrade soils. The recommended coefficient of friction and passive earth pressure values do not include a safety factor, and an appropriate safety factor should be included in design. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

The above recommendations for lateral earth pressures assume that the backfill behind the subsurface walls will consist of properly compacted structural fill, and no adjacent surcharge loading. If the walls will be subjected to the influence of surcharge loading within a horizontal distance equal to or less than the height of the wall, the walls should be designed for the additional horizontal pressure. For uniform surcharge pressures, a uniformly distributed lateral pressure of 0.3 times the surcharge pressure should be added.

The recommended equivalent fluid densities assume a free-draining condition behind the walls so that hydrostatic pressures do not build up. This can be accomplished by placing a 12-inch wide zone of crushed drain rock containing less than 5 percent fines against the walls. A 3-inch minimum diameter perforated, plastic drain pipe should be installed at the base of the walls and connected to a sump to remove water from the crushed drain rock zone. The drain pipe should be wrapped in filter fabric (Mirafi 140N or other as approved by the geotechnical engineer) to minimize clogging. The above drainage measures are intended to remove water from behind the wall to prevent hydrostatic pressures from building up. Additional drainage measures may be specified by the project architect or structural engineer, for damp-proofing or other reasons.

HGSI should be contacted during construction to verify subgrade strength in wall keyway excavations, to verify that backslope soils are in accordance with our assumptions, and to take density tests on the wall backfill materials.

Concrete Slabs-on-Grade

Preparation of areas beneath concrete slab-on-grade floors should be performed as recommended in the *Site Preparation* section. Care should be taken during excavation for foundations and floor slabs, to avoid disturbing subgrade soils. If subgrade soils have been adversely impacted by wet weather or otherwise disturbed, the surficial soils should be scarified to a minimum depth of 8 inches, moisture conditioned to within about 3 percent of optimum moisture content, and compacted to engineered fill specifications. Alternatively, disturbed soils may be removed and the removal zone backfilled with additional crushed rock.

For evaluation of the concrete slab-on-grade floors using the beam on elastic foundation method, a modulus of subgrade reaction of 200 kcf (115 pci) should be assumed for the soils anticipated at subgrade depth. This value assumes the concrete slab system is designed and constructed as recommended herein, with a minimum thickness of crushed rock of 8 inches beneath the slab.

Interior slab-on-grade floors should be provided with an adequate moisture break. The capillary break material should consist of ODOT open graded aggregate per ODOT Standard Specifications 02630-2. The minimum recommended thickness of capillary break materials on re-compacted soil subgrade is 8 inches. The total thickness of crushed aggregate will be dependent on the subgrade conditions at the time of construction, and should be verified visually by proof-rolling. Under-slab aggregate should be compacted to at least 90% of its maximum dry density as determined by ASTM D1557 or equivalent.

In areas where moisture will be detrimental to floor coverings or equipment inside the proposed structure, appropriate vapor barrier and damp-proofing measures should be implemented. A commonly applied vapor barrier system consists of a 10-mil polyethylene vapor barrier placed directly over the capillary break material. With this type of system, an approximately 2-inch thick layer of sand is often placed over the vapor barrier to protect it from damage, to aid in curing of the concrete, and also to help prevent cement from bleeding down into the underlying capillary break materials. Other damp/vapor barrier systems may also be feasible. Appropriate design professionals should be consulted regarding vapor barrier and damp proofing systems, ventilation, building material selection and mold prevention issues, which are outside HGSI’s area of expertise.

Perimeter Footing Drains

Due to the potential for perched surface water above fine grained deposits such as those encountered at the site, we recommend the outside edge of perimeter footings be provided with a drainage system consisting of 3-inch minimum diameter perforated PVC pipe embedded in a minimum of 1 ft^3 per lineal foot of clean, free-draining sand and gravel or 1”- ¼” drain rock. The drain pipe and surrounding drain rock should be wrapped in non-woven geotextile (Mirafi 140N, or approved equivalent) to minimize the potential for clogging and/or ground loss due to piping. Water collected from the footing drains should be directed into the local storm drain system or other suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. The footing drains should include clean-outs to allow periodic maintenance and inspection.

Down spouts and roof drains should collect roof water in a system separate from the footing drains in order to reduce the potential for clogging. Roof drain water should be directed to an appropriate discharge point well away from structural foundations. Grades should be sloped downward and away from buildings to reduce the potential for ponded water near structures.

Seismic Design

Structures should be designed to resist earthquake loading in accordance with the methodology described in the 2012 International Building Code (IBC) with applicable 2014 Oregon Structural Specialty Code (OSSC) revisions. We recommend Site Class C be used for design per the OSSC, which references ASCE 7-10, Chapter 20, Table 20.3-1. Design values determined for the site using the USGS (United States Geological Survey) *Earthquake Ground Motion Parameters* utility are summarized on Table 1.

Table 1. Recommended Earthquake Ground Motion Parameters (2012 IBC / 2014 OSSC)

Parameter	Value
Location (Lat, Long), degrees	45.317, -122.747
Mapped Spectral Acceleration Values (MCE, Site Class B):	
Short Period, S_s	0.928 g
1.0 Sec Period, S_1	0.408 g
Soil Factors for Site Class D:	
F_a	1.129
F_v	1.592
SD_s = 2/3 x F_a x S_s	0.698 g
SD_1 = 2/3 x F_v x S_1	0.433 g

Potential seismic impacts also include secondary effects such as soil liquefaction, fault rupture potential, and other hazards as discussed below:

- **Soil Liquefaction Potential –** Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to earthquake shaking. Soil liquefaction is generally limited to loose, granular soils located below the water table. Following development, on-site soils will consist predominantly of engineered fill or stiff clayey native soils above the water table, which are not considered susceptible to liquefaction. Therefore, it is our opinion that special design or construction measures are not required to mitigate the effects of liquefaction.
- **Fault Rupture Potential** – Based on our review of available geologic literature, we are not aware of any mapped active (demonstrating movement in the last 10,000 years) faults on the site. During our field investigation, we did not observe any evidence of surface rupture or recent faulting. Therefore, we conclude that the potential for fault rupture on site is low.
- **Seismic Induced Landslide** – Topography in the vicinity of the subject site is generally flat to gently sloping. The potential for slope instability and seismic induced landslide on site is considered very low.
- **Effects of Local Geology and Topography** – In our opinion, no additional seismic hazard will occur due to local geology or topography. The site is expected to have no greater seismic hazard than surrounding properties and the Wilsonville area in general.

Excavating Conditions and Utility Trench Backfill

We anticipate that on-site soils can be excavated using conventional heavy equipment such as scrapers and trackhoes to a depth of 8 feet and likely greater. Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. Actual slope inclinations at the time of construction should be determined based on safety requirements and actual soil and groundwater conditions. All temporary cuts in excess of 4 feet in height should be sloped in accordance with U.S. Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926), or be shored. The existing native soils classify as Type B Soil and temporary excavation side slope inclinations as steep as 1H:1V may be assumed for planning purposes. This cut slope inclination is applicable to excavations above the water table only.

Perched groundwater conditions often occur over fine-grained native deposits such as those beneath the site, particularly during the wet season. If encountered, the contractor should be prepared to implement an appropriate dewatering system for installation of the utilities. At this time, we anticipate that dewatering systems consisting of ditches, sumps and pumps would be adequate for control of groundwater where encountered during construction conducted during the dry season. Regardless of the dewatering system used, it should be installed and operated such that in-place soils are prevented from being removed along with the groundwater.

Vibrations created by traffic and construction equipment may cause some caving and raveling of excavation walls. In such an event, lateral support for the excavation walls should be provided by the contractor to prevent loss of ground support and possible distress to existing or previously constructed structural improvements.

Utility trench backfill should consist of ¾”-0 crushed rock, compacted to at least 90% of the maximum dry density obtained by Modified Proctor (ASTM D1557) or equivalent. Initial backfill lift thick nesses for a ¾”-0 crushed aggregate base may need to be as great as 4 feet to reduce the risk of flattening underlying flexible pipe. Subsequent lift thickness should not exceed 1 foot. If imported granular fill material is used, then the lifts for large vibrating plate-compaction equipment (e.g. hoe compactor attachments) may be up to 2 feet, provided that proper compaction is being achieved and each lift is tested. Use of large vibrating compaction equipment should be carefully monitored near existing structures and improvements due to the potential for vibration-induced damage.

Adequate density testing should be performed during construction to verify that the recommended relative compaction is achieved. Typically, one density test is taken for every 4 vertical feet of backfill on each 200-lineal-foot section of trench.

Erosion Control Considerations

During our field exploration program, we did not observe soil types that would be considered highly susceptible to erosion. Erosion at the site during construction can be minimized by implementing the project erosion control plan, which should include judicious use of straw, bio-bags, silt fences, or other appropriate technology. Where used, erosion control devices should be in place and remain in place throughout site preparation and construction. Areas of exposed soil requiring immediate and/or temporary protection against exposure should be covered with either mulch or erosion control netting/blankets.

UNCERTAINTIES AND LIMITATIONS

We have prepared this report for the owner and his/her consultants for use in design of this project only. This report should be provided in its entirety to prospective contractors for bidding and estimating purposes; however, the conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, HGSI should be notified for review of the recommendations of this report, and revision of such if necessary.

Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. Recommendations for design changes will be provided should conditions revealed during construction differ from those anticipated, and to verify that the geotechnical aspects of construction comply with the contract plans and specifications.

Within the limitations of scope, schedule and budget, HGSI executed these services in accordance with generally accepted professional principles and practices in the field of geotechnical engineering at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

We appreciate this opportunity to be of service.

Sincerely,

HARDMAN GEOTECHNICAL SERVICES INC.

REGISTERED PROFESSIONAL ENGINEER
64,422PE
OREGON
SEPTEMBER 26, 2000
SCOTT L. HARDMAN
EXPIRES: 06-30-2019

7-2-18

Scott L. Hardman, P.E., G.E.
Geotechnical Engineer

Attachments: References
Figure 1 – Vicinity Map
Figure 2 – Site Plan
Logs of Hand Auger Borings HA-1 through HA-8

REFERENCES

Beeson, M.H., Tolan, T.L., and Madin, I.P., 1991, Geologic map of the Portland Quadrangle, Multnomah, and Washington Counties, Oregon: Oregon Department of Geology and Mineral Industries Geological Map Series GMS-75, scale 1:24,000.

Madin, I.P., 1990, Earthquake hazard geology maps of the Portland metropolitan area, Oregon: Oregon Department of Geology and Mineral Industries Open-File Report 0-90-2, scale 1:24,000, 22 p.

Snyder, D.T., 2008, Estimated Depth to Ground Water and Configuration of the Water Table in the Portland, Oregon Area: U.S. Geological Survey Scientific Investigations Report 2008–5059, 41 p., 3 plates.

Yeats, R.S., Graven, E.P., Werner, K.S., Goldfinger, C., and Popowski, T., 1996, Tectonics of the Willamette Valley, Oregon: in Assessing earthquake hazards and reducing risk in the Pacific Northwest, Vol. 1: U.S. Geological Survey Professional Paper 1560, P. 183-222, 5 plates, scale 1:100,000.

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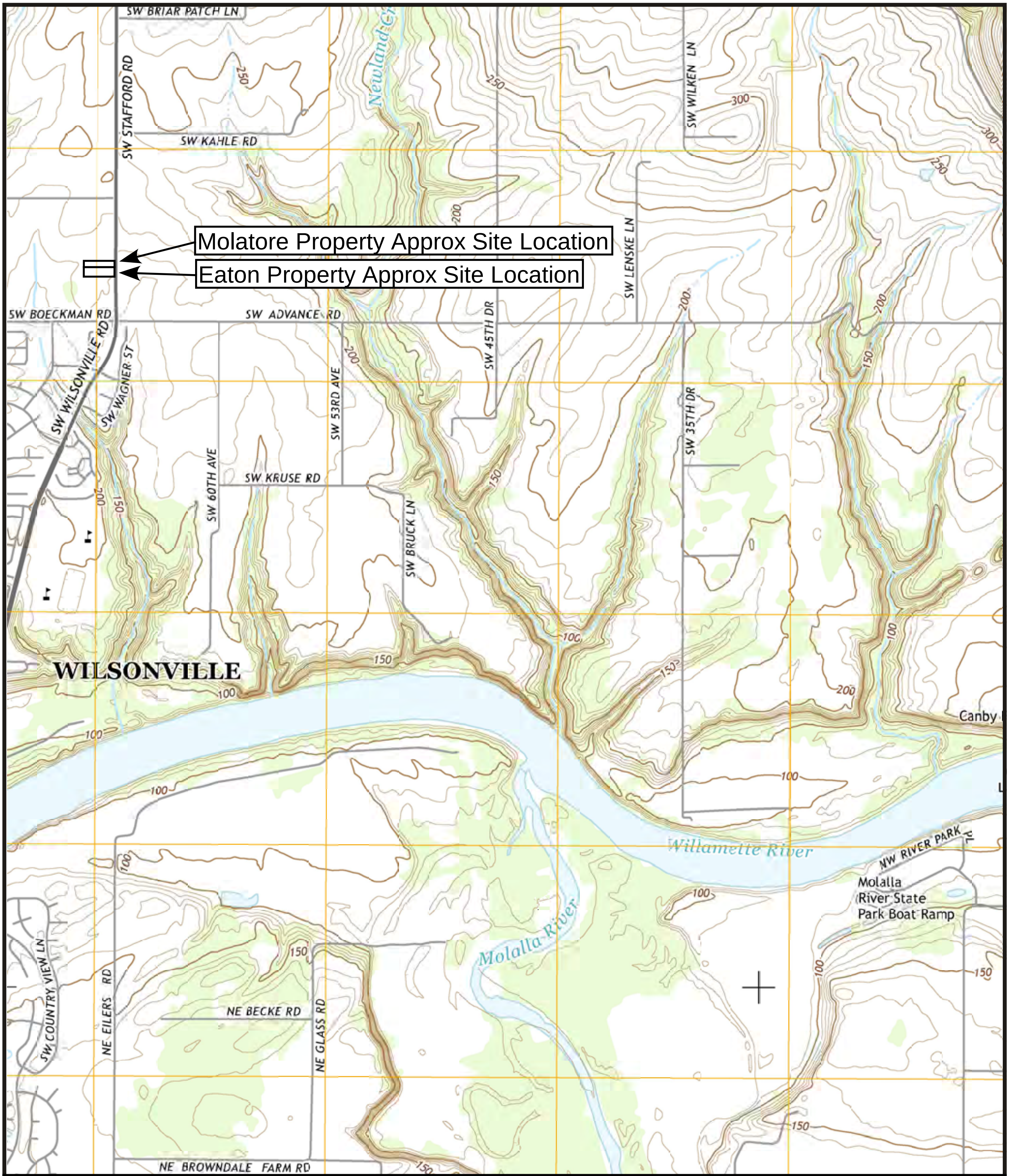
VICINITY MAP


Molatore Property Approx Site Location

Eaton Property Approx Site Location

Project: Stafford Road Properties
Wilsonville, Oregon

Project No. 18-2320

FIGURE 1

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SITE MAP

Legend

⊕ **Hand Auger Location (Approximate)**

⊕ **Dynamic Cone Penetrometer Location (Approximate)**

Base map from Google Earth

Project: Stafford Road Properties Wilsonville, Oregon	Project No. 18-2319	FIGURE 2

HAND AUGER BORING LOG

Project: Frog Pond - Stafford Road Prop.
Wilsonville, Oregon

Project No. 18-2319

Boring No. HA- 1

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT (OH), dark brown, moist (Topsoil)
1						Medium stiff, silt (CL),light brown, desicated (Willamette Formation)
						Small round 1"-2" river rock
2						Practical refusal at 2 feet Boring terminated at rocky material
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

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10110 SW Nimbus Avenue, Suite B-5
Portland, Oregon 97223
(503) 530-8076

LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 6/14/18

Logged By: CSH

HAND AUGER BORING LOG

Project: Frog Pond - Stafford Road Prop.
Wilsonville, Oregon

Project No. 18-2319

Boring No. HA- 2

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT (OH), dark brown, moist (Topsoil)
1						Soft, clayey SILT (MH),light brown with orange and gray mottling, slightly moist (Till zone / disturbed native soil)
2						Medium stiff, silty CLAY (CL),greyish brown with orange and gray mottling, moist (Willamette Formation)
3						
4						
5						Very stiff, clayey SILT (MH),light brown with orange and gray mottling, slightly moist (Willamette Formation)
6						↓ Material moistening and softening with depth
7						
8						Boring terminated at 8 feet
9						
10						
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 6/14/18

Logged By: CSH

HAND AUGER BORING LOG

Project: Frog Pond - Stafford Road Prop. Wilsonville, Oregon	Project No. 18-2319	Boring No. HA- 3

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT(OL), dark brown, moist (Till zone / disturbed native soil)
1						
2						Medium stiff to stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
3						
4						
5						
6						Boring terminated at 6 feet
7						
8						
9						
10						
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 6/14/18

Logged By: CSH

HAND AUGER BORING LOG

Project: Frog Pond - Stafford Road Prop. Wilsonville, Oregon	Project No. 18-2319	Boring No. HA- 4

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT(OL), dark brown, moist (Till zone / disturbed native soil)
1						
2						Stiff to very stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
3						
4						
5					▽	
6						Medium stiff, clayey SILT (ML),light brown with orange and gray mottling, saturated (Willamette Formation)
7						
8						Boring terminated at 8 feet
9						
10						
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 6/14/18

Logged By: CSH

HAND AUGER BORING LOG

Project: Frog Pond - Stafford Road Prop. Wilsonville, Oregon	Project No. 18-2319	Boring No. HA- 5

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	**Material Description**
						Soft, highly organic (grass roots) SILT(OL), dark brown, moist (Till zone / disturbed native soil)
1						Stiff to very stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
2						
3						
4						
5						
6						
7						
8						Boring terminated at 8 feet
9						
10						
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 6/14/18

Logged By: CSH

HAND AUGER BORING LOG

Project: Frog Pond - Stafford Road Prop.
Wilsonville, Oregon

Project No. 18-2319

Boring No. HA- 6

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT(OL), dark brown, moist (Till zone / disturbed native soil)
1						
2						Medium stiff, silty CLAY (CL),greyish brown with orange and gray mottling, moist (Willamette Formation)
3						
4						Stiff to very stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
5						
6					▽	Material moistens substantiallly at about 7 feet
7						
8						Boring terminated at 8 feet
9						
10						
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 6/14/18

Logged By: CSH

HAND AUGER BORING LOG

Project: Frog Pond - Stafford Road Prop.
Wilsonville, Oregon

Project No. 18-2319

Boring No. HA- 7

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT(OL), dark brown, moist (Till zone / disturbed native soil)
1						
2						Medium stiff, silty CLAY (CL),greyish brown with orange and gray mottling, moist (Willamette Formation)
3						
4						Stiff to very stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
5						
6						
					▽	Material moistens substantiallly at about 7 feet
7						
8						Boring terminated at 8 feet
9						
10						
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 6/14/18

Logged By: CSH

HAND AUGER BORING LOG

Project: Frog Pond - Stafford Road Prop. Wilsonville, Oregon	Project No. 18-2319	Boring No. HA- 8

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	**Material Description**
						Soft, highly organic (grass roots) SILT(OL), dark brown, moist (Till zone / disturbed native soil)
1						
2						Medium stiff to stuff, silty CLAY (CL),greyish brown with orange and gray mottling, moist (Willamette Formation)
3						
4						
5						
6						Boring terminated at 6 feet
7						
8						
9						
10						
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 6/14/18

Logged By: CSH

HGSI HARDMAN GEOTECHNICAL SERVICES INC.
Practical, Cost-Effective Geotechnical Solutions

May 24, 2018
HGSI Project No. 18-2318

Dan Grimberg / Kristi Hosea
West Hills Land Development
3330 NW Yeon Avenue, Suite 200
Portland, Oregon 97210

Via e-mail (pdf format); hard copies can be mailed on request

Subject: **GEOTECHNICAL ENGINEERING REPORT**
FROG POND – SCHOOL DISTRICT PROPERTY #2
WILSONVILLE, CLACKAMAS COUNTY, OREGON

This report presents the results of a geotechnical engineering study conducted by Hardman Geotechnical Services Inc. (HGSI) for the above-referenced project. The purpose of this study was to evaluate subsurface conditions at the site and to provide geotechnical recommendations for site development. This geotechnical study was performed in accordance with HGSI Proposal No. 18-781, dated May 14, 2018, and your subsequent authorization of our proposal and *General Conditions for Geotechnical Services*.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

This geotechnical evaluation was performed for the site designated School District Property #2. This property is the easternmost roughly 1.53 acres of Tax Lot 31W12D02200 (Figures 1 and 2). There are no structures on the property, which is heavily wooded with established trees as well as underbrush and grasses. The site is flat to gently sloping.

The intent of this geotechnical report is to provide adequate geotechnical information for design and construction applicable to the School District Property #2 site. A grading plan has not been finalized and should be reviewed by HGSI when completed. Underground utilities and onsite stormwater systems are also planned. HGSI should review the grading plan when available to verify consistency with the geotechnical recommendations, and to provide any supplemental or revised input to the design needed based on geotechnical considerations.

REGIONAL GEOLOGY AND SEISMIC SETTING

The subject site lies within the Portland Basin, a broad structural depression situated between the Coast Range on the west and the Cascade Range on the east. The Portland Basin is a northwest-southwest trending structural basin produced by broad regional downwarping of the area. The Portland Basin is approximately 20 miles wide and 45 miles long and is filled with consolidated and unconsolidated sedimentary rocks of late Miocene, Pliocene and Pleistocene age.

The subject site is underlain by Quaternary age (last 1.6 million years) loess, a windblown silt deposit that mantles older deposits and basalt bedrock in the Portland Hills (Madin, 1990). The loess generally consists of massive silt deposited following repeated catastrophic flooding events in the Willamette Valley, the last of which occurred about 10,000 years ago. In localized areas, the loess includes buried paleosols that developed between depositional events. Regionally, the total thickness of loess ranges from 5 feet to greater than 100 feet.

The loess is underlain by residual soil formed by in place weathering of the underlying Columbia River Basalt Formation (Madin, 1990). The Miocene aged (about 14.5 to 16.5 million years ago) Columbia River Basalts are a thick sequence of lava flows which form the crystalline basement of the Tualatin Valley. The basalts are composed of dense, finely crystalline rock that is commonly fractured along blocky and columnar vertical joints. Individual basalt flow units typically range from 25 to 125 feet thick and interflow zones are typically vesicular, scoriaceous, brecciated, and sometimes include sedimentary rocks.

At least three major fault zones capable of generating damaging earthquakes are known to exist in the region. These include the Portland Hills Fault Zone, Gales Creek-Newberg-Mt. Angel Structural Zone, and the Cascadia Subduction Zone. These potential earthquake source zones are included in the determination of seismic design values for structures, as presented in the *Seismic Design* section. None of the known faults extend beneath the site.

FIELD EXPLORATION

The site-specific exploration for this study was conducted on May 17, 2018 and included 2 test pits (designated TP-11 and TP-12) excavated to depths of approximately 8 to 10 feet below ground surface (bgs) at the approximate locations shown on Figure 2. It should be noted that exploration locations were determined in the field by pacing or taping distances from apparent property corners and other site features shown on the plans provided. As such, the locations of the explorations should be considered approximate.

Explorations were conducted under the full-time observation of HGSI personnel. Soil samples obtained from the borings were classified in the field and representative portions were placed in relatively air-tight plastic bags. These soil samples were then returned to the laboratory for further examination. Pertinent information including soil sample depths, stratigraphy, soil engineering characteristics, and groundwater occurrence was recorded. Soils were classified in general accordance with the Unified Soil Classification System.

Summary test pit logs are attached to this report. The stratigraphic contacts shown on the individual borehole logs represent the approximate boundaries between soil types. The actual transitions may be more gradual. The soil and groundwater conditions depicted are only for the specific dates and locations reported, and therefore, are not necessarily representative of other locations and times.

SURFACE CONDITIONS

The following discussion is a summary of subsurface conditions encountered in our explorations. For more detailed information regarding subsurface conditions at specific exploration locations, refer to the attached test pit logs. Also, please note that subsurface conditions can vary between exploration locations, as discussed in the *Uncertainty and Limitations* section below.

Soil

On-site soils are anticipated to consist of topsoil, clayey silt, and clay, as described below.

> ***Topsoil / Disturbed Zone –*** From the ground surface, all test pits encountered 2 to 3 feet of topsoil / disturbed zone material, comprised of very moist silt. The upper about 1 foot of the topsoil was highly organic.

> ***Clayey Silt –*** Beneath the topsoil in the test pits, we encountered stiff to very stiff, moist, brown clayey silt with orange and gray mottling. All of the test pits terminated in the clayey silt unit, at depths of 8 to 10 feet bgs.

Groundwater

During the field exploration, no static groundwater level was encountered to the maximum depth of exploration at 10 feet bgs. Slight to moderate seepage was encountered in both test pits. Seepage was observed from the sidewalls at roughly 4 and 8 feet bgs. Perched groundwater conditions often occur over fine-grained native deposits such as those beneath the site, particularly during the wet season. It is anticipated that groundwater conditions will vary depending on the season, local subsurface conditions, changes in site utilization, and other factors. The groundwater conditions reported above are for the specific date and locations indicated, and therefore may not necessarily be indicative of other times and/or locations.

CONCLUSIONS AND RECOMMENDATIONS

Results of this study indicate that the proposed development is geotechnically feasible, provided that the recommendations of this report are incorporated into the design and construction phases of the project. Recommendations are presented below regarding site preparation and undocumented fill removal, engineered fill, wet weather earthwork, spread footing foundations, below grade structural retaining walls, concrete slabs-on-grade, perimeter footing drains, seismic design, excavating conditions and utility trench backfill, and erosion control considerations.

Site Preparation and Undocumented Fill Removal

The areas of the site to be graded should first be cleared of vegetation, undocumented fill, and any loose debris; and debris from clearing should be removed from the site. Organic-rich topsoil should then be removed to competent native soils. We anticipate that the average depth of topsoil stripping will be about 12 inches over most of the site, however deeper stripping may be needed in localized areas. The final depth of stripping removal may vary depending on local subsurface conditions and the contractor’s methods, and should be determined on the basis of site observations after the initial stripping has been performed. Stripped organic soil should be stockpiled only in designated areas or removed from the site and stripping operations should be observed and documented by HGSI. Existing subsurface structures (tile drains, old utility lines, septic leach fields, etc.) beneath areas of proposed structures and pavement should be removed and the excavations backfilled with engineered fill.

There is potential for old fills to be present on site in areas beyond our explorations. Where encountered beneath proposed structures, pavements, or other settlement-sensitive improvements, undocumented fill should be removed down to firm inorganic native soils and the removal area backfilled with engineered fill (see below). HGSI should observe removal excavations (if any) prior to fill placement to verify that overexcavations are adequate and an appropriate bearing stratum is exposed.

In construction areas, once stripping has been verified, the area should be ripped or tilled to a depth of 12 inches, moisture conditioned, and compacted in-place prior to the placement of engineered fill. Exposed subgrade soils should be evaluated by HGSI. For large areas, this evaluation is normally performed by proof-rolling the exposed subgrade with a fully loaded scraper or dump truck. For smaller areas where access is restricted, the subgrade should be evaluated by probing the soil with a steel probe. Soft/loose soils identified during subgrade preparation should be compacted to a firm and unyielding condition or over-excavated and replaced with engineered fill, as described below. The depth of overexcavation, if required, should be evaluated by HGSI at the time of construction.

Engineered Fill

In general, we anticipate that on-site soils will be suitable for use as engineered fill in dry weather conditions, provided they are relatively free of organics and are properly moisture conditioned for compaction. Imported fill material must be approved by the geotechnical engineer prior to being imported to the site. Oversize material greater than 6 inches in size should not be used within 3 feet of foundation footings, and material greater than 12 inches in diameter should not be used in engineered fill.

Engineered fill should be compacted in horizontal lifts not exceeding 8 inches using standard compaction equipment. We recommend that engineered fill be compacted to at least 90 percent of the maximum dry density determined by ASTM D1557 (Modified Proctor) or equivalent. On-site soils may be wet or dry of optimum; therefore, we anticipate that moisture conditioning of native soil will be necessary for compaction operations.

Proper test frequency and earthwork documentation usually requires daily observation and testing during stripping, rough grading, and placement of engineered fill. Field density testing should conform to ASTM D2922 and D3017, or D1556. Engineered fill should be periodically observed and tested by the project geotechnical engineer or his representative. Typically, one density test is performed for at least every 2 vertical feet of fill placed or every 500 yd^3, whichever requires more testing.

Wet Weather Earthwork

The on-site soils are moisture sensitive and may be difficult to handle or traverse with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. Earthwork performed during the wet-weather season will probably require expensive measures such as cement treatment or imported granular material to compact fill to the recommended engineering specifications. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions when soil moisture content is difficult to control, the following recommendations should be incorporated into the contract specifications.

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soils should be followed promptly by the placement and compaction of clean engineered fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance. Under some circumstances, it may be necessary to excavate soils with a backhoe to minimize subgrade disturbance caused by equipment traffic;
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;
- Material used as engineered fill should consist of clean, granular soil containing less than about 7 percent fines. The fines should be non-plastic. Alternatively, cement treatment of on-site soils may be performed to facilitate wet weather placement;
- The ground surface within the construction area should be sealed by a smooth drum vibratory roller, or equivalent, and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials;
- Excavation and placement of fill should be observed by the geotechnical engineer to verify that all unsuitable materials are removed and suitable compaction and site drainage is achieved; and
- Bales of straw and/or geotextile silt fences should be strategically located to control erosion.

If cement or lime treatment is used to facilitate wet weather construction, HGSI should be contacted to provide additional recommendations and field monitoring.

Spread Footing Foundations

Shallow, conventional isolated or continuous spread footings may be used to support the proposed structures, provided they are founded on competent native soils, or compacted engineered fill placed directly upon the competent native soils. We recommend a maximum allowable bearing pressure of 2,000 pounds per square foot (psf) for designing spread footings bearing on undisturbed native soils or engineered fill. The recommended maximum allowable bearing pressure may be increased by a factor of 1.33 for short term transient conditions such as wind and seismic loading. Exterior footings should be founded at least 18 inches below the lowest adjacent finished grade. Minimum footing widths should be determined by the project engineer/architect in accordance with applicable design codes.

Assuming construction is accomplished as recommended herein, and for the foundation loads anticipated, we estimate total settlement of spread foundations of less than about 1 inch and differential settlement between two adjacent load-bearing components supported on competent soil of less than about ½ inch. We anticipate that the majority of the estimated settlement will occur during construction, as loads are applied.

Wind, earthquakes, and unbalanced earth loads will subject the proposed structure to lateral forces. Lateral forces on a structure will be resisted by a combination of sliding resistance of its base or footing on the underlying soil and passive earth pressure against the buried portions of the structure. For use in design, a coefficient of friction of 0.5 may be assumed along the interface between the base of the footing and subgrade soils. Passive earth pressure for buried portions of structures may be calculated using an equivalent fluid weight of 390 pounds per cubic foot (pcf), assuming footings are cast against dense, natural soils or engineered fill. The recommended coefficient of friction and passive earth pressure values do not include a safety factor. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

Footing excavations should be trimmed neat and the bottom of the excavation should be carefully prepared. Loose, wet or otherwise softened soil should be removed from the footing excavation prior to placing reinforcing steel bars. HGSI should observe foundation excavations prior to placing crushed rock, to verify that adequate bearing soils have been reached. Due to the high moisture sensitivity of on-site soils, construction during wet weather may require overexcavation of footings and backfill with compacted, crushed aggregate.

Below-Grade Structural Retaining Walls

Lateral earth pressures against below-grade retaining walls will depend upon the inclination of any adjacent slopes, type of backfill, degree of wall restraint, method of backfill placement, degree of backfill compaction, drainage provisions, and magnitude and location of any adjacent surcharge loads. At-rest soil pressure is exerted on a retaining wall when it is restrained against rotation. In contrast, active soil pressure will be exerted on a wall if its top is allowed to rotate or yield a distance of roughly 0.001 times its height or greater. If the subject retaining walls will be free to rotate at the top, they should be designed for an active earth pressure equivalent to that generated by a fluid weighing 35 pcf for level backfill against the wall. For restrained walls, an at-reset equivalent fluid pressure of 54 pcf should be used in design, again assuming level backfill against the wall. These values assume that the recommended drainage provisions are incorporated, and hydrostatic pressures are not allowed to develop against the wall.

During a seismic event, lateral earth pressures acting on below-grade structural walls will increase by an incremental amount that corresponds to the earthquake loading. Based on the Mononobe-Okabe equation and peak horizontal accelerations appropriate for the site location, seismic loading should be modeled using the active or at-rest earth pressures recommended above, plus an incremental rectangular-shaped seismic load of magnitude 5H, where H is the total height of the wall.

We assume relatively level ground surface below the base of the walls. As such, we recommend passive earth pressure of 390 pcf for use in design, assuming wall footings are cast against competent native soils or engineered fill. If the ground surface slopes down and away from the base of any of the walls, a lower passive earth pressure should be used and HGSI should be contacted for additional recommendations.

A coefficient of friction of 0.5 may be assumed along the interface between the base of the wall footing and subgrade soils. The recommended coefficient of friction and passive earth pressure values do not include a safety factor, and an appropriate safety factor should be included in design. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

The above recommendations for lateral earth pressures assume that the backfill behind the subsurface walls will consist of properly compacted structural fill, and no adjacent surcharge loading. If the walls will be subjected to the influence of surcharge loading within a horizontal distance equal to or less than the height of the wall, the walls should be designed for the additional horizontal pressure. For uniform surcharge pressures, a uniformly distributed lateral pressure of 0.3 times the surcharge pressure should be added.

The recommended equivalent fluid densities assume a free-draining condition behind the walls so that hydrostatic pressures do not build up. This can be accomplished by placing a 12-inch wide zone of crushed drain rock containing less than 5 percent fines against the walls. A 3-inch minimum diameter perforated, plastic drain pipe should be installed at the base of the walls and connected to a sump to remove water from the crushed drain rock zone. The drain pipe should be wrapped in filter fabric (Mirafi 140N or other as approved by the geotechnical engineer) to minimize clogging. The above drainage measures are intended to remove water from behind the wall to prevent hydrostatic pressures from building up. Additional drainage measures may be specified by the project architect or structural engineer, for damp-proofing or other reasons.

HGSI should be contacted during construction to verify subgrade strength in wall keyway excavations, to verify that backslope soils are in accordance with our assumptions, and to take density tests on the wall backfill materials.

Concrete Slabs-on-Grade

Preparation of areas beneath concrete slab-on-grade floors should be performed as recommended in the *Site Preparation* section. Care should be taken during excavation for foundations and floor slabs, to avoid disturbing subgrade soils. If subgrade soils have been adversely impacted by wet weather or otherwise disturbed, the surficial soils should be scarified to a minimum depth of 8 inches, moisture conditioned to within about 3 percent of optimum moisture content, and compacted to engineered fill specifications. Alternatively, disturbed soils may be removed and the removal zone backfilled with additional crushed rock. For evaluation of the concrete slab-on-grade floors using the beam on elastic foundation method, a modulus of subgrade reaction of 200 kcf (115 pci) should be assumed for the soils anticipated at subgrade depth. This value assumes the concrete slab system is designed and constructed as recommended herein, with a minimum thickness of crushed rock of 8 inches beneath the slab.

Interior slab-on-grade floors should be provided with an adequate moisture break. The capillary break material should consist of ODOT open graded aggregate per ODOT Standard Specifications 02630-2. The minimum recommended thickness of capillary break materials on re-compacted soil subgrade is 8 inches. The total thickness of crushed aggregate will be dependent on the subgrade conditions at the time of construction, and should be verified visually by proof-rolling. Under-slab aggregate should be compacted to at least 90% of its maximum dry density as determined by ASTM D1557 or equivalent.

In areas where moisture will be detrimental to floor coverings or equipment inside the proposed structure, appropriate vapor barrier and damp-proofing measures should be implemented. A commonly applied vapor barrier system consists of a 10-mil polyethylene vapor barrier placed directly over the capillary break material. With this type of system, an approximately 2-inch thick layer of sand is often placed over the vapor barrier to protect it from damage, to aid in curing of the concrete, and also to help prevent cement from bleeding down into the underlying capillary break materials. Other damp/vapor barrier systems may also be feasible. Appropriate design professionals should be consulted regarding vapor barrier and damp proofing systems, ventilation, building material selection and mold prevention issues, which are outside HGSI's area of expertise.

Perimeter Footing Drains

Due to the potential for perched surface water above fine grained deposits such as those encountered at the site, we recommend the outside edge of perimeter footings be provided with a drainage system consisting of 3-inch minimum diameter perforated PVC pipe embedded in a minimum of 1 ft^3 per lineal foot of clean, free-draining sand and gravel or 1"- ¼" drain rock. The drain pipe and surrounding drain rock should be wrapped in non-woven geotextile (Mirafi 140N, or approved equivalent) to minimize the potential for clogging and/or ground loss due to piping. Water collected from the footing drains should be directed into the local storm drain system or other suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. The footing drains should include clean-outs to allow periodic maintenance and inspection.

Down spouts and roof drains should collect roof water in a system separate from the footing drains in order to reduce the potential for clogging. Roof drain water should be directed to an appropriate discharge point well away from structural foundations. Grades should be sloped downward and away from buildings to reduce the potential for ponded water near structures.

Seismic Design

Structures should be designed to resist earthquake loading in accordance with the methodology described in the 2012 International Building Code (IBC) with applicable 2014 Oregon Structural Specialty Code (OSSC) revisions. We recommend Site Class C be used for design per the OSSC, which references ASCE 7-10, Chapter 20, Table 20.3-1. Design values determined for the site using the USGS (United States Geological Survey) *Earthquake Ground Motion Parameters* utility are summarized on Table 2.

Table 2. Recommended Earthquake Ground Motion Parameters (2012 IBC / 2014 OSSC)

Parameter	Value
Location (Lat, Long), degrees	45.3193, -122.7477
Mapped Spectral Acceleration Values (MCE, Site Class B):	
Short Period, S_s	0.929 g
1.0 Sec Period, S_1	0.409 g
Soil Factors for Site Class D:	
F_a	1.129
F_v	1.591
$SD_s = 2/3 \times F_a \times S_s$	0.699 g
$SD_1 = 2/3 \times F_v \times S_1$	0.434 g

Potential seismic impacts also include secondary effects such as soil liquefaction, fault rupture potential, and other hazards as discussed below:

- **Soil Liquefaction Potential –** Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to earthquake shaking. Soil liquefaction is generally limited to loose, granular soils located below the water table. Following development, on-site soils will consist predominantly of engineered fill or stiff clayey native soils above the water table, which are not considered susceptible to liquefaction. Therefore, it is our opinion that special design or construction measures are not required to mitigate the effects of liquefaction.
- **Fault Rupture Potential** – Based on our review of available geologic literature, we are not aware of any mapped active (demonstrating movement in the last 10,000 years) faults on the site. During our field investigation, we did not observe any evidence of surface rupture or recent faulting. Therefore, we conclude that the potential for fault rupture on site is low.
- **Seismic Induced Landslide** – Topography in the vicinity of the subject site is generally flat to gently sloping. The potential for slope instability and seismic induced landslide on site is considered very low.
- **Effects of Local Geology and Topography** – In our opinion, no additional seismic hazard will occur due to local geology or topography. The site is expected to have no greater seismic hazard than surrounding properties and the Wilsonville area in general.

Excavating Conditions and Utility Trench Backfill

We anticipate that on-site soils can be excavated using conventional heavy equipment such as scrapers and trackhoes to a depth of 7 feet and likely greater. Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. Actual slope inclinations at the time of construction should be determined based on safety requirements and actual soil and groundwater conditions. All temporary cuts in excess of 4 feet in height should be sloped in accordance with U.S. Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926), or be shored. The existing native soils classify as Type B Soil and temporary excavation side slope inclinations as steep as 1H:1V may be assumed for planning purposes. This cut slope inclination is applicable to excavations above the water table only.

Perched groundwater conditions often occur over fine-grained native deposits such as those beneath the site, particularly during the wet season. If encountered, the contractor should be prepared to implement an appropriate dewatering system for installation of the utilities. At this time, we anticipate that dewatering systems consisting of ditches, sumps and pumps would be adequate for control of groundwater where encountered during construction conducted during the dry season. Regardless of the dewatering system used, it should be installed and operated such that in-place soils are prevented from being removed along with the groundwater.

Vibrations created by traffic and construction equipment may cause some caving and raveling of excavation walls. In such an event, lateral support for the excavation walls should be provided by the contractor to prevent loss of ground support and possible distress to existing or previously constructed structural improvements.

Utility trench backfill should consist of ¾”-0 crushed rock, compacted to at least 90% of the maximum dry density obtained by Modified Proctor (ASTM D1557) or equivalent. Initial backfill lift thick nesses for a ¾”-0 crushed aggregate base may need to be as great as 4 feet to reduce the risk of flattening underlying flexible pipe. Subsequent lift thickness should not exceed 1 foot. If imported granular fill material is used, then the lifts for large vibrating plate-compaction equipment (e.g. hoe compactor attachments) may be up to 2 feet, provided that proper compaction is being achieved and each lift is tested. Use of large vibrating compaction equipment should be carefully monitored near existing structures and improvements due to the potential for vibration-induced damage.

Adequate density testing should be performed during construction to verify that the recommended relative compaction is achieved. Typically, one density test is taken for every 4 vertical feet of backfill on each 200-lineal-foot section of trench.

Erosion Control Considerations

During our field exploration program, we did not observe soil types that would be considered highly susceptible to erosion. Erosion at the site during construction can be minimized by implementing the project erosion control plan, which should include judicious use of straw, bio-bags, silt fences, or other appropriate technology. Where used, erosion control devices should be in place and remain in place throughout site preparation and construction. Areas of exposed soil requiring immediate and/or temporary protection against exposure should be covered with either mulch or erosion control netting/blankets.

UNCERTAINTIES AND LIMITATIONS

We have prepared this report for the owner and his/her consultants for use in design of this project only. This report should be provided in its entirety to prospective contractors for bidding and estimating purposes; however, the conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, HGSI should be notified for review of the recommendations of this report, and revision of such if necessary.

Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. Recommendations for design changes will be provided should conditions revealed during construction differ from those anticipated, and to verify that the geotechnical aspects of construction comply with the contract plans and specifications.

Within the limitations of scope, schedule and budget, HGSI executed these services in accordance with generally accepted professional principles and practices in the field of geotechnical engineering at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

We appreciate this opportunity to be of service.

Sincerely,

HARDMAN GEOTECHNICAL SERVICES INC.

64,422PE
SEPTEMBER 26, 2000
SCOTT L. HARDMAN
EXPIRES: 06-30-2019

5-24-18

Scott L. Hardman, P.E., G.E.
Geotechnical Engineer

Scott L. Hardman, P.E., G.E.
Geotechnical Engineer

Attachments:

REFERENCES

Beeson, M.H., Tolan, T.L., and Madin, I.P., 1991, Geologic map of the Portland Quadrangle, Multnomah, and Washington Counties, Oregon: Oregon Department of Geology and Mineral Industries Geological Map Series GMS-75, scale 1:24,000.

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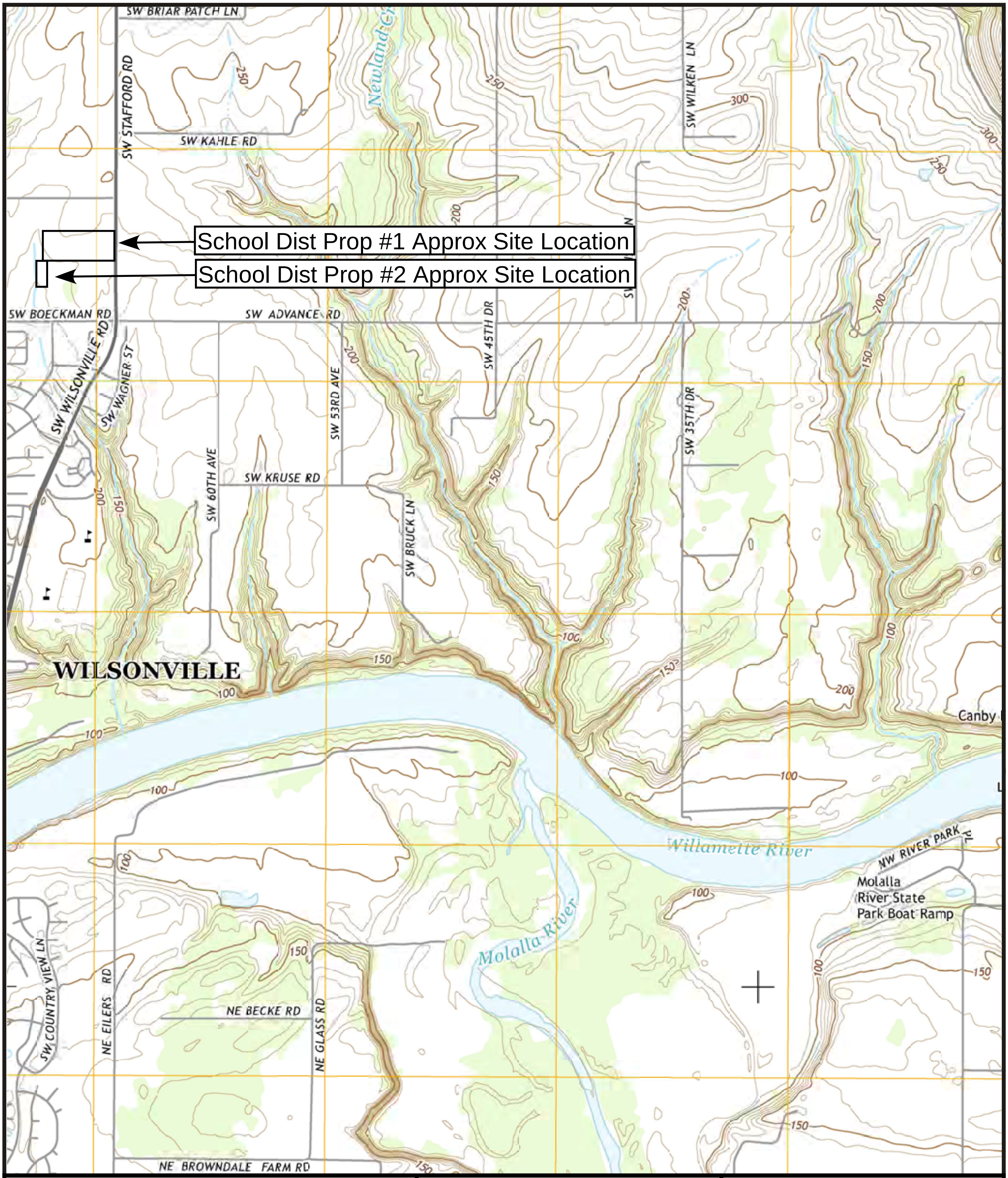
VICINITY MAP



Project: School District Properties Wilsonville, Oregon	Project No. 18-2318	FIGURE 1

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SITE MAP AND EXPLORATION LOCATIONS

Legend

HA-1 ⯐	Hand Auger Designation and Approximate Location	
DCP-1 ◉	DCP Test Designation and Approximate Location	
TP-1 ▚	Test Pit Designation and Approximate Location	

Base map from Google Earth

Project: School District Properties
Wilsonville, Oregon

Project No. 18-2318

FIGURE 2

TEST PIT LOG

Project: Frog Pond - School District Prop. Wilsonville, Oregon	Project No. 18-2317	Test Pit No. TP- 11

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Very soft, highly organic, SILT(OL), dark brown, very moist (Topsoil / Disturbed Zone)
1						
2						
3						Medium stiff, clayey SILT (ML),brown with orange and black mottling, very moist (Willamette Formation)
4					▽	Moderate Seepage from exacavation sidewalls
5						
6						
7					▽	Substantial Seepage, water filling the excavation estimate rate at 5 gal / minute
8						Test pit terminated at 8 feet
9						
10						
11						
12						
13						
14						
15						

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Practical Cost-Effective Geotechnical Solutions

10110 SW Nimbus Avenue, Suite B-5
Portland, Oregon 97223
(503) 530-8076

LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 5/17/18

Logged By: CSH

TEST PIT LOG

Project: Frog Pond - School District Prop. Wilsonville, Oregon	Project No. 18-2317	Test Pit No. TP- 12

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Very soft, highly organic, SILT(OL), dark brown, very moist (Topsoil)
1						
2						
						Medium stiff, clayey SILT (ML),brown with orange and black mottling, moist (Willamette Formation)
3						
4						
5						
6						
7						
8					▽	Slight seepage observed from excavation sidewalls
9						
10						
						Test pit terminated at 10 feet
11						
12						
13						
14						
15						

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Portland, Oregon 97223
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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 5/17/18

Logged By: CSH

HARDMAN GEOTECHNICAL SERVICES INC.
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May 23, 2018
HGSI Project No. 18-2318

Dan Grimberg / Kristi Hosea
West Hills Land Development
3330 NW Yeon Avenue, Suite 200
Portland, Oregon 97210

Via e-mail (pdf format); hard copies can be mailed on request

Subject: **GEOTECHNICAL ENGINEERING REPORT**
FROG POND – SCHOOL DISTRICT PROPERTY #1
WILSONVILLE, CLACKAMAS COUNTY, OREGON

This report presents the results of a geotechnical engineering study conducted by Hardman Geotechnical Services Inc. (HGSI) for the above-referenced project. The purpose of this study was to evaluate subsurface conditions at the site and to provide geotechnical recommendations for site development. This geotechnical study was performed in accordance with HGSI Proposal No. 18-781, dated May 14, 2018, and your subsequent authorization of our proposal and *General Conditions for Geotechnical Services*.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

This geotechnical evaluation was performed for an area including the subject site, School District Property #1 Tax Lot Number 31W12D01800. The property is roughly 10 acres and is generally rectangular in shape. There is a single small out building structure on the project. Vegetation consists of mostly grasses with a few areas of shrubs and trees. The site is flat to gently sloping. Review of aerial photographs indicates that there were two additional residences, or possibly one residence and one barn/shop, on the site in the past. These were removed from the site in the time frame of 2002 – 2003 based on the aerial photographs.

The intent of this geotechnical report is to provide adequate geotechnical information for design and construction applicable to the entire site, or to the School District Property #1 portion of the site. A grading plan has not been finalized and should be reviewed by HGSI when completed. Underground utilities and onsite stormwater systems are also planned. HGSI should review the grading plan when available to verify consistency with the geotechnical recommendations, and to provide any supplemental or revised input to the design needed based on geotechnical considerations.

REGIONAL GEOLOGY AND SEISMIC SETTING

The subject site lies within the Portland Basin, a broad structural depression situated between the Coast Range on the west and the Cascade Range on the east. The Portland Basin is a northwest-southwest trending structural basin produced by broad regional downwarping of the area. The Portland Basin is approximately 20 miles wide and 45 miles long and is filled with consolidated and unconsolidated sedimentary rocks of late Miocene, Pliocene and Pleistocene age.

The subject site is underlain by Quaternary age (last 1.6 million years) loess, a windblown silt deposit that mantles older deposits and basalt bedrock in the Portland Hills (Madin, 1990). The loess generally consists of massive silt deposited following repeated catastrophic flooding events in the Willamette Valley, the last of which occurred about 10,000 years ago. In localized areas, the loess includes buried paleosols that developed between depositional events. Regionally, the total thickness of loess ranges from 5 feet to greater than 100 feet.

The loess is underlain by residual soil formed by in place weathering of the underlying Columbia River Basalt Formation (Madin, 1990). The Miocene aged (about 14.5 to 16.5 million years ago) Columbia River Basalts are a thick sequence of lava flows which form the crystalline basement of the Tualatin Valley. The basalts are composed of dense, finely crystalline rock that is commonly fractured along blocky and columnar vertical joints. Individual basalt flow units typically range from 25 to 125 feet thick and interflow zones are typically vesicular, scoriaceous, brecciated, and sometimes include sedimentary rocks.

At least three major fault zones capable of generating damaging earthquakes are known to exist in the region. These include the Portland Hills Fault Zone, Gales Creek-Newberg-Mt. Angel Structural Zone, and the Cascadia Subduction Zone. These potential earthquake source zones are included in the determination of seismic design values for structures, as presented in the *Seismic Design* section. None of the known faults extend beneath the site.

FIELD EXPLORATION

The site-specific exploration for this study was conducted on May 17, 2018 and included 10 test pits (designated TP-1 through TP-10) excavated to depths of approximately 8 to 10 feet below ground surface (bgs) at the approximate locations shown on Figure 2. It should be noted that exploration locations were determined in the field by pacing or taping distances from apparent property corners and other site features shown on the plans provided. As such, the locations of the explorations should be considered approximate.

On May 17, 2018, HGSI also drilled five hand auger borings for the purpose of infiltration testing, at the request of the design team. The hand auger borings, designated HA-1 through HA-5, were located as shown on Figure 2.

Explorations were conducted under the full-time observation of HGSI personnel. Soil samples obtained from the borings were classified in the field and representative portions were placed in relatively air-tight plastic bags. These soil samples were then returned to the laboratory for further examination. Pertinent information including soil sample depths, stratigraphy, soil engineering characteristics, and groundwater occurrence was recorded. Soils were classified in general accordance with the Unified Soil Classification System.

Summary test pit logs are attached to this report. The stratigraphic contacts shown on the individual borehole logs represent the approximate boundaries between soil types. The actual transitions may be more gradual. The soil and groundwater conditions depicted are only for the specific dates and locations reported, and therefore, are not necessarily representative of other locations and times.

INFILTRATION TESTING

Soil infiltration testing was performed using the open hole, falling head method in hand auger borings HA-1 through HA-5, on May 17, 2018. Soils in the boring were pre-saturated a minimum of several hours prior to testing. Following the soil saturation, the infiltration test was conducted. The water level was measured to the nearest 0.1 inch from a fixed point. The change in water level was recorded at intervals during the test period. Table 1 presents the results of the falling head infiltration tests.

Table 1. Summary of Infiltration Test Results

Test Pit	Depth (feet bgs)	Soil Type	Infiltration Rate (in/hr)	Approx. Average Hydraulic Head Range (inches)
HA-1	4	Clayey Silt	**0.5**	18.8
HA-2	4	Clayey Silt	**0.05**	14.0
HA-3	4	Clayey Silt	**0.3**	26.5
HA-4	4	Clayey Silt	**0.2**	20.5
HA-5	6	Clayey Silt	**1.6***	24.5

*Use with caution – not representative of typical rates in this soil type.

SUBSURFACE CONDITIONS

The following discussion is a summary of subsurface conditions encountered in our explorations. For more detailed information regarding subsurface conditions at specific exploration locations, refer to the attached test pit logs. Also, please note that subsurface conditions can vary between exploration locations, as discussed in the *Uncertainty and Limitations* section below.

Soil

On-site soils are anticipated to consist of topsoil, clayey silt, and clay, as described below.

> ***Topsoil –*** From the ground surface, all test pits encountered 1.5 to 3 feet of topsoil, comprised of moist silt. The upper about 1 foot of the topsoil was highly organic.
>
> ***Gray Clay –*** Directly beneath the top soil in test pits TP-2, TP-5, TP-6, and TP-7, we encountered gray silty clay. The clay ranged from medium stiff to stiff and dry to very moist. The clay was moderately plastic and extended to roughly 3 to 5 feet bgs.
>
> ***Clayey Silt –*** Beneath the topsoil in the hand auger borings and the majority of the test pits; and beneath the clay unit in test pits TP-2, TP-5, TP-6 and TP-7, we encountered stiff to very stiff, moist, brown clayey silt with orange and gray mottling. All of the test pits terminated in the clayey silt unit, at depths of 8 to 10 feet bgs.

Groundwater

During the field exploration, no static groundwater level was encountered to the maximum depth of exploration at 10 feet bgs. Slight to moderate seepage was encountered in the majority of test pits. Seepage was observed from the sidewalls of several excavations at roughly 4 feet. Seepage depth was about 7 feet bgs in TP-1 and TP-2. Perched groundwater conditions often occur over fine-grained native deposits such as those beneath the site, particularly during the wet season. It is anticipated that groundwater conditions will vary depending on the season, local subsurface conditions, changes in site utilization, and other factors. The groundwater conditions reported above are for the specific date and locations indicated, and therefore may not necessarily be indicative of other times and/or locations.

CONCLUSIONS AND RECOMMENDATIONS

Results of this study indicate that the proposed development is geotechnically feasible, provided that the recommendations of this report are incorporated into the design and construction phases of the project. Recommendations are presented below regarding site preparation and undocumented fill removal, engineered fill, wet weather earthwork, spread footing foundations, below grade structural retaining walls, concrete slabs-on-grade, perimeter footing drains, seismic design, infiltration rates and stormwater system design, excavating conditions and utility trench backfill, and erosion control considerations.

Site Preparation and Undocumented Fill Removal

The areas of the site to be graded should first be cleared of vegetation, undocumented fill, and any loose debris; and debris from clearing should be removed from the site. Organic-rich topsoil should then be removed to competent native soils. We anticipate that the average depth of topsoil stripping will be about 12 inches over most of the site, however deeper stripping may be needed in localized areas. The final depth of stripping removal may vary depending on local subsurface conditions and the contractor's methods, and should be determined on the basis of site observations after the initial stripping has been performed. Stripped organic soil should be stockpiled only in designated areas or removed from the site and stripping operations should be observed and documented by HGSI. Existing subsurface structures (tile drains, old utility lines, septic leach fields, etc.) beneath areas of proposed structures and pavement should be removed and the excavations backfilled with engineered fill.

There is potential for old fills to be present on site in areas beyond our explorations. Where encountered beneath proposed structures, pavements, or other settlement-sensitive improvements, undocumented fill should be removed down to firm inorganic native soils and the removal area backfilled with engineered fill (see below). HGSI should observe removal excavations (if any) prior to fill placement to verify that overexcavations are adequate and an appropriate bearing stratum is exposed.

In construction areas, once stripping has been verified, the area should be ripped or tilled to a depth of 12 inches, moisture conditioned, and compacted in-place prior to the placement of engineered fill. Exposed subgrade soils should be evaluated by HGSI. For large areas, this evaluation is normally performed by proof-rolling the exposed subgrade with a fully loaded scraper or dump truck. For smaller areas where access is restricted, the subgrade should be evaluated by probing the soil with a steel probe. Soft/loose soils identified during subgrade preparation should be compacted to a firm and unyielding condition or over-excavated and replaced with engineered fill, as described below. The depth of overexcavation, if required, should be evaluated by HGSI at the time of construction.

Engineered Fill

In general, we anticipate that on-site soils will be suitable for use as engineered fill in dry weather conditions, provided they are relatively free of organics and are properly moisture conditioned for compaction. Imported fill material must be approved by the geotechnical engineer prior to being imported to the site. Oversize material greater than 6 inches in size should not be used within 3 feet of foundation footings, and material greater than 12 inches in diameter should not be used in engineered fill.

Engineered fill should be compacted in horizontal lifts not exceeding 8 inches using standard compaction equipment. We recommend that engineered fill be compacted to at least 90 percent of the maximum dry density determined by ASTM D1557 (Modified Proctor) or equivalent. On-site soils may be wet or dry of optimum; therefore, we anticipate that moisture conditioning of native soil will be necessary for compaction operations.

Proper test frequency and earthwork documentation usually requires daily observation and testing during stripping, rough grading, and placement of engineered fill. Field density testing should conform to ASTM D2922 and D3017, or D1556. Engineered fill should be periodically observed and tested by the project geotechnical engineer or his representative. Typically, one density test is performed for at least every 2 vertical feet of fill placed or every 500 yd^3, whichever requires more testing.

Wet Weather Earthwork

The on-site soils are moisture sensitive and may be difficult to handle or traverse with construction equipment during periods of wet weather. Earthwork is typically most economical when performed under dry weather conditions. Earthwork performed during the wet-weather season will probably require expensive measures such as cement treatment or imported granular material to compact fill to the recommended engineering specifications. If earthwork is to be performed or fill is to be placed in wet weather or under wet conditions when soil moisture content is difficult to control, the following recommendations should be incorporated into the contract specifications.

- Earthwork should be performed in small areas to minimize exposure to wet weather. Excavation or the removal of unsuitable soils should be followed promptly by the placement and compaction of clean engineered fill. The size and type of construction equipment used may have to be limited to prevent soil disturbance. Under some circumstances, it may be necessary to excavate soils with a backhoe to minimize subgrade disturbance caused by equipment traffic;
- The ground surface within the construction area should be graded to promote run-off of surface water and to prevent the ponding of water;
- Material used as engineered fill should consist of clean, granular soil containing less than about 7 percent fines. The fines should be non-plastic. Alternatively, cement treatment of on-site soils may be performed to facilitate wet weather placement;
- The ground surface within the construction area should be sealed by a smooth drum vibratory roller, or equivalent, and under no circumstances should be left uncompacted and exposed to moisture. Soils which become too wet for compaction should be removed and replaced with clean granular materials;
- Excavation and placement of fill should be observed by the geotechnical engineer to verify that all unsuitable materials are removed and suitable compaction and site drainage is achieved; and
- Bales of straw and/or geotextile silt fences should be strategically located to control erosion.

If cement or lime treatment is used to facilitate wet weather construction, HGSI should be contacted to provide additional recommendations and field monitoring.

Spread Footing Foundations

Shallow, conventional isolated or continuous spread footings may be used to support the proposed structures, provided they are founded on competent native soils, or compacted engineered fill placed directly upon the competent native soils. We recommend a maximum allowable bearing pressure of 2,000 pounds per square foot (psf) for designing spread footings bearing on undisturbed native soils or engineered fill. The recommended maximum allowable bearing pressure may be increased by a factor of 1.33 for short term transient conditions such as wind and seismic loading. Exterior footings should be founded at least 18 inches below the lowest adjacent finished grade. Minimum footing widths should be determined by the project engineer/architect in accordance with applicable design codes.

Assuming construction is accomplished as recommended herein, and for the foundation loads anticipated, we estimate total settlement of spread foundations of less than about 1 inch and differential settlement between two adjacent load-bearing components supported on competent soil of less than about ½ inch. We anticipate that the majority of the estimated settlement will occur during construction, as loads are applied.

Wind, earthquakes, and unbalanced earth loads will subject the proposed structure to lateral forces. Lateral forces on a structure will be resisted by a combination of sliding resistance of its base or footing on the underlying soil and passive earth pressure against the buried portions of the structure. For use in design, a coefficient of friction of 0.5 may be assumed along the interface between the base of the footing and subgrade soils. Passive earth pressure for buried portions of structures may be calculated using an equivalent fluid weight of 390 pounds per cubic foot (pcf), assuming footings are cast against dense, natural soils or engineered fill. The recommended coefficient of friction and passive earth pressure values do not include a safety factor. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

Footing excavations should be trimmed neat and the bottom of the excavation should be carefully prepared. Loose, wet or otherwise softened soil should be removed from the footing excavation prior to placing reinforcing steel bars. HGSI should observe foundation excavations prior to placing crushed rock, to verify that adequate bearing soils have been reached. Due to the high moisture sensitivity of on-site soils, construction during wet weather may require overexcavation of footings and backfill with compacted, crushed aggregate.

Below-Grade Structural Retaining Walls

Lateral earth pressures against below-grade retaining walls will depend upon the inclination of any adjacent slopes, type of backfill, degree of wall restraint, method of backfill placement, degree of backfill compaction, drainage provisions, and magnitude and location of any adjacent surcharge loads. At-rest soil pressure is exerted on a retaining wall when it is restrained against rotation. In contrast, active soil pressure will be exerted on a wall if its top is allowed to rotate or yield a distance of roughly 0.001 times its height or greater. If the subject retaining walls will be free to rotate at the top, they should be designed for an active earth pressure equivalent to that generated by a fluid weighing 35 pcf for level backfill against the wall. For restrained walls, an at-reset equivalent fluid pressure of 54 pcf should be used in design, again assuming level backfill against the wall. These values assume that the recommended drainage provisions are incorporated, and hydrostatic pressures are not allowed to develop against the wall.

During a seismic event, lateral earth pressures acting on below-grade structural walls will increase by an incremental amount that corresponds to the earthquake loading. Based on the Mononobe-Okabe equation and peak horizontal accelerations appropriate for the site location, seismic loading should be modeled using the active or at-rest earth pressures recommended above, plus an incremental rectangular-shaped seismic load of magnitude 5H, where H is the total height of the wall.

We assume relatively level ground surface below the base of the walls. As such, we recommend passive earth pressure of 390 pcf for use in design, assuming wall footings are cast against competent native soils or engineered fill. If the ground surface slopes down and away from the base of any of the walls, a lower passive earth pressure should be used and HGSI should be contacted for additional recommendations.

A coefficient of friction of 0.5 may be assumed along the interface between the base of the wall footing and subgrade soils. The recommended coefficient of friction and passive earth pressure values do not include a safety factor, and an appropriate safety factor should be included in design. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

The above recommendations for lateral earth pressures assume that the backfill behind the subsurface walls will consist of properly compacted structural fill, and no adjacent surcharge loading. If the walls will be subjected to the influence of surcharge loading within a horizontal distance equal to or less than the height of the wall, the walls should be designed for the additional horizontal pressure. For uniform surcharge pressures, a uniformly distributed lateral pressure of 0.3 times the surcharge pressure should be added.

The recommended equivalent fluid densities assume a free-draining condition behind the walls so that hydrostatic pressures do not build up. This can be accomplished by placing a 12-inch wide zone of crushed drain rock containing less than 5 percent fines against the walls. A 3-inch minimum diameter perforated, plastic drain pipe should be installed at the base of the walls and connected to a sump to remove water from the crushed drain rock zone. The drain pipe should be wrapped in filter fabric (Mirafi 140N or other as approved by the geotechnical engineer) to minimize clogging. The above drainage measures are intended to remove water from behind the wall to prevent hydrostatic pressures from building up. Additional drainage measures may be specified by the project architect or structural engineer, for damp-proofing or other reasons.

HGSI should be contacted during construction to verify subgrade strength in wall keyway excavations, to verify that backslope soils are in accordance with our assumptions, and to take density tests on the wall backfill materials.

Concrete Slabs-on-Grade

Preparation of areas beneath concrete slab-on-grade floors should be performed as recommended in the *Site Preparation* section. Care should be taken during excavation for foundations and floor slabs, to avoid disturbing subgrade soils. If subgrade soils have been adversely impacted by wet weather or otherwise disturbed, the surficial soils should be scarified to a minimum depth of 8 inches, moisture conditioned to within about 3 percent of optimum moisture content, and compacted to engineered fill specifications. Alternatively, disturbed soils may be removed and the removal zone backfilled with additional crushed rock. For evaluation of the concrete slab-on-grade floors using the beam on elastic foundation method, a modulus of subgrade reaction of 200 kcf (115 pci) should be assumed for the soils anticipated at subgrade depth. This value assumes the concrete slab system is designed and constructed as recommended herein, with a minimum thickness of crushed rock of 8 inches beneath the slab.

Interior slab-on-grade floors should be provided with an adequate moisture break. The capillary break material should consist of ODOT open graded aggregate per ODOT Standard Specifications 02630-2. The minimum recommended thickness of capillary break materials on re-compacted soil subgrade is 8 inches. The total thickness of crushed aggregate will be dependent on the subgrade conditions at the time of construction, and should be verified visually by proof-rolling. Under-slab aggregate should be compacted to at least 90% of its maximum dry density as determined by ASTM D1557 or equivalent.

In areas where moisture will be detrimental to floor coverings or equipment inside the proposed structure, appropriate vapor barrier and damp-proofing measures should be implemented. A commonly applied vapor barrier system consists of a 10-mil polyethylene vapor barrier placed directly over the capillary break material. With this type of system, an approximately 2-inch thick layer of sand is often placed over the vapor barrier to protect it from damage, to aid in curing of the concrete, and also to help prevent cement from bleeding down into the underlying capillary break materials. Other damp/vapor barrier systems may also be feasible. Appropriate design professionals should be consulted regarding vapor barrier and damp proofing systems, ventilation, building material selection and mold prevention issues, which are outside HGSI's area of expertise.

Perimeter Footing Drains

Due to the potential for perched surface water above fine grained deposits such as those encountered at the site, we recommend the outside edge of perimeter footings be provided with a drainage system consisting of 3-inch minimum diameter perforated PVC pipe embedded in a minimum of 1 ft^3 per lineal foot of clean, free-draining sand and gravel or 1”- ¼” drain rock. The drain pipe and surrounding drain rock should be wrapped in non-woven geotextile (Mirafi 140N, or approved equivalent) to minimize the potential for clogging and/or ground loss due to piping. Water collected from the footing drains should be directed into the local storm drain system or other suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. The footing drains should include clean-outs to allow periodic maintenance and inspection.

Down spouts and roof drains should collect roof water in a system separate from the footing drains in order to reduce the potential for clogging. Roof drain water should be directed to an appropriate discharge point well away from structural foundations. Grades should be sloped downward and away from buildings to reduce the potential for ponded water near structures.

Seismic Design

Structures should be designed to resist earthquake loading in accordance with the methodology described in the 2012 International Building Code (IBC) with applicable 2014 Oregon Structural Specialty Code (OSSC) revisions. We recommend Site Class C be used for design per the OSSC, which references ASCE 7-10, Chapter 20, Table 20.3-1. Design values determined for the site using the USGS (United States Geological Survey) *Earthquake Ground Motion Parameters* utility are summarized on Table 2.

Table 2. Recommended Earthquake Ground Motion Parameters (2012 IBC / 2014 OSSC)

Parameter	Value
Location (Lat, Long), degrees	45.3205, -122.7458
Mapped Spectral Acceleration Values (MCE, Site Class B):	
Short Period, S_s	0.928 g
1.0 Sec Period, S_1	0.408 g
Soil Factors for Site Class D:	
F_a	1.129
F_v	1.592
$SD_s = 2/3 \times F_a \times S_s$	0.698 g
$SD_1 = 2/3 \times F_v \times S_1$	0.433 g

Potential seismic impacts also include secondary effects such as soil liquefaction, fault rupture potential, and other hazards as discussed below:

- **Soil Liquefaction Potential –** Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to earthquake shaking. Soil liquefaction is generally limited to loose, granular soils located below the water table. Following development, on-site soils will consist predominantly of engineered fill or stiff clayey native soils above the water table, which are not considered susceptible to liquefaction. Therefore, it is our opinion that special design or construction measures are not required to mitigate the effects of liquefaction.
- **Fault Rupture Potential** – Based on our review of available geologic literature, we are not aware of any mapped active (demonstrating movement in the last 10,000 years) faults on the site. During our field investigation, we did not observe any evidence of surface rupture or recent faulting. Therefore, we conclude that the potential for fault rupture on site is low.

- **Seismic Induced Landslide** – Topography in the vicinity of the subject site is generally flat to gently sloping. The potential for slope instability and seismic induced landslide on site is considered very low.
- **Effects of Local Geology and Topography** – In our opinion, no additional seismic hazard will occur due to local geology or topography. The site is expected to have no greater seismic hazard than surrounding properties and the Wilsonville area in general.

Infiltration Rates and Stormwater System Design

Based on results of the soil infiltration testing, soils on site exhibit low infiltration rate where test holes did not encounter perched water. Infiltration rates ranged from 0.05 to 1.6 inches/hour as indicated on Table 1. We do not recommend use of the 1.6 inches/hour value obtained in HA-5, it is not representative of typical values for this soil type. We recommend shallow systems in the range of 2 to 5 feet bgs be designed using an infiltration rate of **0.2 inches/hour**. This is slightly less than the average test value of 0.26 inches/hour (results from HA-1 through HA-4 only), but we feel 0.2 inches/hour is more representative of overall site conditions. Also, please note that the potential for infiltration of stormwater will be reduced during the wet season due to saturated soils / perched water conditions over much of the site. We do not believe the site is well suited for use of deeper infiltration facilities such as dry wells due to the very low-permeability site soils, and perched water conditions.

The designer should select an appropriate infiltration value based on our test results and the location of the proposed infiltration facility. The recommended infiltration rates do not incorporate a factor of safety. For the design infiltration rate, the system designer should incorporate an appropriate factor of safety against slowing of the rate over time due to biological and sediment clogging.

Infiltration test methods and procedures attempt to simulate the as-built conditions of the planned disposal system. However, due to natural variations in soil properties, actual infiltration rates may vary from the measured and/or recommended design rates. All systems should be constructed such that potential overflow is discharged in a controlled manner away from structures, and all systems should include an adequate factor of safety. Infiltration rates presented in this report should not be applied to inappropriate or complex hydrological models such as a closed basin without extensive further studies.

Excavating Conditions and Utility Trench Backfill

We anticipate that on-site soils can be excavated using conventional heavy equipment such as scrapers and trackhoes to a depth of 7 feet and likely greater. Maintenance of safe working conditions, including temporary excavation stability, is the responsibility of the contractor. Actual slope inclinations at the time of construction should be determined based on safety requirements and actual soil and groundwater conditions. All temporary cuts in excess of 4 feet in height should be sloped in accordance with U.S. Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926), or be shored. The existing native soils classify as Type B Soil and temporary excavation side slope inclinations as steep as 1H:1V may be assumed for planning purposes. This cut slope inclination is applicable to excavations above the water table only.

Perched groundwater conditions often occur over fine-grained native deposits such as those beneath the site, particularly during the wet season. If encountered, the contractor should be prepared to implement an appropriate dewatering system for installation of the utilities. At this time, we anticipate that dewatering systems consisting of ditches, sumps and pumps would be adequate for control of groundwater where encountered during construction conducted during the dry season. Regardless of the dewatering system used, it should be installed and operated such that in-place soils are prevented from being removed along with the groundwater.

Vibrations created by traffic and construction equipment may cause some caving and raveling of excavation walls. In such an event, lateral support for the excavation walls should be provided by the contractor to prevent loss of ground support and possible distress to existing or previously constructed structural improvements.

Utility trench backfill should consist of ¾”-0 crushed rock, compacted to at least 90% of the maximum dry density obtained by Modified Proctor (ASTM D1557) or equivalent. Initial backfill lift thick nesses for a ¾”-0 crushed aggregate base may need to be as great as 4 feet to reduce the risk of flattening underlying flexible pipe. Subsequent lift thickness should not exceed 1 foot. If imported granular fill material is used, then the lifts for large vibrating plate-compaction equipment (e.g. hoe compactor attachments) may be up to 2 feet, provided that proper compaction is being achieved and each lift is tested. Use of large vibrating compaction equipment should be carefully monitored near existing structures and improvements due to the potential for vibration-induced damage.

Adequate density testing should be performed during construction to verify that the recommended relative compaction is achieved. Typically, one density test is taken for every 4 vertical feet of backfill on each 200-lineal-foot section of trench.

Erosion Control Considerations

During our field exploration program, we did not observe soil types that would be considered highly susceptible to erosion. Erosion at the site during construction can be minimized by implementing the project erosion control plan, which should include judicious use of straw, bio-bags, silt fences, or other appropriate technology. Where used, erosion control devices should be in place and remain in place throughout site preparation and construction. Areas of exposed soil requiring immediate and/or temporary protection against exposure should be covered with either mulch or erosion control netting/blankets.

UNCERTAINTIES AND LIMITATIONS

We have prepared this report for the owner and his/her consultants for use in design of this project only. This report should be provided in its entirety to prospective contractors for bidding and estimating purposes; however, the conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary significantly over small distances. Inconsistent conditions can occur between explorations that may not be detected by a geotechnical study. If, during future site operations, subsurface conditions are encountered which vary appreciably from those described herein, HGSI should be notified for review of the recommendations of this report, and revision of such if necessary.

Sufficient geotechnical monitoring, testing and consultation should be provided during construction to confirm that the conditions encountered are consistent with those indicated by explorations. Recommendations for design changes will be provided should conditions revealed during construction differ from those anticipated, and to verify that the geotechnical aspects of construction comply with the contract plans and specifications.

Within the limitations of scope, schedule and budget, HGSI executed these services in accordance with generally accepted professional principles and practices in the field of geotechnical engineering at the time the report was prepared. No warranty, expressed or implied, is made. The scope of our work did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous or toxic substances in the soil, surface water, or groundwater at this site.

We appreciate this opportunity to be of service.

Sincerely,

HARDMAN GEOTECHNICAL SERVICES INC.

REGISTERED PROFESSIONAL ENGINEER
64,422PE
OREGON
SEPTEMBER 26, 2000
SCOTT L. HARDMAN

5-23-18

EXPIRES: 06-30-2019

Scott L. Hardman, P.E., G.E.
Geotechnical Engineer

Attachments:

REFERENCES

Beeson, M.H., Tolan, T.L., and Madin, I.P., 1991, Geologic map of the Portland Quadrangle, Multnomah, and Washington Counties, Oregon: Oregon Department of Geology and Mineral Industries Geological Map Series GMS-75, scale 1:24,000.

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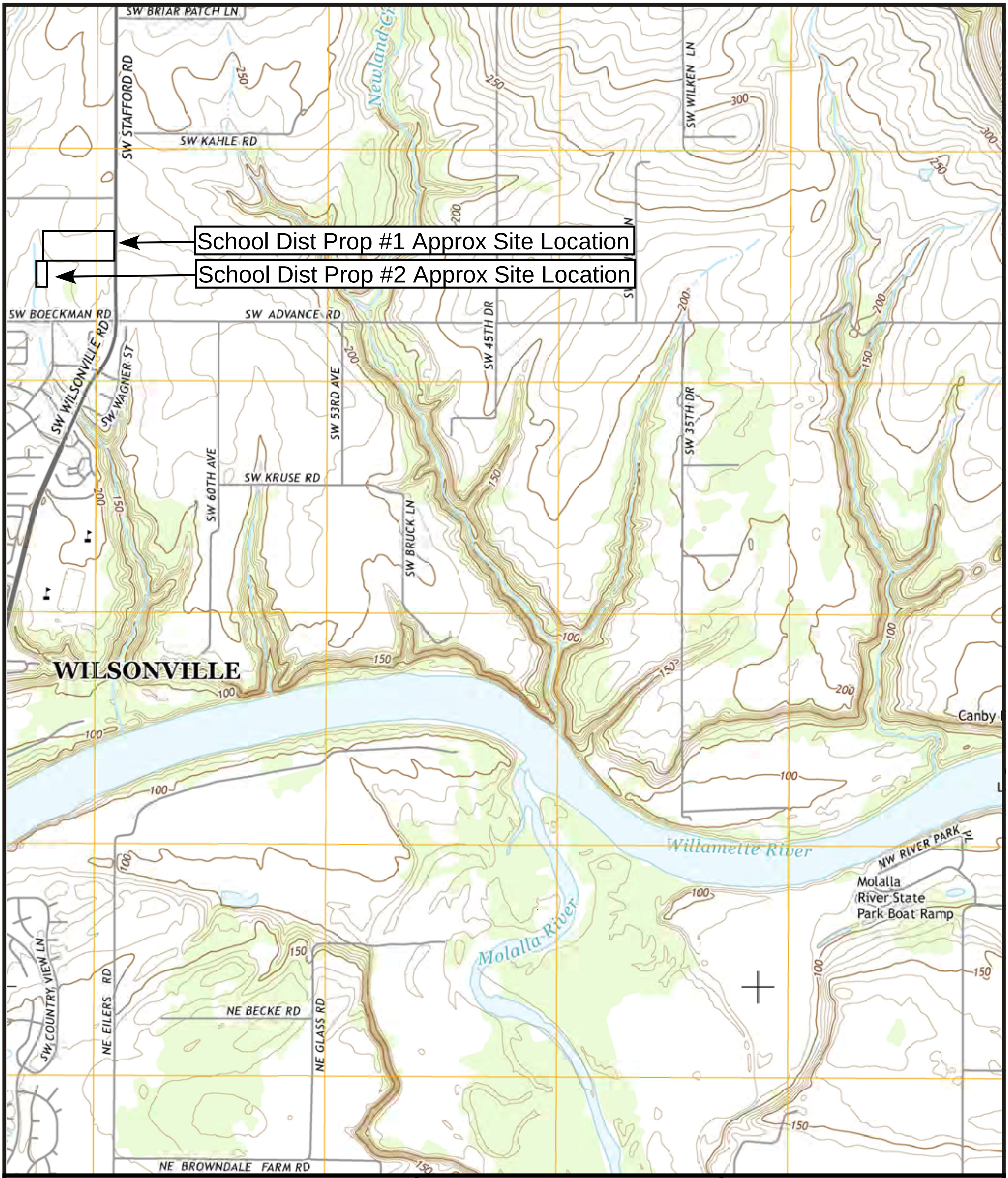
VICINITY MAP



School Dist Prop #1 Approx Site Location

School Dist Prop #2 Approx Site Location

Project: School District Properties Wilsonville, Oregon	Project No. 18-2318	FIGURE 1

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SITE MAP AND EXPLORATION LOCATIONS

Legend

HA-1 ⌖ Hand Auger Designation and Approximate Location

DCP-1 ⌖ DCP Test Designation and Approximate Location

TP-1 ▨ Test Pit Designation and Approximate Location

Base map from Google Earth

Project: School District Properties
Wilsonville, Oregon

Project No. 18-2318

FIGURE 2

TEST PIT LOG

Project: Frog Pond - School District Prop. Wilsonville, Oregon	Project No. 18-2317	Test Pit No. TP-1

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	**Material Description**
						Soft, highly organic (grass roots) SILT, dark brown, moist (Till zone / disturbed native soil)
1						
2						Medium stiff to stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
3						
4			4.2			
5				▽		Stiffening with depth to very stiff at 5 feet Slight seepage at approximately 5 feet
6						
				▽		Moderate seepage at approximately 7 feet
7						Medium, clayey SILT (ML),light brown with orange and gray mottling, saturated
8						Test pit terminated at 8 feet
9						
10						
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 5/17/18

Logged By: CSH

TEST PIT LOG

Project: Frog Pond - School District Prop.
Wilsonville, Oregon

Project No. 18-2317

Test Pit No. TP- 2

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT (OH), dark brown, moist (Till zone / disturbed native soil)
1						Soft, clayey SILT (MH),light brown with orange and gray mottling, slightly moist (Till zone / disturbed native soil)
2			1.5			Medium stiff, silty CLAY (CL),greyish brown with orange and gray mottling, moist (Willamette Formation)
3						
4			4.1		▽	Slight seepage observed at approximately 4.5 feet
5						Very stiff, clayey SILT (MH),light brown with orange and gray mottling, slightly moist (Willamette Formation)
6						
7						
8						
9						Moderate seepage coming from sidewalls and bottom of excavation
10						Test pit terminated at 10 feet
11						
12						
13						
14						
15						

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TEST PIT LOG

Project: Frog Pond - School District Prop.
Wilsonville, Oregon

Project No. 18-2317

Test Pit No. TP-3

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
1						Soft, highly organic (grass roots) SILT(OL), dark brown, moist (Till zone / disturbed native soil)
2						Medium stiff to stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
3						
4			3.5			
5						
6						
7						
8						
9						
10						Stiffening with depth to very stiff No seepage or groundwater was observed during the excavation
11						Test pit terminated at 10 feet
12						
13						
14						
15						

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▽ Observed seepage at time of excavation

Date Excavated: 5/17/18

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TEST PIT LOG

Project: Frog Pond - School District Prop.
Wilsonville, Oregon

Project No. 18-2317

Test Pit No. TP- 4

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT(OL), dark brown, moist (Till zone / disturbed native soil)
1						Soft, clayey SILT (ML),brown, moist (Till zone / disturbed native soil)
2						Stiff to very stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
3						
4						
			4.5+			
5						
6						
7						
8					▽	Slight seepage from excavation sidewalls at 8 feet
9						
10						Test pit terminated at 10 feet
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 5/17/18

Logged By: CSH

TEST PIT LOG

Project: Frog Pond - School District Prop. Wilsonville, Oregon	Project No. 18-2317	Test Pit No. TP- 5

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT(OL), dark brown, moist (Till zone / disturbed native soil)
1						
2			4.0			Stiff to very stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
3						Medium stiff, silty CLAY (CL),greyish brown with orange and gray mottling, moist (Willamette Formation)
4			3.6			
5						Stiff to very stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
6						
7						
8						Slight seepage from excavation sidewalls at 8 feet
9						
10						Test pit terminated at 10 feet
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 5/17/18

Logged By: CSH

TEST PIT LOG

Project: Frog Pond - School District Prop.
Wilsonville, Oregon

Project No. 18-2317

Test Pit No. TP- 6

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT(OL), dark brown, moist (Till zone / disturbed native soil)
1						
2			1.1			
3						Medium stiff, silty CLAY (CL),greyish brown with orange and gray mottling, moist (Willamette Formation)
4			2.8			
5						Stiff to very stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
6						
7						
8						
9						No seepage or grandwater was observed
10						Test pit terminated at 10 feet
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 5/17/18

Logged By: CSH

TEST PIT LOG

Project: Frog Pond - School District Prop.
Wilsonville, Oregon

Project No. 18-2317

Test Pit No. TP- 7

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT(OH), dark brown, moist (Till zone / disturbed native soil)
1						
2						Medium stiff to stiff, silty CLAY (CL),greyish brown with orange and gray mottling, very moist (Willamette Formation)
3						
4			3.8			
5					▽	Minor Seepage
6						Stiff to very stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
7						
8						
9						
10						Test pit terminated at 10 feet
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 5/17/18

Logged By: CSH

TEST PIT LOG

Project: Frog Pond - School District Prop.
Wilsonville, Oregon

Project No. 18-2317

Test Pit No. TP- 8

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft²)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT(OL), dark brown, moist (Till zone / disturbed native soil)
1						
2						cStiff, Clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
3						
4			4.1			
5						
6						
7					▽	Stiffening with depth to very stiff Minor seepage observed at the bottom of the excavation
8						Test pit terminated at 8 feet
9						
10						
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 5/17/18

Logged By: CSH

TEST PIT LOG

Project: Frog Pond - School District Prop.
Wilsonville, Oregon

Project No. 18-2317

Test Pit No. TP- 9

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT(OL), dark brown, moist (Till zone / disturbed native soil)
1						Soft, Clayey SILT (ML),brown, moist (Till zone / disturbed native soil)
2						Stiff to very stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
3						
4						
5						
6						
7						
8					▽	Slight seepage from excavation sidewalls at 8 feet
9						
10						Test pit terminated at 10 feet
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 5/17/18

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TEST PIT LOG

Project: Frog Pond - School District Prop.
Wilsonville, Oregon

Project No. 18-2317

Test Pit No. TP- 10

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT(OL), dark brown, moist (Till zone / disturbed native soil)
1						Soft, Clayey SILT (ML),brown, moist (Till zone / disturbed native soil)
2						Stiff to very stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
3						
4						
5						
6						
7						
8						
9						No seepage or groundwater observed during excavation
10						Test pit terminated at 10 feet
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 5/17/18
Logged By: CSH

TEST PIT LOG

Project: Frog Pond - School District Prop.
Wilsonville, Oregon

Project No. 18-2317

Test Pit No. TP- 11

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Very soft, highly organic, SILT(OL), dark brown, very moist (Topsoil / Undocmented Fill)
1						
2						
3						Medium stiff, clayey SILT (ML),brown with orange and black mottling, very moist (Willamette Formation)
4					▽	Moderate Seepage from exacavation sidewalls
5						
6						
7					▽	Substantial Seepage, water filling the excavation estimate rate at 5 gal / minute
8						Test pit terminated at 8 feet
9						
10						
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 5/17/18

Logged By: CSH

TEST PIT LOG

Project: Frog Pond - School District Prop.
Wilsonville, Oregon

Project No. 18-2317

Test Pit No. TP- 12

Depth (ft)	Sample Interval	Sample Designation	Pocket Penetrometer (tons/ft^2)	Moisture Content (%)	Groundwater	Material Description
						Very soft, highly organic, SILT(OL), dark brown, very moist (Topsoil / Undocmented Fill)
1						
2						Medium stiff, clayey SILT (ML),brown with orange and black mottling, moist (Willamette Formation)
3						
4						
5						
6						
7						
8					▽	Slight seepage overserved from excavation sidewalls
9						
10						Test pit terminated at 10 feet
11						
12						
13						
14						
15						

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LEGEND

▽ Observed seepage at time of excavation

Date Excavated: 5/17/18

Logged By: CSH

HAND AUGER BORING LOG

Project: School District Properties Willsonville, Oregon	Project No. 18-2317	Boring No. HA-1

Depth (ft)	Sample Interval	Sample Designation	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Groundwater	**Material Description**
						Soft, highly organic (grass roots) SILT, dark brown, moist (Till zone / disturbed native soil)
1						
						Medium stiff to stiff, clayey SILT (ML), light brown with orange and gray mottling, slightly moist (Willamette Formation)
2						
3						
4						Boring terminated at 4 feet
5						
6						
7						

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LEGEND

☒ S-1 — Soil Sample Depth Interval and Designation

▽ — Water Level at Time of Drilling

Date Excavated: 05/23/18
Logged By: EAH
Surface Elevation:

HAND AUGER BORING LOG

Project: School District Properties
Willsonville, Oregon

Project No. 18-2317

Boring No. HA-2

Depth (ft)	Sample Interval	Sample Designation	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT, dark brown, moist (Till zone / disturbed native soil)
1						
						Medium stiff to stiff, clayey SILT (ML), light brown with orange and gray mottling, slightly moist (Willamette Formation)
2						
3						
4						Boring terminated at 4 feet
5						
6						
7						

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LEGEND

☒ S-1 Soil Sample Depth Interval and Designation

▽ Water Level at Time of Drilling

Date Excavated: 05/23/18
Logged By: EAH
Surface Elevation:

HAND AUGER BORING LOG

Project: School District Properties Willsonville, Oregon	Project No. 18-2317	Boring No. HA- 3

Depth (ft)	Sample Interval	Sample Designation	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Groundwater	**Material Description**
						Soft, highly organic (grass roots) SILT, dark brown, moist (Topsoil)
1						very stiff, clay with trace silt, grey brown, moist (dry creek bed)
2						
3						Medium stiff to stiff, clayey SILT (ML), light brown with orange and gray mottling, slightly moist (Willamette Formation)
4						Boring terminated at 4 feet
5						
6						
7						

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LEGEND

☒ S-1 Soil Sample Depth Interval and Designation

▽ Water Level at Time of Drilling

Date Excavated: 05/23/18
Logged By: EAH
Surface Elevation:

HAND AUGER BORING LOG

Project: School District Properties Willsonville, Oregon	Project No. 18-2317	Boring No. HA- 4

Depth (ft)	Sample Interval	Sample Designation	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT, dark brown, moist (Topsoil)
1						Medium stiff to stiff, clayey SILT (ML), light brown with orange and gray mottling, slightly moist (Willamette Formation)
2						
3						
4						Boring terminated at 4 feet
5						
6						
7						

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LEGEND

☒ S-1 Soil Sample Depth Interval and Designation

▽ Water Level at Time of Drilling

Date Excavated: 05/23/18
Logged By: EAH
Surface Elevation:

HAND AUGER BORING LOG

Project: School District Properties
Willsonville, Oregon

Project No. 18-2317

Boring No. HA- 5

Depth (ft)	Sample Interval	Sample Designation	In-Situ Dry Density (lb/ft^3)	Moisture Content (%)	Groundwater	Material Description
						Soft, highly organic (grass roots) SILT, dark brown, moist (Till zone / disturbed native soil)
1						
2						Medium stiff to stiff, clayey SILT (ML), light brown with orange and gray mottling, slightly moist (Willamette Formation)
3						
4						
5						Stiff to very stiff, clayey SILT (ML),light brown with orange and gray mottling, slightly moist (Willamette Formation)
6						Boring terminated at 6 feet
7						

HGSI HARDMAN GEOTECHNICAL SERVICES INC.
Practical Cost-Effective Geotechnical Solutions
10110 SW Nimbus Avenue, Suite B-5
Portland, Oregon 97223
(503) 530-8076

LEGEND

☒ S-1 Soil Sample Depth Interval and Designation

▽ Water Level at Time of Drilling

Date Excavated: 05/23/18

Logged By: EAH

Surface Elevation:

Appendix H

Draft Declaration of Protective Covenants, Conditions, Restrictions and Easements

AFTER RECORDING, RETURN TO:

Law Office of Michelle D. Da Rosa
1001 SW Fifth Avenue, Suite 1100
Portland, OR 97204

DECLARATION OF PROTECTIVE COVENANTS, CONDITIONS, RESTRICTIONS AND EASEMENTS FOR STAFFORD MEADOWS

____________________, LLC

Declarant

TABLE OF CONTENTS

DECLARATION OF PROTECTIVE COVENANTS,
CONDITIONS, RESTRICTIONS AND EASEMENTS
FOR STAFFORD MEADOWS

THIS DECLARATION is made this _______ day of ____________, 2018 by ___________________ **LLC**, an Oregon limited liability company ("**Declarant**").

RECITALS

A. Declarant has recorded the plat of "**Stafford Meadows**" in the plat records of Clackamas County, Oregon as Plat No. __________. Declarant is the only owner of the land so platted.

B. Declarant desires to subject the Lots and Tracts described in Section 2.1 to the conditions, restrictions and charges set forth in this instrument for the benefit of such property, and its present and subsequent owners, and to establish such property under the Oregon Planned Community Act, ORS 94.550 to 94.783, as the first phase of a Class I planned development to be known as Stafford Meadows.

NOW, THEREFORE, Declarant hereby declares that the property described in Section 2.1 will be held, sold and conveyed subject to the following easements, covenants, restrictions and charges, which run with such property and are binding on all parties having or acquiring any right, title, or interest in such property or any part thereof, unless otherwise provided herein, and inure to the benefit of all such persons.

Article 1

DEFINITIONS

As used in this Declaration, the terms set forth below have the following meanings:

1.1 "**Additional Property**" means any land that is made subject to this Declaration as provided in Section 2.2.

1.2 "**Architectural Review Committee" or "the Committee**" means the committee appointed pursuant to Article 7.

1.3 "**Assessments**" means all assessments and other charges, fines and fees imposed by the Association on an Owner in accordance with this Declaration, the Bylaws of the Association, or the provisions of the Oregon Planned Community Act, including, without limitation, General Assessments, Special Assessments, Emergency Assessments, Limited Common Area Assessments, Working Fund Assessments and Individual Assessments as described in Article 10.

1.4 "**Association**" means the nonprofit corporation formed to serve as the Owners association as provided in Article 8, and its successors and assigns.

1.5 "**Board of Directors" or "the Board**" means the duly appointed or elected board of directors of the Association, which is invested with the authority to operate the Association and to appoint the officers of the Association. Prior to the Turnover Meeting, Declarant will appoint the Board of Directors. After the Turnover Meeting, the Board will be elected by the Owners.

1.6 "**Bylaws**" means the duly adopted bylaws of the Association as the same may hereafter be amended or replaced.

1.7 "**Common Areas**" means those lots or tracts designated as such on any plat of the Property, or in this Declaration or any declaration annexing Additional Property to Stafford Meadows, including any Improvements thereon, and also includes Common Easement Areas and any Lots converted to Common Areas as provided in Section 3.2.

1.8 "**Common Easement Areas**" means the utility, storm water, public sidewalk, and pedestrian and bicycle access easements established for the benefit of all property within Stafford Meadows pursuant to this Declaration.

1.9 "**Common Maintenance Areas**" means the Common Areas and any other areas designated as such in Section 9.1 of this Declaration or in any declaration annexing Additional Property to Stafford Meadows as being maintained by the Association.

1.10 "**Declarant**" means __________________ LLC, and its successors and assigns if such successor or assignee should acquire Declarant's interest in the remainder of the Property, or less than all of such property if a recorded instrument executed by Declarant assigns to the transferee all of Declarant's rights under this Declaration, and any affiliate of __________________ LLC. Any such successor declarant will succeed to all of the rights and obligations of the Declarant under this Declaration, including, without limitation, the obligation to complete any Improvements required by Clackamas County as part of its subdivision approval.

1.11 "**Design Guidelines**" means the guidelines adopted from time to time by the Architectural Review Committee pursuant to Article 7.

1.12 "**Emergency Assessments**" means the Assessments described in Section 10.4(c).

1.13 "**Front Yard**" means the front yards and side yards of Lots not enclosed by a fence, including street frontage planter strips for all Lots, street trees and entry monuments, if any.

1.14 "**General Assessments**" means the Assessments described in Section 10.4(a).

1.15 "**General Plan of Development**" means Declarant's general plan of development of the Property as approved by Clackamas County, as the same may be amended from time to time.

1.16 "**Improvement**" means every structure or improvement of any kind, including, but not limited to, a fence, wall, driveway, swimming pool, storage shelter, mailbox and newspaper receptacle, landscaping and any other product of construction efforts on or in respect to the Property.

1.17 “**Individual Assessments**” means the Assessments described in Section 10.4(d).

1.18 “**Initial Property**” means the real property referred to in Section 2.1.

1.19 “**Limited Common Area**” means those Common Areas established for the exclusive use or enjoyment of certain Lots as designated in this Declaration.

1.20 “**Limited Common Area Assessments**” means the Assessments described in Section 10.4(d).

1.21 “**Limited Common Easement Areas**” means those Limited Common Area easements established for the exclusive use or enjoyment of certain Lots as designated in this Declaration or in the Plat.

1.22 “**Living Unit**” means a building or a portion of a building located upon a Lot within the Property and designated for separate residential occupancy.

1.23 “**Lot**” means a platted or partitioned lot within the Property, with the exception of any lot marked on the Plat as being common or open space or so designated in this Declaration or the declaration annexing such property to Stafford Meadows.

1.24 “**Mortgage**” means a mortgage or a trust deed, “**Mortgagee**” means a mortgagee or a beneficiary of a trust deed, and “**Mortgagor**” means a mortgagor or a grantor of a trust deed.

1.25 “**Occupant**” means the occupant of a Living Unit who is the Owner, lessee or any other Person authorized by the Owner to occupy the premises.

1.26 “**Operations Fund**” means the fund described in Section 10.6.

1.27 “**Owner**” means the Person or Persons, including Declarant, owning any Lot in the Property, but does not include a tenant or holder of a leasehold interest or a contract vendor or other Person holding only a security interest in a Lot. If a Lot is Sold under a recorded real estate installment sale contract, the purchaser (rather than the seller) will be considered the Owner unless the contract specifically provides to the contrary. If a Lot is subject to a written lease with a term in excess of one year and the lease specifically so provides, then upon filing a copy of the lease with the Board of Directors, the lessee (rather than the fee owner) will be considered the Owner during the term of the lease for the purpose of exercising any rights related to such Lot under this Declaration. The rights, obligations and other status of being an Owner commence upon acquisition of the ownership of a Lot and terminate upon disposition of such ownership, but termination of ownership does not discharge an Owner from obligations incurred prior to termination.

1.28 “**Person**” means a human being, a corporation, partnership, limited liability company, trustee or other legal entity.

1.29 “**Plat**” means the plat of Stafford Meadows recorded in the plat records of Clackamas County, Oregon as Document No. _______________ and any annexation plat, as the same may be amended.

1.30 “**Public Areas**” means areas dedicated to the public or established for public use in any plat of the Property, or so designated in this Declaration or the declaration annexing such property to Stafford Meadows.

1.31 “**Reserve Fund**” means the fund described in Section 10.7.

1.32 “**Rules and Regulations**” means those policies, procedures, rules and regulations adopted by the Association pursuant to the authority granted in this Declaration, as the same may be amended from time to time.

1.33 “**Sold**” means that legal title has been conveyed or that a contract of sale has been executed and recorded under which the purchaser has obtained the right to possession.

1.34 “**Special Assessments**” means the Assessments described in Section 10.4(b)

1.35 “**The Property**” means Stafford Meadows.

1.36 “**Stafford Meadows**” means the Initial Property and any Additional Property annexed to this Declaration.

1.37 “**This Declaration**” means all of the easements, covenants, restrictions and charges set forth in this instrument, together with any rules or regulations promulgated hereunder, as the same may be amended or supplemented from time to time in accordance with the provisions hereof, including the provisions of any supplemental declaration annexing property to Stafford Meadows.

1.38 “**Turnover Meeting**” means the meeting called by Declarant pursuant to Section 8.7, at which Declarant will turn over administrative responsibility for the Property to the Association.

1.39 “**Working Fund Assessments**” means the Assessments described in Section 10.4(f).

Article 2

PROPERTY SUBJECT TO THIS DECLARATION

2.1 **Initial Property.** Declarant hereby declares that all of the real property described below is owned and will be owned, conveyed, hypothecated, encumbered, used, occupied and improved subject to this Declaration:

> All real property within that certain plat entitled “**Stafford Meadows**,” filed in the plat records of Clackamas County, Oregon, as Document No. __________________, except Tract H.

2.2 **Annexation of Additional Property**. Declarant may from time to time and in its sole discretion annex to Stafford Meadows as “Additional Property” any real property now or hereafter acquired by it, and may also from time to time and in its sole discretion permit other holders of real property to annex the real property owned by them to Stafford Meadows. The annexation of such Additional Property is accomplished as follows:

(a) The Owner or Owners of such real property will record a declaration that is executed by or bear the approval of Declarant and will, among other things, describe the real property to be annexed; establish land classifications for the Additional Property; establish any additional limitations, uses, restrictions, covenants and conditions that are intended to be applicable to such Additional Property; and declare that such property is held and will be held, conveyed, hypothecated, encumbered, used, occupied and improved subject to this Declaration.

(b) The Additional Property described in any such annexation thereby becomes a part of Stafford Meadows and subject to this Declaration, and the Declarant and the Association will have and accept and exercise administration of this Declaration with respect to such Additional Property.

(c) Notwithstanding any provision apparently to the contrary, a declaration with respect to any Additional Property may:

(1) modify or exclude any then existing restrictions and establish such new land classifications and such limitations, uses, restrictions, covenants and conditions with respect to such Additional Property as Declarant may deem to be appropriate for the development of the Additional Property; and

(2) with respect to existing land classifications, modify or exclude any then existing restrictions and establish additional or different limitations, uses, restrictions, covenants and conditions with respect to such property as Declarant may deem to be appropriate for the development of such Additional Property.

(d) There is no limitation on the number of Lots or Living Units that Declarant may create or annex to Stafford Meadows except as may be established by applicable ordinances of Clackamas County. Similarly, there is no limitation on the right of Declarant to annex common property, except as may be established by Clackamas County.

(e) Declarant does not agree to build any specific future Improvement, but does not choose to limit Declarant's right to add additional Improvements.

(f) Nothing in this Declaration establishes any duty or obligation on Declarant to annex any property to this Declaration, and no owner of property excluded from this Declaration has any right to have such property annexed to this Declaration or Stafford Meadows.

(g) Upon annexation to Stafford Meadows, additional Lots so annexed are entitled to voting rights as set forth in Section 8.3.

(h) The formula to be used for reallocating the common expenses if additional Lots are annexed and the manner of reapportioning the common expenses if additional Lots are annexed during a fiscal year are set forth in Section 10.5.

2.3 **Improvements.** Declarant does not agree to build any Improvements on the Property other than as required by Clackamas County, but may elect, at Declarant's option, to build additional Improvements.

2.4 **Withdrawal of Property.** Property may be withdrawn from Stafford Meadows only by duly adopted amendment to this Declaration, except that Declarant may withdraw all or a portion of the Initial Property or any Additional Property annexed pursuant to a declaration described in Section 2.2 at any time prior to the sale of the first Lot in the plat of the Initial Property or, in the case of Additional Property, prior to the sale of the first Lot in the property annexed by the supplemental declaration, subject to the prior approval of Clackamas County. Such withdrawal will be by a declaration executed by Declarant and recorded in the deed records of Clackamas County, Oregon. If a portion of the Property is withdrawn, all voting rights otherwise allocated to Lots being withdrawn will be eliminated, and the common expenses will be reallocated among the remaining Lots.

2.5 **Dedications.** Declarant reserves the right to dedicate any portions of the Property then owned by Declarant to any governmental authority, quasi-governmental entity or entity qualifying under Section 501(c)(3) of the Internal Revenue Code or similar provisions, from time to time, for such purposes as Declarant may deem to be appropriate, including, without limitation, for utility stations, equipment, fixtures and lines; streets and roads; sidewalks; trails; open space; recreational facilities; schools; fire, police, security, medical and similar services; and such other purposes as Declarant and such governmental authority or quasi-governmental entity determines to be appropriate from time to time. Any consideration received by Declarant as a result of such dedication or by reason of any condemnation or any conveyance in lieu of condemnation will belong solely to Declarant.

2.6 **Conversion of Lots to Common Areas**. Declarant may elect to build common facilities on one or more Lots and designate such Lots, or any portion thereof, as Common Areas by a supplemental declaration recorded in the deed records of Clackamas County, Oregon. The supplemental declaration must be executed by Declarant. Additionally, Declarant reserves the right over the Common Areas (excluding the Common Easement Areas) to make boundary line adjustments between any Lot (before the Lot has been sold to someone other than the Declarant or a successor declarant) and an adjacent Common Area by a supplemental declaration and plat recorded in the deed records of Clackamas County, Oregon, notwithstanding that such an adjustment may convert a Lot or a portion thereof to Common Area, or a Common Area, or portion thereof, into a Lot or portion of a Lot. This reserved conversion right will expire upon turnover of the Association to the members by the Declarant as provided for in the Bylaws.

2.7 **Subdivisions**. Declarant reserves the right to subdivide any Lots in the Additional Property then owned by it upon receiving all required approvals from the applicable governing authority. If any two or more Lots are so subdivided or subject to condominium ownership, they will be deemed separate Lots for the purposes of allocating assessments under the Declaration. No other Owner of any Lot in the Additional Property may subdivide any Lot without the prior written approval of Declarant prior to the Turnover Meeting and thereafter by the Architectural Review Committee, which consent may be granted or denied at the sole discretion of Declarant or the Committee, as applicable.

2.8 **Consolidations**. Declarant has the right to consolidate any two or more Lots in the Additional Property then owned by it upon receipt of any required approvals from the applicable governing authority. No other Owner may consolidate any Lots without the prior written approval of Declarant before the Turnover Meeting and thereafter by the Architectural Review Committee, which may be granted or denied at the sole discretion of Declarant or the Committee, as applicable. An approved consolidation will be effected by the recording of a supplemental declaration stating that the affected Lots are consolidated, which declaration must be executed by the Owner(s) of the affected Lots and by the chairperson of the Association. Once so consolidated, the consolidated Lot may not thereafter be partitioned, nor may the consolidation be revoked except as provided in Section 2.7 above. Any Lots consolidated pursuant to this section will be considered one Lot thereafter for the purposes of the Declaration, including voting rights and allocation of Assessments.

Article 3

LAND CLASSIFICATIONS

3.1 **Land Classifications Within Initial Property.** All land within the Initial Property is included in one or another of the following classifications:

(a) Lots, which consist of Lots 1 through 46 of the plat of the Initial Property.

(b) Common Areas, including the area marked as Tracts A, B, C, D, E, F and G on the plat of the Initial Property, plus the Common Easement Areas and Public Areas referred to below. Tract A is an Open Space, natural resource area; Tract B is a storm water facility subject to an easement over its entirety in favor of _____________; Tracts C is a landscape buffer along Boeckman Road; Tracts, D, E, and F are pedestrian access tracts subject to public pedestrian easements of their entirety.

(c) Common Easement Areas, which are wall maintenance easement areas over Lots 6, 7, 12-18, inclusive, public sidewalk easements, clean water service and storm facility easement areas, utility easements, sight distance easements, and any other easements established on the plat of the Initial Property or in any recorded document for entrance signage, monuments, or landscaping over Lots.

(d) There are no Limited Common Areas or Limited Common Easement Areas in the Initial Property.

3.2 **Conversion of Lots to Common Areas**. Declarant may elect to build common facilities on one or more Lots and designate such Lots as Common Areas by a declaration recorded in the deed records of Clackamas County, Oregon. Such declaration must be executed by Declarant as Owner of the Lots.

3.3 **Subdivisions.** Declarant reserves the right to subdivide any Lots then owned by it upon receiving all required approvals from Clackamas County. If a Lot or Lots are so subdivided, the new lots will be deemed separate Lots for the purposes of allocating Assessments under this Declaration. No other Owner of any Lot in the Property may subdivide any Lot without the prior written approval of the Declarant prior to the Turnover Meeting and thereafter by the Architectural Review Committee, which consent may be granted or denied at the sole discretion of the Declarant or the Committee, as applicable.

3.4 **Consolidations.** Declarant has the right to consolidate any two or more Lots then owned by it upon receipt of any required approvals from Clackamas County. No other Owner may consolidate any Lots without the prior written approval of the Declarant prior to the Turnover Meeting and thereafter by the Architectural Review Committee, which may be granted or denied at the sole discretion of the Declarant or Committee, as applicable. An approved consolidation will be effected by the recording of a supplemental declaration stating that the affected Lots are consolidated, which declaration must be executed by the Owner(s) of the affected Lots and by the president of the Association. Once so consolidated, the consolidated Lot may not thereafter be partitioned, nor may the consolidation be revoked except as provided in Section 3.3. Any Lots consolidated pursuant to this section will be considered one Lot thereafter for the purposes of this Declaration, including voting rights and allocation of Assessments.

Article 4

PROPERTY RIGHTS IN COMMON AREAS

4.1 **Owners' Easements of Enjoyment.** Subject to the provisions of this Article 4, every Owner and his or her invitees have a right and easement of enjoyment in and to the Common Areas, which easement is appurtenant to and passes with the title to every Lot. The use of the Common Easement Areas, however, are limited to the Owners and invitees of the Lots designated in the declaration establishing the Limited Common Easement Area.

4.2 **Title to Common Areas.** Except for portions dedicated to the public or any governmental authority and otherwise provided in this Section 4.2, title to the Common Areas will be conveyed to the Association by Declarant AS IS, but free and clear of monetary liens, on or before the Turnover Meeting. The Association, upon such conveyance, will assume all obligations to maintain, insure, and otherwise assume the obligations of the Declarant in respect of the Common Areas set forth in this Agreement or the Plat. Title to Common Easement Areas and Limited Common Easement Areas, if any, subject to the easements set forth in this Declaration or the supplemental declaration creating such areas, rests in the Owners of the respective Lots within which such areas are located, or to the public if part of dedicated street rights-of-way.

4.3 **Extent of Owners' Rights.** The rights and easements of enjoyment in the Common Areas created hereby are subject to the following and to all other provisions of this Declaration:

(a) **Association Easements.** Declarant grants to the Association for the benefit of the Association and all Owners of Lots within the Property the following easements over, under and upon the Common Maintenance Areas:

(1) An easement for underground installation and maintenance of power, gas, electric, water and other utility and communication lines and services installed by Declarant or with the approval of the Board of Directors of the Association and any such easement shown on any plat of the Property.

(2) An easement for construction, maintenance, repair, and use of such areas, including any common facilities on Tracts A, B, C, D, E, F or G.

(3) An easement for access for regular upkeep, maintenance, modification and replacement of the Front Yard landscaping and related irrigation equipment, including drainage systems, if any, and for making emergency repairs to the landscaping and related equipment and settings in the Front Yards of the Lots necessary for the public safety or to prevent damage to the

Common Maintenance Areas or to another Lot, or to enforce this Declaration or the Rules and Regulations, or with the approval of the Board of Directors of the Association.

(4) An easement for the purpose of making repairs to any existing structures on Common Areas.

(b) **Public and Utility Easements.**

The Common Areas are subject to the public and utility easements established the Plat. In addition, the public is hereby granted access easements over all sidewalks, pedestrian accesses and trails in the Common Areas within the Property as designated on the Plat. In addition, Declarant or the Association may (and, to the extent required by law will) grant or assign such easements to municipalities or other utilities performing utility services and to communication companies, and the Association may grant free access thereon to police, fire and other public officials, and to employees of utility companies and communications companies serving the Property.

(c) **Use of the Common Areas.** The Common Areas will be used for the purposes set forth in any plat of the Property and not be partitioned or otherwise divided into parcels for residential use, and no private structure of any type will be constructed on the Common Areas. Except as otherwise provided in this Declaration, the Common Areas are reserved for the use and enjoyment of all Owners. No private use may be made of the Common Areas except as otherwise provided in this Declaration. No Owner may place or cause to be placed on the Common Areas any trash, structure, equipment, furniture, package, or object of any kind. Nothing in this Declaration prevents the placing of a sign or signs upon the Common Areas by Declarant or the Association identifying the Property or identifying pathways or items of interest, signs restricting certain uses, or warning, traffic or directional signs, provided that such signs are approved by the Architectural Review Committee and comply with any applicable sign ordinances. The Board of Directors has authority to abate any trespass or encroachment upon the Common Areas at any time, by any reasonable means and with or without having to bring legal proceedings. A declaration annexing Additional Property may provide that the Owners of such Additional Property do not have the right to use a particular Common Area or facility located on such Common Area, in which event such Common Area will automatically become a "Limited Common Area" assigned to the Lots that have access thereto.

(d) **Alienation of the Common Areas.** The Association may not by act or omission seek to abandon, partition, subdivide, encumber as security for a debt, sell, transfer or convey the Common Areas owned directly or indirectly by the Association for the benefit of the Lots unless the holders of at least 80 percent of the Class A voting rights and the Class B Member (as defined in Section 8.3), if any, have given their prior written approval and unless approved by Clackamas County. Such approvals will not be required for dedications under Section 2.5. The Association, upon approval in writing of at least two-thirds of the Class A voting rights and the Class B Member, if any, and if approved by order or resolution of Clackamas County, may dedicate or convey any portion of the Common Areas to a park district or other public body. Any sale, transfer, conveyance or encumbrance permitted by this Declaration may provide that the Common Area may be released from any restrictions imposed by this Declaration if the request for approval of the action also includes approval of the release.

(e) **Leases, Easements, Rights-of-Way, Licenses and Similar Interests and Vacations of Roadways**. Notwithstanding the provisions of Section 4.3(d), the Association may execute, acknowledge and deliver leases, easements, rights-of-way, licenses and other similar interests affecting the Common Areas and consent to vacation of roadways within and adjacent to the Common Areas, subject to such approvals as are required by ORS 94.665(4) and (5).

(f) **Limitations on Use.** Use of the Common Areas is subject to the following:

(1) The provisions of this Declaration and any applicable supplemental declaration;

(2) Any restrictions or limitations contained in any deed or other instrument conveying such property to the Association;

(3) Easements reserved or granted in this Declaration or any supplemental declaration;

(4) The Common Areas may not be used for the construction of residential structures at any time.

(5) The Board's right to:

(A) adopt Rules and Regulations regulating use and enjoyment of the Common Areas, including rules limiting the number of guests who may use the Common Areas;

(B) suspend the right of an Owner to use the Common Areas as provided in this Declaration;

(C) dedicate or transfer all or any part of the Common Areas, subject to such approval requirements as may be set forth in this Declaration;

(D) impose reasonable membership requirements and charge reasonable admission or other use fees for the use of any recreational facility situated upon the Common Areas;

(E) permit use of any recreational facilities situated on the Common Areas by Persons other than Owners, their families, lessees and guests with or without payment of use fees established by the Board;

(F) designate areas and facilities of Common Areas as Public Areas; and

(G) provide certain Owners the rights to the exclusive use of those portions of the Common Areas designated as Limited Common Areas.

4.4 **Delegation of Use.** Any Owner may extend the Owner's right of use and enjoyment of the Common Areas to the members of the Owner's family, lessees and social invitees, as applicable, subject to reasonable regulation by the Board of Directors. An Owner who leases the Owner's Living Unit will be deemed to have assigned all such rights to the lessee of such Living Unit for the period of the lease.

4.5 **Easements Reserved by Declarant.** So long as Declarant owns any Lot, Declarant reserves an easement for itself and its successor and assigns (including any builder who purchased more than one Lot from Declarant for purposes of development), over, under and across the Common Areas to carry out sales and rental activities necessary or convenient for the sale or rental of Lots, including, without limitation, advertising and "For Sale" signs. Declarant, for itself and its successors and assigns, hereby retains a right and easement of ingress and egress over, in, upon, under and across the Common Areas and the right to store materials thereon and to make such other use thereof as may be reasonably necessary or incident to the construction of the Improvements on the Property or other real property owned by Declarant; provided, however, that no such rights may be exercised by Declarant in such a way as to unreasonably interfere with the occupancy of, use of, enjoyment of or access to an Owner's Lot by the Owner or the Owner's family, tenants, employees, guests, or invitees.

4.6 **Easement to Serve Other Property.** Declarant reserves for itself and its duly authorized agents, successors, assigns and Mortgagees, and the developers of Improvements in all future phases of Stafford Meadows, a perpetual easement over the Common Areas for the purposes of enjoyment, use, access and development of the property, even if such property is never made subject to this Declaration. This easement includes, but is not limited to, a right of ingress and egress over the Common Areas for construction, utilities, water and sanitary sewer lines, communication lines, drainage facilities, irrigation systems and signs, and ingress and egress for the benefit of other portions of Stafford Meadows and any Additional Property that becomes subject to this Declaration or any property in the vicinity of the Property or Additional Property that is then owned by Declarant or an affiliate thereof. Declarant agrees that such users are responsible for any damage caused to the Common Areas resulting from their actions in connection with development of such property. If the easement is exercised for permanent use by such property and such property or any portion thereof benefiting from such easement is not made subject to this Declaration, Declarant, its successors or assigns will enter a reasonable agreement with the Association to share the cost of any maintenance of such facilities. The allocation of costs in any such agreement will be based on the relative extent of use of such facilities.

4.7 **Limited Common Areas.** If any Limited Common Areas are included in an annexation declaration, the respective Limited Common Areas will be subject to a reciprocal access easement for the use by the Owners of the benefited Lots for vehicular access and utilities and communication lines serving such Lots. Such areas will be operated, maintained, replaced, and improved by the Association, but the entire cost thereof, including reserves for future maintenance, repairs, and replacements, will be assessed on an equal basis as Limited Common Area Assessments to the Owners of Lots to which such Limited Common Areas pertain.

Article 5

PROPERTY RIGHTS IN LOTS

5.1 **Use and Occupancy.** The Owner of a Lot in the Property is entitled to the exclusive use and benefit of such Lot, except as otherwise expressly provided in this Declaration, but the Lot is bound by, and each Owner and Declarant must comply with, the restrictions contained in Article 6, all other provisions of this Declaration and the provisions of any supplement or amendment to this Declaration.

5.2 **Easements Reserved.** In addition to any utility and drainage easements shown on any recorded plat, Declarant hereby reserves the following easements for the benefit of Declarant and the Association:

(a) **Adjacent Common Maintenance Area.** The Owner of any Lot that includes a Common Maintenance Area, or adjoins or blends together visually with any Common Maintenance Area must, as the Association so requires, permit the Association to enter upon the Lot to perform the maintenance of such Common Maintenance Area. The Owner and Occupant of each Lot is responsible for controlling such Owner's or Occupant's pets so as to not harm or otherwise disturb Persons performing such maintenance on behalf of the Association.

(b) **Utility Easements.** Easements for installation and maintenance of utilities and drainage facilities may be reserved over portions of certain Lots, as shown on any recorded plat. Within the easements, the Architectural Review Committee will not permit any structure, planting or other material to be placed or permitted to remain on the easement area if such structure, planting or other material may damage or interfere with the installation or maintenance of utilities, change the direction of flow of drainage systems or drainage infiltration facilities in the easements, or obstruct or retard the flow of water through drainage channels in the easements. The easement area of each Lot and all Improvements in it will be maintained continuously by the Owner of the Lot, except for those Improvements for which a public authority or utility company is responsible, and except Common Maintenance Areas, which are maintained by the Association.

(c) **Construction on Adjoining Lot.** Declarant hereby reserves for the benefit of Declarant and its assigns a temporary easement over each Lot for access to the adjoining Lot for construction purposes, including temporary placement of ladders or scaffolding. Declarant will restore the Lot to its condition as it existed prior to such access and will be responsible for any damage to the Lot.

(d) **Utility Inspection and Repairs.** Each utility and communication service provider and its agents or employees has authority to access all Lots, but not Improvements constructed thereon, and the Common Areas on which communication, power, gas, drainage, sewage or water facilities may be located for the purpose of installing, operating, maintaining, improving or constructing such facilities; reading meters; inspecting the condition of pipes, lines and facilities; and completing repairs. The Owner of any such Lot will be given advance notice if possible. In the case of an emergency, as determined solely by the utility or communication service provider, no prior notice will be required.

(e) **Easements for Encroachments.** Declarant grants reciprocal appurtenant easements of encroachment, and for maintenance and use of any permitted encroachment, between each Lot and any adjacent Common Areas and between adjacent Lots due to the unintentional placement or settling or shifting of the Improvements constructed, reconstructed or altered thereon (in accordance with the terms of this Declaration and the Design Guidelines) to a distance of not more than three feet, as measured from any point on the common boundary along a line perpendicular to such boundary. However, in no event will an easement for encroachment exist if such encroachment occurred due to willful and knowing conduct on the part of, or with the knowledge and consent of, the Person claiming the benefit of such easement.

(f) **Easements for Maintenance, Emergency and Enforcement.** Upon request given to the Owner and any Occupant, any Person authorized by the Association may enter a Lot to perform necessary maintenance, repair, or replacement of any property for which the Association has maintenance, repair or replacement responsibility under this Declaration, to make emergency repairs to a Lot that are necessary for the public safety or to prevent damage to Common Areas or to another Lot, or to enforce this Declaration or the Rules and Regulations. Requests for entry must be made in advance and for a reasonable time, except in the case of any emergency, when the right of entry is immediate. An emergency entry does not constitute a trespass or otherwise create a right of action in the Owner of the Lot.

(g) **Future Easements.** Declarant reserves the nonexclusive right and power to grant and record such specific easements as may be necessary, in the sole discretion of Declarant, in connection with the development of any of the Property. The location of any such easement is subject to the written approval of the Owner of the burdened Lot, which approval will not unreasonably be withheld, delayed or conditioned.

Article 6

GENERAL USE RESTRICTIONS

6.1 **Structures Permitted.** No structures may be erected or permitted to remain on any Lot except a single Living Unit and structures normally accessory thereto that have been constructed by Declarant or have first been approved by the Architectural Review Committee pursuant to Article 7. For purposes of this limitation, "normally accessory thereto" will not include accessory dwelling units even if they are otherwise permitted by applicable law. This provision does not exclude construction of a private greenhouse or storage unit, provided that the location of such is in conformity with the applicable regulations of Clackamas County, is compatible in design and decoration with the dwelling structure constructed on such Lot, and has been approved by the Committee.

6.2 **Residential Use.** Lots must only be used for residential purposes. Except with the consent of the Board of Directors, no trade, craft, business, profession, commercial or similar activity of any kind will be conducted on any Lot, nor may any goods, equipment, vehicles, materials, or supplies used in connection with any trade, service or business be kept or stored on any such Lot. The mere parking on a Lot of a vehicle bearing the name of a business will not, in itself, constitute a violation of this provision. Nothing in this Section 6.2 will be deemed to prohibit (a) activities relating to the sale of Living Units; (b) the right of Declarant or any contractor or home builder to construct Improvements on any Lot, to store construction materials and equipment on such Lots in the normal course of construction, and to use one or more Living Units as sales offices or model homes for purposes of sales in Stafford Meadows; and (c) the right of the Owner of a Lot to maintain his or her professional personal library, keep his or her personal business or professional records or accounts, handle his or her personal business or professional telephone calls or confer with business or professional associates, clients or customers in his or her Living Unit by appointment only. The Board will not approve commercial activities otherwise prohibited by this Section 6.2 unless the Board determines that only normal residential activities would be observable outside of the Living Unit and that the activities would not be in violation of applicable law. The Board may specify acceptable activities in the Rules and Regulations.

6.3 **Offensive or Unlawful Activities.** No noxious or offensive activities may be carried out upon the Property, nor will anything be done or placed on the Property that interferes with or jeopardizes the enjoyment of the Property, or that is a source of annoyance to Owners or Occupants. Occupants will use extreme care about creating disturbances, making noises or using musical instruments, radios, televisions, amplifiers and audio equipment that may disturb other Occupants. No unlawful use may be made of the Property or any part thereof, and all valid laws, zoning ordinances and regulations of all governmental bodies having jurisdiction over the Property must be observed. Owners and other Occupants must not engage in any abusive or harassing behavior, either verbal or physical, or any form of intimidation or aggression directed at other Owners, Occupants, guests or invitees, or directed at the managing agent, its agents or employees, or vendors.

6.4 **Animals.** No animals, livestock, or poultry of any kind may be raised, bred, kept or permitted within any Lot other than seeing eye horses and a reasonable number of household pets that are not kept, bred, or raised for commercial purposes and that are reasonably controlled so as not to be a nuisance. Any unrestrained or barking dog constitutes a nuisance. Any inconvenience, damage or unpleasantness caused by such pets are the responsibility of their respective Owners. No animal is permitted to roam the Property unattended, and each dog must be kept on a leash while outside a Lot. The construction or installation of dog runs and doghouses are subject to prior review and approval by the Architectural Review Committee pursuant to Article 7. An Owner or Occupant may be required to remove a pet upon receipt of the third written notice from the Board of Directors of violations of any rule, regulation or restriction governing pets within the Property.

6.5 **Maintenance of Structures.** Each Owner must maintain the Owner's Lot and Improvements thereon, including sidewalks adjacent to the Owner's Lot, and walkways and the driveway, in a clean and attractive condition, in good repair and in such fashion as not to create a fire or other hazard. Such maintenance includes, without limitation, exterior painting or staining, repair, replacement and care for roofs, gutters, downspouts, exterior building surfaces, walks, lights, perimeter fences and other exterior Improvements and glass surfaces. All repainting or re-staining, any change in type of roof or roof color and any exterior remodeling or changes are subject to prior review and approval by the Architectural Review Committee. Damage caused by fire, flood, storm, earthquake, riot, vandalism or other causes are likewise the responsibility of each Owner and must be restored within a reasonable time. Any change in appearance must first be approved by the Committee.

6.6 **Landscape Installation.** All landscaping on a Lot must be completed within a reasonable time not to exceed six months from the date of occupancy of the Living Unit constructed on a Lot. In the event of undue hardship due to weather conditions, this provision may be extended for a reasonable length of time upon approval of the Architectural Review Committee. Landscape plans will be submitted to the Committee for approval. Landscaping in the Front Yards must not be changed by an Owner without the approval of the Committee. Notwithstanding such limitations, an Owner may utilize planting pots or other free standing, movable planters within the Front Yard of his or her Lot; provided that the planters and plants growing in the planters are properly maintained. The Board of Directors may regulate the number and type of such planters.

6.7 **Maintenance of Landscaping.** Each Owner will keep all shrubs, trees, grass and plantings of every kind on the Owner's Lot (other than the landscaping in the Front Yard that is maintained by the Association), neatly trimmed, properly cultivated and free of trash, weeds and other unsightly material, except that the Association will be responsible for installation, maintenance and irrigation of landscaping of the Front Yard of each Lot, including the irrigation equipment and controllers. No Owner or Occupant will alter, change or tamper with the irrigation equipment, controllers or settings, which settings belong to the Association.

6.8 **Boundary Fences**. The responsibility for and cost of maintenance, repair and replacement of fencing on boundary lines between Lots will be shared by the Owners on either side of the fence in accordance with ORS Chapter 96.

6.9 **Fences, Hedges and Walls.** No fence, hedge, structure, wall, or retaining wall may be constructed or exist anywhere on any Lot without prior approval of the Architectural Review Committee and in accordance with its Design Guidelines. No planting or structure obstructing vision at driveways or intersections is permissible or may be maintained. Installation and maintenance of retaining walls that are required and approved by the Committee due to topographic conditions of individual Lots (other than the walls constructed by Declarant or a builder of Living Units on Lots 1-6, in the wall maintenance area designated on the Plat) are the sole and absolute responsibility of the individual Lot Owner, are to be aesthetically incorporated into the landscaping of the Lot, and are not the responsibility of the Association.

6.10 **Pest and Weed Control.** No Owner will permit any thing or condition to exist upon any portion of the Property that will induce, breed or harbor infectious plant or animal diseases or noxious insects or vermin. Each Owner must control noxious weeds on the Owner's Lot.

6.11 **Parking.** Except as may otherwise be provided in the Rules and Regulations, parking in excess of 24 hours of boats, trailers, mobile homes, campers or other recreational vehicles or equipment, regardless of weight, are not be allowed on any part of the Property or on public streets within the Property unless within areas designated for such purposes by the Board of Directors or within the confines of an enclosed garage and approved by the Architectural Review Committee before construction or screened from view in a manner approved by the Committee. No portion of the vehicle may project beyond the screened area. If there is no rear fencing and the vehicle could be seen from outside the Lot other than from the front road, the vehicle must also be screened from view from that direction. Vehicles may not be used for storage of materials for more than 48 hours without approval from the Committee. No motor vehicle of any type may be occupied for residential purposes while located within the Property. The Rules and Regulations may restrict the amount of noise vehicles may generate. The parking of vehicles is prohibited on any public or private street within the Property if posted or marked "No Parking" or if curbs are painted to restrict parking. Blocking a Common Area, roadways or alleys is prohibited. No parking is permitted in Common Areas unless so posted.

6.12 **Vehicles in Disrepair.** No Owner will permit any vehicle that is in an extreme state of disrepair or not currently licensed to be abandoned or to remain parked on the Owner's Lot (unless screened from view) or on the Common Area or any street for a period in excess of 48 hours. A vehicle will be deemed in an "extreme state of disrepair" when the Board of Directors determines that its presence reasonably offends the Occupants of the area due to its appearance or continued inoperability. Should any Owner fail to remove such vehicle within five days following the date on which notice is mailed to him or her by the Association, the Association may have the vehicle removed from the Property and charge the expense of such removal to the Owner.

6.13 **Signs.** No signs may be erected or maintained on any Lot except that not more than one "For Sale" sign placed by the Owner, Declarant or a licensed real estate agent, not exceeding 24 inches high and 36 inches long, may be temporarily displayed within the Front Yard of any Lot or inside of a first floor, front street facing window of a Living Unit located on a Lot, and two such signs may be placed on a Lot during the course of initial construction of a dwelling on such Lot. "For Rent" and "For Lease" signs are prohibited. The restrictions contained in this paragraph do not prohibit the temporary placement of "political" signs on any Lot by the Owner, subject to reasonable regulations adopted by the Architectural Review Committee relating to size and length of display.

6.14 **Rubbish, Trash and Outside Storage.** No part of the Property may be used as a dumping ground for trash or rubbish of any kind, and no rubbish, refuse or garbage is allowed to accumulate. All garbage and other waste must be kept in appropriate sanitary containers for proper disposal and out of public view, except the night before and during garbage pickup days. Yard rakings, dirt, and other material resulting from landscaping work will not be dumped onto Lots, streets, or Common Maintenance Areas. Storage areas, and the storage of machinery and equipment are prohibited on any Lot, unless obscured from view of neighboring property and streets by an appropriate screen or enclosure approved by the Architectural Review Committee. Tarps and covers are prohibited except as otherwise provided in the Rules and Regulations and the Design Guidelines. Should any Owner or Occupant responsible for its generation fail to remove any such materials within 10 days following the date on which notice is mailed to the Owner or Occupant by the Board of Directors, the Association may have the materials removed and charge the expense of such removal to the Owner.

6.15 **Construction.** The construction of any building on any Lot, including painting and all exterior finish, must be completed within eight months from the beginning of construction so as to present a finished appearance when viewed from any angle, and the Living Unit will not be occupied until so completed. In the event of undue hardship due to weather conditions or other causes beyond the reasonable control of the Owner, this time period may be extended for a reasonable length of time upon approval from the Architectural Review Committee. The building area must be kept reasonably clean and in workmanlike order, free of litter, during the construction period with a garbage can or other garbage disposal facility on the site during such period. Debris may not be deposited on any other Lot. All construction debris, stumps, trees, etc. must be periodically removed from each Lot by the builder or Owner, and such debris will not be dumped in any area within the Property unless approved by the Committee. The Rules and Regulations may impose reasonable limitations on the hours during which construction activities may take place. If construction has not commenced upon any Lot within one year after an Owner has acquired it, other than Declarant or an affiliate of Declarant, the Owner must install the sidewalk and landscape the area within 20 feet from the curb. The Owner will irrigate and maintain this area. The Committee may waive this requirement if it determines that construction will commence within a reasonable time. In any case, all unimproved or unoccupied Lots will be kept in a neat and orderly condition, free of brush, vines, weeds and other debris, and grass thereon must be cut or mowed at sufficient intervals to prevent creation of a nuisance or fire hazard.

6.16 **Temporary Structures.** No incomplete building or structure of a temporary character, nor any trailer, basement, tent, shack, garage, barn, or other outbuilding may be used on any Lot at any time as a residence either temporarily or permanently.

6.17 **Recreational Equipment.** Unless approved by the Architectural Review Committee or permitted by the Design Guidelines, no playground, athletic or recreational equipment or structures, including without limitation, permanently installed basketball backboards, hoops and related supporting structures, will be placed, installed or utilized on any Lot in view from any street, sidewalk or Common Area within the Property. Portable basketball backboards, hoops, soccer goal nets, and related supporting structures may be used during daylight hours, so long as such equipment is stored out of view from any street, sidewalk, or Common Area within the Property.

6.18 **Service Facilities.** Service facilities (garbage containers, fuel tanks, clotheslines, etc.) will be screened such that the elements screened are not visible at any time from the street or a neighboring property. The Architectural Review Committee may develop guidelines for clotheslines that are consistent with the green sustainability objectives of Stafford Meadows. All telephone, power, natural gas, cable television and other communication lines will be placed underground, except as otherwise mandated by local jurisdictions or public utility companies.

6.19 **Antennas and Satellite Dishes.** Exterior antennas, satellite receivers, and transmission dishes and other communication devices will not be permitted to be placed upon any Lot except in accordance with rules established by the Architectural Review Committee in accordance with Section 7.3.

6.20 **Exterior Lighting or Noisemaking Devices.** Except with the consent of the Architectural Review Committee, no exterior lighting or noisemaking devices may be installed or maintained on any Lot, other than as originally installed by the builder of the home and security alarms and fire alarms. Seasonal holiday lighting and decorations are permissible if consistent with any applicable Rules and Regulations and if installed not more than 30 days before and removed within 30 days after the celebrated holiday. The Committee may regulate the shielding or hours of use of lighting in order to reduce annoyance to neighboring properties. The location of air conditioning compressors must be approved by the Committee prior to installation.

6.21 **Subdividing or Partitioning Lots.** Except as otherwise provided in this Declaration, no Lot may be subdivided or partitioned, nor may its Lot lines be adjusted, without the approval of Clackamas County and the Architectural Review Committee.

6.22 **Grades, Slopes and Drainage.** Each Owner of a Lot accepts the burden of the established drainage pattern and grades, slopes and courses related thereto over any Lot or Common Area, and will not in any manner alter, modify or interfere with such drainage pattern, grades, slopes and courses without the prior approval of the Architectural Review Committee, and then only to the extent and in the manner specifically approved. No structure, plantings or other materials may be placed or permitted to remain on or within any grades, slopes or courses, nor may any other activities be undertaken that may damage or interfere with established slope ratios, create erosion or sliding problems, or obstruct, change the direction of or retard the flow of water through drainage channels.

6.23 **Garages.** All garage doors must remain closed except to permit entrance and exit and in connection with outside activities. Garages will be used primarily for parking of vehicles, and only secondarily for storage, and must not be used as office or living space without the prior approval of the Architectural Review Committee.

6.24 **Windows, Decks, Porches and Outside Walls.** To preserve the attractive appearance of the Property, the Association may regulate the nature of items that may be placed in or on windows, decks, porches, and the outside walls so as to be visible from the street or Common Areas, including, without limitation, window air conditioners and fans. Window coverings, curtains, shutters, drapes or blinds, other than those of commercially produced quality, are not permitted to be visible from any public or private street, pathway, Common Area or adjacent property. No aluminum foil, reflective film, or similar treatment may be placed on windows or glass doors. Garments, rugs, laundry and other similar items may not be hung from windows, facades, porches or decks.

6.25 **Leasing and Rental of Living Units**. All leases of a Living Unit must be by written agreement specifying that: (i) the tenant is subject to all provisions of the Declaration, Bylaws and Rules and Regulations; and (ii) failure to comply with any provision of the Declaration, Bylaws or Rules and Regulations constitutes a default under the rental agreement. The Owner must provide each tenant a copy of the Declaration, Bylaws and Rules and Regulations. Owner is responsible for any violations by tenants and is solely responsible for either correcting or eliminating such violations or causing tenant to do the same.

6.26 **Rules and Regulations.** In addition, the Association from time to time may adopt, modify, or revoke such nondiscriminatory Rules and Regulations governing the conduct of Persons and the operation and use of the Property as it may deem necessary or appropriate to ensure the peaceful and orderly use and enjoyment of the Property. A copy of the Rules and Regulations, upon adoption, and a copy of each amendment, modification or revocation thereof, must be delivered by the Board of Directors promptly to each Owner. The Rules and Regulations may be adopted by the Board, except as may be otherwise provided in the Bylaws of the Association.

Article 7

ARCHITECTURAL REVIEW COMMITTEE

7.1 **Architectural Review.** No Improvement may be commenced, erected, placed or altered on any Lot, until the construction plans and specifications showing the nature, shape, heights, materials, colors and proposed location of the Improvement have been submitted to and approved in writing by the Architectural Review Committee, except that construction by Declarant or any affiliate of Declarant, or any builder of Living Units on multiple Lots, will be presumed to have been approved and is thereby exempt from this review. The building plans to be submitted will consist of one complete set of plans and specifications in the usual form showing insofar as appropriate, (i) size and dimensions of the Improvements; (ii) exterior design; (iii) approximate exterior color scheme; (iv) location of Improvements on the Lot, including setbacks, driveway and parking areas; and (v) location of existing trees to be removed. These plans and specifications must be left with the Committee until 60 days after notice of completion has been received by the Committee. This is for the purpose of determining whether, after inspection by the Committee, the Improvement complies substantially with the plans and specifications that were submitted and approved. The Committee is not responsible for determining compliance with structural and building codes, zoning codes, or any other governmental regulations, all of which are the responsibility of the applicant. The procedure and specific requirements for review and approval of construction may be set forth in Design Guidelines adopted from time to time by the Committee. The Committee may charge a reasonable fee to cover the cost of processing an application. In all cases in which the Committee's consent is required by this

Declaration, the provisions of this Article 7 apply, except that this Article 7 does not apply to construction by Declarant or any affiliate of Declarant.

7.2 **Committee Decision.** The Architectural Review Committee will render its decision with respect to a construction proposal within 30 working days after it has received all material required by it with respect to the application. In the event the Committee fails to render its approval or disapproval within 45 working days after the Committee has received all material required by it with respect to the proposal, or if no suit to enforce this Declaration has been commenced within one year after completion thereof, approval will not be required and the related provisions of this Declaration will be deemed to have been fully complied with.

7.3 **Committee Discretion.** The Architectural Review Committee may withhold consent to any proposed work if the Committee finds the proposed work would be inappropriate for the particular Lot or incompatible with the Design Guidelines or design standards that the Committee intends for Stafford Meadows. It is the intent and purpose of this Declaration to ensure quality of workmanship and materials, to ensure harmony of external design with the existing Improvements and with respect to topography and finished grade elevations, and to ensure compliance with the setback requirements contained in the conditions of approval of Clackamas County. Considerations such as siting, shape, size, color, design, materials, height, screening, impairment of the view from other Lots or other effect on the enjoyment of other Lots or the Common Area, disturbance of existing terrain and vegetation, and any other factors that the Committee reasonably believes to be relevant may be considered by the Committee in determining whether or not to consent to any proposed work. Regulations on siting of television antennas and satellite receiving dishes must be in conformance with any applicable Federal Communications Commission rules.

7.4 **Membership: Appointment and Removal.** The Architectural Review Committee will consist of as many Persons as Declarant may from time to time appoint. Declarant, at its discretion, may appoint a single Person to serve as the Committee and may remove any member of the Committee from office at any time and may appoint new or additional members at any time. The Association will keep on file at its principal office a list of the names and addresses of the members of the Committee. Declarant may at any time delegate to the Board of Directors of the Association the right to appoint or remove members of the Committee. In such event, or in the event Declarant fails to appoint an Architectural Review Committee, the members of the Committee will be appointed by, and serve on behalf of, the Board, or if the Board fails to appoint such members, then the Board will serve as the Committee. The term of office for each member appointed by the Board will be one year unless lengthened by the Board at the time of appointment or unless the Board serves as the Committee, in which case the terms of the members will be the same as their terms as Board members. The Board may appoint any or all of its members to the Committee and is not required to appoint non-Board members. The Board may appoint one or more members to the Committee who are not Owners, but who have special expertise regarding the matters that come before the Committee. In the sole discretion of the Board, such non-Owner members of the Committee may be paid for such services, the cost of which may be paid by the applicants or treated as a common expense, as determined by the Board.

7.5 **Majority Action.** Except as otherwise provided in this Declaration, a majority of the members of the Architectural Review Committee has the power to act on behalf of the Committee, without the necessity of a meeting and without the necessity of consulting the remaining members of the Committee. The Committee may render its decision only by written instrument setting forth the action taken by the consenting members.

7.6 **Liability.** Neither the Architectural Review Committee nor any member thereof is liable to any Owner, Occupant, builder or developer for any damage, loss or prejudice suffered or claimed on account of any action or failure to act of the Committee or a member of the Committee, and the Association will indemnify the Committee and its members therefrom, provided only that the member has, in accordance with the actual knowledge possessed by him or her, acted in good faith.

7.7 **Nonwaiver.** Consent by the Architectural Review Committee to any matter proposed to it or within its jurisdiction will not be deemed to constitute a precedent or waiver impairing its right to withhold approval as to any similar matter thereafter proposed or submitted to it for consent.

7.8 **Appeal.** At any time after Declarant has delegated appointment of the members of the Architectural Review Committee to the Board of Directors pursuant to Section 7.4, any Owner adversely affected by action of the Committee may appeal such action to the Board. Appeals must be made in writing within 10 days of the Committee's action and must contain specific objections or mitigating circumstances justifying the appeal. If the Board is already acting as the Committee, the appeal will be treated as a request for a rehearing, in which case the Board will meet and receive evidence and argument on the matter. A final, conclusive decision will be made by the Board within 15 working days after receipt of such notification.

7.9 **Effective Period of Consent.** The Architectural Review Committee's consent to any proposed work will automatically be revoked one year after issuance unless construction of the work has been substantially commenced in the judgment of the Committee and thereafter diligently pursued, or unless the Owner has applied for and received an extension of time from the Committee.

7.10 **Estoppel Certificate.** Within 20 business days after written request is delivered to the Architectural Review Committee by any Owner, and upon payment to the Committee of a reasonable fee fixed by the Committee to cover costs, the Committee will provide such Owner with an estoppel certificate executed by a member of the Committee and acknowledged, certifying with respect to any Lot owned by the Owner, that as of the date of the certificate either (a) all Improvements made or done upon or within such Lot by the Owner comply with this Declaration or (b) such Improvements do not so comply, in which event the certificate must also identify the noncomplying Improvements and set forth with particularity the nature of such noncompliance. Any purchaser from the Owner, and any Mortgagee or other encumbrancer, is entitled to rely on such certificate with respect to the matters set forth therein, such matters being conclusive as between Declarant, the Committee, the Association and all Owners, and such purchaser or Mortgagee.

7.11 **Enforcement.** If during or after the construction the Architectural Review Committee finds that the work was not performed in substantial conformance with the approval granted, or that the required approval was not obtained, the Committee will notify the Owner in writing of the noncompliance, specifying the particulars of the noncompliance. The Committee may require conforming changes to be made or that construction be stopped. The cost of any required changes will be borne by the Owner. The Committee has the power and authority to order any manner of changes or complete removal of any Improvement, alteration, or other activity for which prior written approval from the Committee is required and has not been obtained or waived in writing. If an Owner fails to comply with an order of the Committee, then, subject to the Owner's right of appeal under Section 7.8, either the Committee or the Board of Directors may enforce compliance in accordance with the procedures set forth in Section 11.1.

Article 8

ASSOCIATION

Declarant has organized, or before conveyance of the first Lot will organize, an association of all of the Owners within Stafford Meadows. Such Association, and its successors and assigns, will be organized as an Oregon nonprofit corporation under the name "**Stafford Meadows Homeowners Association**," and will have such property, powers and obligations as are set forth in this Declaration for the benefit of the Property and all Owners of Lots located therein.

8.1 **Organization.** Declarant will, before the first Lot is conveyed to an Owner, organize the Association as a nonprofit corporation under the general nonprofit corporation laws of the State of Oregon. The Articles of Incorporation of the Association will provide for its perpetual existence, but in the event the Association is at any time dissolved, whether inadvertently or deliberately, it will automatically be succeeded by an unincorporated association of the same name. In that event, the unincorporated association will have all the property, powers and obligations of the incorporated association existing immediately prior to dissolution. To the greatest extent possible, any successor unincorporated association will be governed by the Articles of Incorporation and Bylaws of the Association as if they had been made to constitute the governing documents of the unincorporated association, and will be served by the members of the Board of Directors and the officers who served immediately prior to dissolution.

8.2 **Membership.** Every Owner of one or more Lots within the Property must, immediately upon creation of the Association and thereafter during the entire period of such Owner's ownership of one or more Lots within the Property, be a member of the Association. Such membership commences, exists, and continues simply by virtue of such ownership; expires automatically upon termination of such ownership; and need not be confirmed or evidenced by any certificate or acceptance of membership.

8.3 **Voting Rights.** The Association has two classes of voting membership:

Class A. Class A Members are all Owners with the exception of the Class B Member and are entitled to one vote for each Lot owned. When more than one Person holds an interest in any Lot, all such Persons are members. The vote for such Lot is exercised as they among themselves determine, but in no event will more than one vote be cast with respect to any Lot.

Class B. The Class B Member is Declarant, who is entitled to three votes for each Lot owned by Declarant. The Class B Membership will cease and be converted to Class A Membership on the happening of any of the following events, whichever occurs earlier:

(1) When all of the Lots in the final phase of development of Stafford Meadows have been Sold and conveyed to Owners other than a successor Declarant; or

(2) At such earlier time as Declarant may elect in writing to terminate Class B Membership.

8.4 **General Powers and Obligations.** The Association has, exercises and performs all of the following powers, duties, and obligations:

(a) The powers, duties and obligations granted to the Association by this Declaration.

(b) The powers and obligations of a nonprofit corporation pursuant to the general nonprofit corporation laws of the State of Oregon.

(c) The powers, duties and obligations of a homeowners association pursuant to the Oregon Planned Community Act.

(d) Any additional or different powers, duties and obligations necessary or desirable for the purpose of carrying out the functions of the Association pursuant to this Declaration or otherwise promoting the general benefit of the Owners within the Property.

The powers and obligations of the Association may from time to time be amended, repealed, enlarged or restricted by changes in this Declaration made in accordance with the provisions of this Declaration, accompanied by any required changes in the Articles of Incorporation or Bylaws of the Association made in accordance with such instruments and with the nonprofit corporation laws of the State of Oregon.

8.5 **Specific Powers and Duties**. The powers and duties of the Association include, without limitation, all of the following:

(a) **Maintenance and Services.** The Association will provide maintenance and services for the Property as provided in Article 9 and other provisions of this Declaration.

(b) **Insurance.** The Association obtains and maintains in force policies of insurance as determined by the Board of Directors and in accordance with any requirements in this Declaration or the Bylaws of the Association.

(c) **Rulemaking.** The Association will make, establish, promulgate, amend and repeal Rules and Regulations as provided in Section 6.25.

(d) **Assessments.** The Association will adopt budgets and impose and collect Assessments as provided in Article 10.

(e) **Enforcement.** The Association will perform such acts, whether or not expressly authorized by this Declaration, as may be reasonably necessary to enforce the provisions of this Declaration and the Rules and Regulations adopted by the Association, including, without limitation, enforcement of the decisions of the Architectural Review Committee. Nothing in this Declaration may be construed as requiring the Association to take any specific action to enforce violations.

(f) **Employment of Agents, Advisers and Contractors.** The Association, through its Board of Directors, may employ the services of any Person as manager; hire employees to manage, conduct and perform the business, obligations and duties of the Association; employ professional counsel and obtain advice from such Persons such as, but not limited to, landscape architects, architects, planners, attorneys and accountants; and contract for or otherwise provide for all services necessary or convenient for the management, maintenance and operation of the Property; provided, however, the Board may not incur or commit the Association to incur legal fees in excess of $5,000 for any specific litigation or claim matter or enter into any contingent fee contract or any claim in excess of $100,000 unless the Owners have enacted a resolution authorizing the incurring of such fees by a vote of 75 percent of the total voting rights of the Association. These limitations are not applicable to legal fees incurred in defending the Association or the Board from claims or litigation brought against them. The limitations set forth in this paragraph (f) will increase by 10 percent on each fifth anniversary of the recording of this Declaration.

(g) **Borrow Money.** The Association may borrow and repay money for the purpose of performing its duties under this Declaration and, subject to Section 4.3(d), encumber the Common Areas as security for the repayment of such borrowed money.

(h) **Acquire and Hold Title to Property.** The Association may acquire and hold title to real and personal property and interests therein, and must accept any real or personal property, leasehold or other property interests within Stafford Meadows conveyed to the Association by Declarant.

(i) **Transfers, Dedications, Encumbrances and Easements.** Except as otherwise provided in Sections 4.3(d) and 4.3(e), the Association may sell, transfer or encumber and grant easements upon all or any portion of the Common Area, or other real property to which it then holds title, to a Person, whether public or private, and dedicate or transfer all or any portion of such Common Area or property to any public agency, authority or utility for public purposes.

(j) **Create Classes of Service and Make Appropriate Charges.** The Association may, in its sole discretion, create various classes of service and make appropriate Individual Assessments or charges therefor to the users of such services, including, but not limited to, reasonable admission and other fees for the use of any and all recreational facilities situated on the Common Areas, without being required to render such services to those of its members who do not assent to such charges and to such related Rules and Regulations as the Board deems proper. In addition, the Board has the right to discontinue any service upon nonpayment of Assessments or to eliminate any service for which there is no demand or for which there are inadequate funds to maintain the same.

(k) **Restoring Damaged Improvements.** In the event of damage to or destruction of Common Areas or other property that the Association insures, the Board of Directors or its duly authorized agent must file and adjust all insurance claims and obtain reliable and detailed estimates of the cost of repairing or restoring the property to substantially the condition in which it existed prior to the damage, allowing for changes or Improvements necessitated by changes in applicable building codes. If a decision is made not to restore the damaged Improvements, and no alternative Improvements are authorized, the affected property will be cleared of all debris and ruins and thereafter will be maintained by the Association in a neat and attractive, landscaped condition. If insurance proceeds are insufficient to cover the costs of reconstruction, the Board may levy Special Assessments to cover the shortfall against those Owners responsible for the premiums for the applicable insurance coverage. Any insurance proceeds remaining after paying the costs of repair or reconstruction, or after such settlement as is necessary and appropriate, will be retained by the Association for the benefit of all or some of the Owners, as appropriate, and placed in a capital Improvements account. This is a covenant for the benefit of Mortgagees and may be enforced by the Mortgagee of any affected Lot.

(l) **Security.** The Association may, but is not obligated to, maintain or support certain activities within Stafford Meadows designed to make the Property more enjoyable or safer than it otherwise might be. **Neither the Association, Declarant nor any managing agent will be considered insurers or guarantors of security or safety within the Property, nor will either be held liable for any loss or damage by reason of failure to provide adequate security or ineffectiveness of security or safety measures undertaken. No representation or warranty is made that any system or measure, including any mechanism or system for limiting access to the Property, cannot be compromised or circumvented, nor that any such system or measure undertaken will in all cases prevent loss or provide the detection or protection for which it is designed or intended. Each Owner acknowledges and agrees that the Association, the Board of Directors and any managing agent are not insurers and that each Person using the Property assumes all risks for personal injury and loss or damage to property resulting from acts of third parties.**

(m) **Services.** The Association may provide or contract for such services as the Board of Directors may reasonably deem to be of benefit to the Property, including, without limitation, landscape services, garbage and trash removal and security services.

(n) **Implied Rights and Obligations.** The Association may exercise any other right or privilege reasonably to be inferred from the existence of any right or privilege expressly given to the Association under this Declaration or reasonably necessary to effectuate any such right or privilege.

8.6 **Liability.** Neither a member of the Board of Directors nor an officer of the Association or member of the Architectural Review Committee or any other committee established by the Board will be liable to the Association, any Owner or any third party for any damage, loss or prejudice suffered or claimed on account of any action or failure to act in the performance of his or her duties, so long as the individual acted in good faith; believed that the conduct was in the best interests of the Association, or at least was not opposed to its best interests; and, in the case of criminal proceedings, had no reason to believe the conduct was unlawful. In the event any member of the Board or any officer or committee member of the Association is threatened with or made a party to any proceeding because the individual was or is a director, officer, or committee member of the Association, the Association will defend the individual against such claims and indemnify the individual against liability and expenses incurred to the maximum extent permitted by law.

8.7 **Interim Board; Turnover Meeting.** Declarant has the right to appoint an interim board of one to three directors, who will serve as the Board of Directors of the Association until replaced by Declarant or until their successors take office at the Turnover Meeting following termination of Class B Membership. Declarant will call a meeting of the Association for the purpose of turning over administrative responsibility for the Property to the Association not later than 90 days after termination of the Class B Membership in accordance with Section 8.3. At the Turnover Meeting the interim directors will resign and their successors will be elected by the Owners, as provided in this Declaration and in the Bylaws of the Association. If Declarant fails to call the Turnover Meeting required by this Section 8.7, any Owner or Mortgagee of a Lot may call the meeting by giving notice as provided in the Bylaws.

8.8 **Contracts Entered into by Declarant or Before Turnover Meeting.** Notwithstanding any other provision of this Declaration, any management contracts, service contracts or employment contracts entered into by Declarant or the Board of Directors on behalf of the Association before the Turnover Meeting will have a term of not more than three years. In addition, any such contract must provide that it may be terminated without cause or penalty by the Association or Board upon not less than 30 days' notice to the other party given not later than 60 days after the Turnover Meeting. The limitations contained in this Section 8.8 do not apply to those contracts referred to in ORS 94.700(2).

8.9 **Bylaws.** The Bylaws of the Association and any amendment or modification of the Bylaws will be recorded in the Deed Records of Clackamas County, Oregon. On behalf of the Association, the Declarant will adopt and record the initial Bylaws as provided in ORS 94.625.

Article 9

MAINTENANCE

9.1 **Common Maintenance Areas.** The Common Maintenance Areas include the Common Areas, Common Easement Areas, and the Front Yards of the Lots in Stafford Meadows, and the wall maintenance areas designated on the Plat, until such maintenance is assumed by the local jurisdiction, if ever.

9.2 **Maintenance and Lighting of Common Maintenance Areas.** The Association is responsible for exterior lighting, if any, in the Common Areas and will perform all maintenance upon the Common Maintenance Areas, including, but not limited to, entrance monuments, gates, fences, walls in Common Areas, signs, parking areas, pathways, bicycle paths, unless the maintenance thereof is assumed by a public body. Sidewalks, notwithstanding the public easement over them, are the Lot Owner's responsibility to maintain, repair, and replace and to keep free of leaves, ice, and snow. The Association is responsible for installation, maintenance, and irrigation of landscaping in the Front Yards and the walls constructed in the wall maintenance easement areas designated on the Plat, and for the design and any modification thereof. In the Front Yards, landscaping installed by Declarant or the Association, including related controllers, monitors, and equipment, belongs to the Association. Landscaping irrigation settings will be set by the Association and no Owner may tamper with or change such settings. The Association has right of access to each such controller, monitor, or other equipment. The Association will also maintain and irrigate the area of the street right-of-way between the curb and the sidewalk. Such areas will be maintained in attractive condition and in a good and workmanlike manner to render them fit for the purposes for which they are intended.

9.3 **Maintenance of Utilities.** The Association will perform or contract to perform maintenance of all private utilities within Common Maintenance Areas, such as sanitary sewer service lines, domestic water service lines and storm drainage lines, except to the extent such maintenance is performed by the utilities furnishing such services. The Association is not liable for any interruption or failure of such services. Each Owner is responsible for maintaining utility lines within his or her Lot other than those serving the Common Maintenance Areas.

9.4 **Owner's Responsibility.** Except as otherwise provided in this Declaration or by written agreement with the Association, all maintenance of the Lots and Improvements, including walkways and the driveway thereon as provided in Section 6.5 and 6.7 will be the sole responsibility of the Owner thereof, who will maintain such Lot in a neat and attractive condition in accordance with the community-wide standard of Stafford Meadows. Sidewalks, notwithstanding the public easement over them, are the Lot Owner's responsibility to maintain, repair, and replace and to keep free of leaves, ice, and snow. The Association may, in the discretion of the Board of Directors, assume the maintenance responsibilities of such Owner if, in the opinion of the Board, the level and quality of maintenance being provided by such Owner does not satisfy such standard. Before assuming such maintenance responsibilities, the Board will notify the Owner in writing of its intention to do so, and if such Owner has not commenced and diligently pursued remedial action within 15 days after mailing of such written notice, then the Association will proceed. The expenses of such maintenance by the Association will be reimbursed to the Association by the Owner, together with interest as provided in Section 11.3. Such charges will be an Individual Assessment and lien on the Lot as provided in Sections 10.4(d) and 11.1.

9.5 **Damage Liability.** Any damage to any Common Maintenance Area by Owners or their children, agents, visitors, friends, relatives, tenants, Occupants or service personnel, to the extent not covered by the Association's insurance (including any deductible), will be assessed to such Owners as an Individual Assessment.

9.6 **Maintenance Plan.** Declarant will initially prepare and thereafter the Board of Directors must implement, review, and update a maintenance plan (the "**Maintenance Plan**") for the maintenance, repair and replacement of all property for which the Association has maintenance, repair or replacement responsibility under this Declaration or the Bylaws or the Oregon Planned Community Act. The Maintenance Plan will describe the maintenance, repair or replacement to be conducted; include a schedule for maintenance, repair or replacement; be appropriate for the size and complexity of the maintenance, repair and replacement responsibility of the Association; and address issues that include, but are not limited to, warranties and the useful life of the items of which the Association has maintenance, repair or replacement responsibility. The Board must review and update the Maintenance Plan as necessary. Changes or updates to the Maintenance Plan will be based on advice of competent experts or consultants. For a period of 10 years following recording of the Declaration, any changes to the Maintenance Plan without the approval of the Declarant and the original general contractor may void any applicable warranty and will release them from liability for any damage resulting from such change.

Article 10

ASSESSMENTS

10.1 **Purpose of Assessments.** The Association may levy Assessments. The Assessments levied by the Association must be used exclusively to promote the recreation, health, safety and welfare of the Owners and Occupants of the Property and for the improvement, operation and maintenance of the Common Maintenance Areas.

10.2 **When Lots Become Subject to Assessment.**

(a) Upon the first sale of each Lot to a purchaser other than (i) Declarant, (ii) another developer or builder in a bulk sale of Lots, (iii) a successor declarant, or (iv) an affiliate of Declarant, the Lot Sold becomes subject to assessment and the Owner will pay General Assessments, Special Assessments, Emergency Assessments, and if any, Individual Assessments.

(b) Declarant may elect to delay collection of General Assessments against all Lots, but in such case will pay all common expenses of the Association until such Assessments commence.

10.3 **Allocation of Assessments.** Except as may otherwise be provided in an applicable supplemental declaration annexing Additional Property to this Declaration, all Lots subject to assessment will pay an equal share of the General Assessments, Special Assessments, and Emergency Assessments.

10.4 **Type of Assessments.** The Association is authorized to levy the following types of Assessments:

(a) **General Assessments.** The Association will levy General Assessments for the common expenses incurred by or on behalf of the Association in accordance with this Declaration. The Board of Directors will from time to time and at least annually prepare an operating budget for the Association, taking into account the current costs of maintenance and services and future needs of the Association, any previous over-assessment and any common profits of the Association. The budget must take into account the number of Lots subject to assessment as of the first day of the fiscal year for which the budget is prepared and the number of Lots reasonably anticipated to become subject to assessment during the fiscal year. The budget may be based upon a greater number of Lots than those reasonably anticipated to be subject to assessment during the fiscal year if the Declarant agrees to subsidize the Association for any shortfall in the Operations Fund. The budget will provide for such reserve or contingency funds as the Board deems necessary or as may be required by law, but not less than the reserves required by Section 10.7. General Assessments for such operating expenses and reserves will then be apportioned among the Lots as provided in Section 10.3. The Board may revise the budget and adjust the General Assessment from time to time during the year. Within 30 days after the adoption of a final budget by the Board, the Board will send a copy of the final budget to each Owner. If the Board fails to adopt a budget, the last adopted budget continues in effect. The manner of billing and collection of Assessments is as provided in the Bylaws.

(b) **Special Assessments.** The Board of Directors may levy during any fiscal year a Special Assessment, applicable to that year only, for the purpose of deferring all or any part of the cost of any construction or reconstruction, unexpected repair, or acquisition or replacement of a described capital Improvement, or for any other one-time expenditure not to be paid for out of General Assessments. Special Assessments for acquisition or construction of new capital Improvements or additions that in the aggregate in any fiscal year exceed an amount equal to 15 percent of the budgeted gross expenses of the Association for the fiscal year may be levied only if approved by a majority of the voting rights voting on such matter, together with the written consent of the Class B Member, if any. Prior to the Turnover Meeting, any Special Assessment for acquisition or construction of new capital Improvements or additions must be approved by not less than 50 percent of the Class A voting rights, together with the written consent of the Class B Member. Special Assessments will be apportioned as provided in Section 10.3 and may be payable in lump sum or in installments, with or without interest or discount, as determined by the Board.

(c) **Emergency Assessments.** If the General Assessments levied at any time are or will become inadequate to meet all expenses incurred under this Declaration for any reason, including nonpayment of any Owner's Assessments on a current basis, the Board of Directors will immediately determine the approximate amount of such inadequacy and issue a supplemental budget, noting the reason therefor, and levy an Emergency Assessment for the amount required to meet all such expenses on a current basis. Emergency Assessments will be apportioned as set forth in Section 10.3 and payable as determined by the Board.

(d) **Limited Common Area Assessments**. General Assessments, Special Assessments and Emergency Assessments relating to maintenance, upkeep, repair, replacement or improvements to Limited Common Areas will be assessed exclusively and on an equal basis to the Lots having the right to use such Limited Common Areas.

(e) **Individual Assessments.** Any common expense or any part of a common expense benefiting fewer than all of the Lots may be assessed as Individual Assessments exclusively against the Lots benefited. Individual Assessments include, without limitation, charges for services provided under Sections 8.5(j) and 9.4 and any loss or cost incurred by the Association that the Board of Directors determines is the fault of one or more Owners and not paid by insurance. Individual Assessments also include default Assessments levied against any Lot to reimburse the Association for costs incurred in bringing such Lot or its Owner into compliance with the provisions of this Declaration or the Rules and Regulations of the Association and for fines or other charges imposed pursuant to this Declaration for violation thereof. Unless otherwise provided by the Board, Individual Assessments will be due 30 days after the Board has given written notice thereof to the Owners subject to the Individual Assessments.

(f) **Working Fund Assessments.** Upon the first sale of a Lot to a purchaser other than a successor Declarant and upon any subsequent sale of such Lot, the purchaser will pay to the Association a Working Fund Assessment equal to two times the monthly General Assessment then applicable to the Lot. The Board of Directors may deposit Working Fund Assessments either in the Operations Fund or in the Reserve Fund, at the discretion of the Board.

10.5 **Assessment of Additional Property.** When Additional Properties are annexed to Stafford Meadows, the Lots included therein become subject to Assessments from the date of such annexation to the extent provided in Section 10.2. The Board of Directors, however, at its option may elect to recompute the budget based upon the additional Lots subject to Assessment and additional Common Areas and recompute General Assessments for all Lots, including the new Lots, for the balance of the fiscal year. Notwithstanding any provision of this Declaration apparently to the contrary, a declaration annexing Additional Property may provide that such Additional Property does not have the right to use a particular Common Area or facility located thereon, in which case such

Additional Property will not be assessed for the costs of operating, maintaining, repairing, replacing or improving such Common Area or facility.

10.6 **Operations Fund.** The Association will keep all funds received by it as Assessments, other than reserves described in Section 10.7 or Working Fund Assessments deposited in the Reserve Fund, separate and apart from its other funds, in an Operations Fund in a bank account in the name of the Association. The Association will use such fund for the purpose of promoting the recreation, health, safety and welfare of the residents within the Property and in particular for the improvement and maintenance of properties, services and facilities devoted to this purpose and related to the use and enjoyment of the Common Maintenance Areas and the Lots, including but not limited to:

(a) Payment of the cost of operation, maintenance, utilities, services, repairs, and replacements for the Common Maintenance Areas.

(b) Payment of the cost of insurance maintained by the Association.

(c) Payment of taxes assessed against the Common Areas and any Improvements thereon.

(d) Payment of the cost of other services that the Association deems to be of general benefit to the Owners, including, but not limited to, accounting, legal, and secretarial services.

10.7 **Reserve Fund.**

(a) **Establishment of Account.** Declarant, on behalf of the Association, will conduct an initial reserve study as described in Section 10.7(c) and establish a Reserve Fund in a bank account in the name of the Association to fund major maintenance, repair or replacement of any common properties that will normally require replacement in whole or in part in more than one and less than 30 years; for exterior painting if the Common Maintenance Areas or other property to be maintained by the Association includes exterior painted surfaces; and for other items, whether or not involving Common Maintenance Areas, if the Association has responsibility to maintain the items, including items required by the Maintenance Plan established pursuant to Section 9.6. The Reserve Fund need not include those items that can reasonably be funded from the general budget or other funds of the Association or for those items for which one or more, but less than all, Owners are responsible for maintenance and replacement under the provisions of this Declaration or the Bylaws.

(b) **Funding of Reserve Fund.** The Reserve Fund will be funded by Assessments against the individual Lots assessed for maintenance of the items for which the Reserve Fund is being established, which sums will be included in the regular General Assessment for the Lot and the Limited Common Area Assessments, if applicable. The Reserve Fund also includes Working Fund Assessments to the extent so allocated by the Board of Directors pursuant to Section 10.4(f). The Reserve Fund will be established in the name of the Association. The Association is responsible for administering the Reserve Fund and making periodic payments into the account. The Board of Directors or the Owners may not vote to eliminate funding the Reserve Account unless the Board determines that the Reserve Account will be adequately funded for the following year, except that after the Turnover Meeting the Board, with the approval of all Owners, may, on an annual basis, elect not to fund the Reserve Fund for the following year.

(c) **Reserve Studies.** The reserve portion of the initial Assessment determined by Declarant will be based on a reserve study described in this paragraph (c) or other sources of information. The Board of Directors will annually conduct a reserve study, or review and update an existing study, to determine the Reserve Fund requirements, and may adjust the amount of payments as indicated by the study or update and provide other reserve items that the Board, in its discretion, may deem appropriate. The reserve study will:

(1) Identify all items for which reserves are to be established;

(2) Include the estimated remaining useful life of each item as of the date of the reserve study; and

(3) Include for each item, as applicable, an estimated cost of maintenance, repair and replacement at the end of its useful life.

(d) **Use of Reserve Fund.** If a Reserve Fund is required, the Reserve Fund will be used only for the purposes for which the reserves have been established and kept separate from other funds. After the Turnover Meeting, however, the Board of Directors may borrow funds from the Reserve Fund to meet high seasonal demands on the regular operating funds or to meet unexpected increases in expenses if the Board has adopted a resolution, which may be an annual continuing resolution, authorizing the borrowing of funds. Not later than the adoption of the budget for the following year, the Board will adopt by resolution a written payment plan providing for repayment of the borrowed funds within a reasonable period. Assessments paid into the Reserve Fund are the property of the Association and are not refundable to sellers or Owners of Lots. Sellers of the Lots, however, may treat their outstanding share of the Reserve Fund as a separate item in any sales agreement.

10.8 **Reserve Fund.** The Board of Directors may establish a Reserve Fund for major maintenance, repair or replacement of those items to be maintained by the Association, all or a part of which could not reasonably be funded from operating Assessments. Such Reserve Fund will be funded by Assessments against the Lots as a General Expense. The Reserve Fund will be established in the name of the Association and adjusted at regular intervals to recognize changes in current replacement costs over time. The Reserve Fund may be used only for replacement of common property as determined by the Board and must be kept separate from the Operations Fund. The Board, however, may borrow funds from the Reserve Fund to meet high seasonal demands on the regular operating funds or to meet other temporary expenses that will later be paid from General Assessments, Special Assessments, or Emergency Assessments. Nothing in this Section 10.8 prohibits prudent investment of the Reserve Fund. Assessments paid into the Reserve Fund are the property of the Association and are not refundable to sellers or Owners of Lots. Sellers of the Lots, however, may treat their outstanding share of the Reserve Fund as a separate item in any sales agreement.

10.9 **Declarant's Subsidy.** Declarant may, but is not be obligated to, reduce the General Assessments for any fiscal year by payment of a subsidy (in addition to any other amounts then owed by Declarant), which may be either a contribution, an advance against future Assessments due from Declarant or a loan, in Declarant's discretion. Any such subsidy will be disclosed as a line item in the income portion of the Association's budget. Payment of such subsidy in any year will not obligate

Declarant to continue payment of such subsidy in future years unless otherwise provided in a written agreement between the Association and Declarant.

10.10 **Commencement of Assessment Obligation; Time of Payment.** The obligation to pay Assessments under this Declaration commences as to each Lot on the first day of the month after such Lot becomes subject to Assessment. The first annual General Assessment levied on each Lot will be adjusted according to the number of months remaining in the fiscal year at the time Assessments commence for such Lot.

10.11 **Payment of Assessments.** Assessments must be paid in such manner and on such dates as the Board of Directors may establish. Unless the Board otherwise provides, the General Assessment is due and payable in advance on the first day of each fiscal year. If any Owner is delinquent in paying any Assessments or other charges levied on his or her Lot, the Board may require the outstanding balance on all Assessments to be paid in full immediately. Until the Turnover Meeting, any obligation of Declarant to pay Assessments may be satisfied in the form of cash or by "in kind" contributions of services or materials, or by a combination of these.

10.12 **Creation of Lien and Personal Obligation of Assessments.** Declarant, for each Lot owned by it within the Property, hereby covenants, and each Owner of any Lot by acceptance of a conveyance thereof, whether or not so expressed in any such conveyance, will be deemed to covenant to pay to the Association all Assessments or other charges as may be fixed, established and collected from time to time in the manner provided in this Declaration or the Association Bylaws. Such Assessments and charges, together with any interest, late charges, expenses or attorneys' fees imposed pursuant to Article 11, are a charge on the land and a continuing lien upon the Lot against which each such Assessment or charge is made. Such Assessments, charges, and other costs are also the personal obligation of the Person who was the Owner of such Lot at the time when the Assessment or charge fell due. Such liens and personal obligations will be enforced in the manner set forth in Article 11.

10.13 **Voluntary Conveyance.** In a voluntary conveyance of a Lot the grantee will be jointly and severally liable with the grantor for all unpaid Assessments against the grantor of the Lot up to the time of the grant or conveyance, without prejudice to the grantee's right to recover from the grantor the amounts paid by the grantee therefor. However, upon request of an Owner or Owner's agent for the benefit of a prospective purchaser, the Board of Directors will make and deliver a written statement of the unpaid Assessments against the prospective grantor of the Lot effective through a date specified in the statement, and the grantee in that case will not be liable for any unpaid Assessments against the grantor not included in the written statement.

10.14 **No Waiver.** Failure of the Board of Directors to fix Assessment amounts or rates or to deliver or mail each Owner an Assessment notice will not be deemed a waiver, modification or release of any Owner from the obligation to pay Assessments. In such event, each Owner will continue to pay Assessments on the same basis as during the last year for which an Assessment was made, if any, until a new Assessment is levied, at which time the Association may retroactively assess any shortfalls in collections.

10.15 **No Option to Exempt.** No Owner may exempt himself or herself from liability for Assessments by nonuse of Common Areas, abandonment of his or her Lot, or any other means. The obligation to pay Assessments is a separate and independent covenant on the part of each Owner. No diminution or abatement of Assessments or set-off may be claimed or allowed for any alleged failure of the Association or Board of Directors to take some action or perform some function required of it, or for inconvenience or discomfort arising from the making of repairs or Improvements, or from any other action it takes.

10.16 **Certificate.** Upon written request, the Association must furnish to any Owner liable for any type of Assessment a certificate in writing signed by an Association officer setting forth whether such Assessment has been paid. Such certificate is conclusive evidence of payment. The Association may require the advance payment of a reasonable processing fee for the issuance of such certificate.

Article 11

ENFORCEMENT

11.1 **Violation of General Protective Covenants.** In the event that any Owner constructs or permits to be constructed on his or her Lot an Improvement contrary to the provisions of this Declaration, or violates any provisions of this Declaration, the Bylaws, or the Rules and Regulations, then the Association acting through the Board of Directors will notify the Owner in writing of any such specific violations. If the Owner is unable, is unwilling, or refuses to comply with the Association's specific directives for remedy or abatement, or the Owner and the Association cannot agree to a mutually acceptable solution within the framework and intent of this Declaration, after notice and opportunity to be heard and within 14 days after issuing written notice to the Owner, then the Association acting through the Board has the right to do any or all of the following:

(a) Assess reasonable fines against such Owner, based upon a resolution adopted by the Board of Directors that is delivered to each Lot, mailed to the mailing address of each Lot or mailed to the mailing address designated by the Owner of each Lot in writing, which fines constitute Individual Assessments for purposes of this Declaration;

(b) Enter the offending Lot and remove the cause of such violation, or alter, repair or change the item that is in violation of this Declaration in such a manner as to make it conform thereto, in which case the Association may assess such Owner for the entire cost of the work done, which amount will be payable to the Operations Fund as an Individual Assessment, provided that no items of construction will be altered or demolished in the absence of judicial proceedings;

(c) Cause any vehicle parked in violation of this Declaration or of the Rules and Regulations to be towed and impounded at the Owner's expense;

(d) Suspend the voting rights, any utility services paid for out of Assessments and the right to use the Common Areas for the period that the violations remain unabated, provided that the Association does not deprive any Owner of access to and from the Owner's Lot in the absence of a lien foreclosure or court order to such effect; and

(e) Bring suit or action against the Owner on behalf of the Association and other Owners to enforce this Declaration.

11.2 **Default in Payment of Assessments; Enforcement of Lien.** If an Assessment or other charge levied under this Declaration is not paid within 30 days after its due date, such Assessment or charge becomes delinquent and bears interest from the due date at the rate set forth below. In such event the Association may exercise any or all of the following remedies:

(a) The Association may suspend such Owner's voting rights, any utility service paid for out of Assessments and right to use the Common Areas until such amounts, plus other charges under this Declaration, are paid in full, and may declare all remaining periodic installments of any General Assessment immediately due and payable. In no event, however, will the Association deprive any Owner of access to and from the Owner's Lot in the absence of a lien foreclosure or court order to such effect.

(b) The Association has a lien in accordance with ORS 94.709 against each Lot for any Assessment levied against the Lot, including any fines or other charges imposed under this Declaration or the Bylaws against the Owner of the Lot, and may foreclose such lien in the manner provided in ORS 94.709.

(c) The Association may bring an action to recover a money judgment for unpaid Assessments under this Declaration without foreclosing or waiving the lien described in Section 11.2(b). Recovery on any such action, however, operates to satisfy the lien, or the portion thereof, for which recovery is made.

(d) The Association has any other remedy available to it by law or in equity.

11.3 **Interest, Late Charges and Expenses.** Any amount not paid to the Association when due in accordance with this Declaration bears interest from the due date until paid at a rate that is the greater of 12 percent per annum or such other rate as may be established by the Board of Directors, but not to exceed the lawful rate of interest under the laws of the state of Oregon. A late charge may be charged for each delinquent Assessment in an amount established from time to time by resolution of the Board, which resolution is delivered to each Lot, mailed to the mailing address of each Lot or mailed to the mailing address designated by the Owner in writing, together with all expenses incurred by the Association in collecting such unpaid Assessments, including attorneys' fees (even if suit is not instituted). In the event the Association files a notice of lien, the lien amount also includes the recording fees associated with filing the notice, and a fee for preparing the notice of lien, established from time to time by resolution of the Board.

11.4 **Costs and Attorneys' Fees.** In the event of any suit or action to enforce this Declaration, the Bylaws, the Rules and Regulations, or the Oregon Planned Community Act, or to collect any money due hereunder or to foreclose a lien, the prevailing party in such suit or act will be entitled to recover all costs and expenses incurred by it in connection with such suit or action, including a foreclosure title report, and will recover such amount as the court may determine to be reasonable as attorneys' fees at trial and upon any appeal or petition for review thereof or in connection with any bankruptcy proceedings or special bankruptcy remedies.

11.5 **Nonexclusiveness and Accumulation of Remedies.** An election by the Association to pursue any remedy provided for violation of this Declaration will not prevent concurrent or subsequent exercise of another remedy permitted under this Declaration. The remedies provided in this Declaration are not exclusive but are in addition to all other remedies, including actions for damages and suits for injunctions and specific performance, available under applicable law to the Association. In addition, any aggrieved Owner may bring an action against another Owner or the Association to recover damages or to enjoin, abate, or remedy any violation of this Declaration by appropriate legal proceedings.

11.6 **Enforcement by Clackamas County**. The provisions of this Declaration relating to preservation and maintenance of Common Areas will be deemed to be for the benefit of Clackamas County as well as the Association and Owners of Lots, and Clackamas County may enforce such provisions by appropriate proceedings at law or in equity, or may cause such maintenance to be performed, the costs of which will become a lien upon the Property.

Article 12

DISPUTE RESOLUTION

12.1 **Mediation**.

(a) Except as otherwise provided in this Section 12.1, before initiating litigation, arbitration, or an administrative proceeding in which the Association and an Owner have an adversarial relationship, the party that intends to initiate litigation, arbitration or an administrative proceeding will offer to use any dispute resolution program available within Clackamas County, Oregon that is in substantial compliance with the standards and guidelines adopted under ORS 36.175. The written offer must be hand-delivered or mailed by certified mail, return receipt requested, to the address, contained in the records of the Association, for the other party.

(b) If the party receiving the offer does not accept the offer within 10 days after receipt of the offer, such acceptance to be made by written notice, hand-delivered or mailed by certified mail, return receipt requested, to the address, contained in the records of the Association, for the other party, the initiating party may commence the litigation, arbitration or administrative proceeding. The notice of acceptance of the offer to participate in the program must contain the name, address, and telephone number of the body administering the dispute resolution program.

(c) If a qualified dispute resolution program exists within Clackamas County, Oregon and an offer to use the program is not made as required under Section 12.1(a), then litigation, arbitration or an administrative proceeding may be stayed for 30 days upon a motion of the noninitiating party. If the litigation, arbitration or administrative action is stayed under this Section 12.1(c), both parties must participate in the dispute resolution process.

(d) Unless a stay has been granted under Section 12.1(c), if the dispute resolution process is not completed within 30 days after receipt of the initial offer, the initiating party may commence litigation, arbitration or an administrative proceeding without regard to whether the dispute resolution is completed.

(e) Once made, the decision of the court, arbitrator or administrative body arising from litigation, arbitration or an administrative proceeding may not be set aside on the grounds that an offer to use a dispute resolution program was not made.

(f) The requirements of this Section 12.1 do not apply to circumstances in which irreparable harm to a party will occur due to delay or to litigation, arbitration, or an administrative proceeding initiated to collect Assessments, other than Assessments attributable to fines.

12.2 **Arbitration.** Any claim, controversy or dispute by or among Declarant (including members, officers, directors, shareholders and affiliates of Declarant), Association, the Architectural Review Committee, or one or more Owners, or any of them, arising out of or related to this Declaration, the Bylaws, the Rules and Regulations, or the Property will be first subject to mediation as described in Section 12.1 or otherwise, and if not timely settled by mediation will be resolved by arbitration in accordance with this Article 12. The decisions and award of the arbitrator are final, binding and nonappealable. The arbitration will be conducted in the Portland, Oregon, metropolitan area or at such other location as may be agreed upon by the parties, pursuant to the arbitration statutes of the state of Oregon, and any arbitration award may be enforced by any court with jurisdiction. Filing for arbitration will be treated the same as filing in court for purposes of meeting any applicable statute of limitations or for purposes of filing a notice of pending action ("lis pendens").

12.3 **Selection of Arbitrator.** The arbitration will be conducted by a single arbitrator selected by mutual agreement of the parties. The arbitrator selected must be neutral and unbiased, except to the extent the arbitrator's prior relationship with any party is fully disclosed and consented to by the other party or parties. If the parties are unable to agree upon the arbitrator within 10 days after a party's demand for arbitration, upon application of any party, the presiding judge of the Circuit Court of Clackamas County, Oregon will designate the arbitrator.

12.4 **Consolidated Arbitration.** Upon demand by any party, claims between or among the parties and third parties will be submitted in a single, consolidated arbitration. Notwithstanding the provisions of this Article 12, in the event any claim, controversy or dispute involves a claim by either party against a third party who is not required to and does not voluntarily agree to submit such claim to arbitration, then either party may elect to have the matter determined by a court of law in a consolidated proceeding, rather than by arbitration. In such case, the parties hereby waive trial by jury and agree that the matter will be determined by a judge sitting without a jury.

12.5 **Discovery.** The parties to the arbitration are entitled to such discovery as would be available to them in an action in Clackamas County Circuit Court. The arbitrator has all of the authority of the court incidental to such discovery, including, without limitation, authority to issue orders to produce documents or other materials, to issue orders to appear and submit to deposition, and to impose appropriate sanctions, including, without limitation, award against a party for failure to comply with any order.

12.6 **Evidence.** The parties to the arbitration may offer such evidence as they desire and will produce such additional evidence as the arbitrator may deem necessary for an understanding and determination of the dispute. The arbitrator will determine the admissibility of the evidence offered. All evidence will be taken in the presence of the arbitrator and all of the parties, except when any of the parties is absent in default or has waived its right to be present.

12.7 **Excluded Matters.** Notwithstanding the foregoing, the following matters are not subject to mediation or arbitration under this Article 12 (but are subject to the applicable provisions of Section 12.8): (a) actions relating to the collection of fees, Assessments, fines and other charges imposed or levied by the Association (other than disputes as to the validity or amount of such fees, Assessments, fines or charges, which disputes will be subject to mediation/arbitration as provided above); and (b) actions to enforce any order, decision or award rendered by arbitration pursuant to this Article 12. The filing of a lis pendens or the application to any court for the issuance of any provisional process or similar remedy described in the Oregon or Federal Rules of Civil Procedure will not constitute a waiver of the right or duty to utilize the procedures specified in this Article 12.

12.8 **Costs and Attorneys' Fees.** The fees of any mediator and the costs of mediation will be divided and paid equally by the parties. Each party will pay its own attorneys' fees and costs in connection with any mediation. The fees of any arbitrator and the costs of arbitration will be paid by the nonprevailing party or parties; if none, such fees and costs will be divided and paid equally by the parties. Should any suit, action or arbitration be commenced in connection with any dispute related to or arising out of this Declaration, the Bylaws, the Rules and Regulations, or the Oregon Planned Community Act to obtain a judicial construction of any provision of this Declaration, the Bylaws or the Rules and Regulations; to rescind this Declaration; or to enforce or collect any judgment or decree of any court or any award obtained during arbitration, the prevailing party will be entitled to recover its costs and disbursements, together with such investigation, expert witness and attorneys' fees incurred in connection with such dispute as the court or arbitrator may adjudge reasonable, at trial, in the arbitration, upon any motion for reconsideration, upon petition for review, and on any appeal of such suit, action or arbitration proceeding. The determination of who is the prevailing party and the amount of reasonable attorneys' fees to be paid to the prevailing party will be decided by the arbitrator (with respect to attorneys' fees incurred before and during the arbitration proceeding) and by the court or courts, including any appellate or review court, in which such matter is tried, heard or decided, including a court that hears a request to compel or enjoin arbitration or that hears exceptions made to an arbitration award submitted to it for confirmation as a judgment (with respect to attorneys' fees incurred in such proceedings).

12.9 **Survival.** The mediation and arbitration agreement set forth in this Article 12 will survive the transfer by any party of its interest or involvement in the Property and any Lot therein and will survive the termination of this Declaration.

Article 13

MORTGAGEES

The following provisions are for the benefit of holders, insurers and guarantors of first Mortgages on Lots. The provisions of this Article 13 apply to both this Declaration and to the Bylaws, notwithstanding any other provisions contained therein.

13.1 **Subordination of Lien to Mortgages.** The lien of the Assessments or charges provided for in this Declaration are subordinate to the lien of any Mortgage on such Lot which was made in good faith and for value and which was recorded prior to the recordation of the notice of lien. Sale or transfer of any Lot does not affect the Assessment lien, but the sale or transfer of any Lot that is subject to any Mortgage or deed of trust pursuant to a decree of foreclosure or nonjudicial sale thereunder extinguishes any lien of an Assessment, notice of which was recorded after the recording of the Mortgage. Such sale or transfer, however, does not release the Lot from liability for any Assessments or charges thereafter becoming due or from the lien of such Assessments or charges.

13.2 **Reimbursement of First Mortgagees.** First Mortgagees of Lots may, jointly or singly, pay taxes or other charges which are in default and which may or have become a charge against any Common Areas and may pay overdue premiums on hazard insurance policies or secure new hazard insurance coverage on the lapse of a policy, for such Common Area. First Mortgagees making such payments are owed immediate reimbursement therefor from the Association.

13.3 **Notification of First Mortgagee.** If a first Mortgagee has requested such notice in writing from the Association, the Board will notify such Mortgagee of any individual Lot of any default in performance of this Declaration by the Owner which is not cured within 60 days after notice of default to the Owner.

13.4 **Notice to Association.** Upon request, each Owner is obligated to furnish to the Association the name and address of the holder of any Mortgage encumbering such Owner's Lot.

Article 14

AMENDMENT AND REPEAL

14.1 **How Proposed.** Amendments to or repeal of this Declaration will be proposed by either a majority of the Board of Directors or by Owners holding 30 percent or more of the Association's voting rights. The proposed amendment or repeal must be reduced to writing and will be included in the notice of any meeting at which action is to be taken thereon or attached to any request for consent to the amendment or repeal.

14.2 **Approval Required.** This Declaration, or any provision thereof, as from time to time in effect with respect to all or any part of the Property, may be amended or repealed by the vote or written consent of Owners representing not less than 75 percent of the voting rights, without regard to any weighted vote for the Class B Member, together with the written consent of the Class B Member, if such Class B Membership has not been terminated as provided in this Declaration. In no event will an amendment under this section create, limit or diminish special Declarant rights without Declarant's written consent, or change the boundaries of any Lot or any uses to which any Lot is restricted under this Declaration or change the method of determining liability for common expenses, the method of determining the right to common profits or the method of determining voting rights of any Lot unless the Owners of the affected Lots unanimously consent to the amendment. Declarant may not amend this Declaration to increase the scope of special Declarant rights reserved in this Declaration after the sale of the first Lot unless Owners representing 75 percent of the total vote, other than Declarant, agree to the amendment. To the extent any amendment relates to the preservation or maintenance of the Common Areas or private utility lines, or the existence of an entity responsible for accomplishing the same, such amendment must be approved by the zoning administrator of Clackamas County.

14.3 **Recordation.** Any such amendment or repeal becomes effective only upon recordation in the Deed Records of Clackamas County, Oregon of a certificate of the president and secretary of the Association setting forth in full the amendment, amendments or repeal so approved and certifying that such amendment, amendments or repeal have been approved in the manner required by this Declaration and ORS 94.590, and acknowledged in the manner provided for acknowledgment of deeds.

14.4 **Regulatory Amendments.** Notwithstanding the provisions of Section 14.2, until the Turnover Meeting has occurred, Declarant has the right to amend this Declaration or the Bylaws of the Association in order to comply with the requirements of the Federal Housing Administration; the United States Department of Veterans Affairs; the Farmers Home Administration of the United States; the Federal National Mortgage Association; the Government National Mortgage Association; the Federal Home Mortgage Loan Corporation; any department, bureau, board, commission or agency of the United States or the state of Oregon; or any corporation wholly owned, directly or indirectly, by the United States or the state of Oregon that insures, guarantees or provides financing for a planned community or lots in a planned community. After the Turnover Meeting, any such amendment must be approved by the Association in accordance with the approval provisions of this Declaration or the Bylaws, as applicable.

Article 15

MISCELLANEOUS PROVISIONS

15.1 **No Implied Obligations.** Nothing in this Declaration may be construed to require Declarant or any successor Declarant to subject Additional Property to this Declaration or to improve or develop any of the Property or to do so for any particular uses.

15.2 **Right to Approve Additional Covenants.** No Person may record any declaration of covenants, conditions and restrictions, declaration of condominium or similar instrument affecting any portion of the Property without Declarant's prior written consent. Any attempted recordation without such consent will result in such instrument being void and of no force or effect unless subsequently approved in writing by Declarant.

15.3 **Notice of Sale or Transfer of Title.** Any Owner selling or otherwise transferring title to his or her Lot must give the Association written notice within seven days after the transfer of the name and address of the purchaser or transferee, the date of such transfer of title and such other information as the Association may reasonably require. The transferor continues to be jointly and severally responsible with the transferee for all obligations of the Owner of the Lot, including Assessment obligations, until the date upon which such notice is received by the Board, notwithstanding the transfer of title.

15.4 **Exclusive Rights to Use Name of Development.** No Person may use the name "Stafford Meadows" or any derivative of such name in any printed, digital (i.e., internet) or other promotional or commercial material without Declarant's prior written consent. However, an Owner may use the name "Stafford Meadows" where such term is used solely to specify that the Owner's property is located within the Property. In no event will any Owner enter into an agreement with any third party for the sale, rental, or management of the Owner's Lot if such agreement purports to grant any right to such third party to use the name "Stafford Meadows" or any derivative of such name in violation of this provision.

15.5 **Lessees and Other Invitees.** Lessees, employees, invitees, licensees, contractors, family members, guests, and other Persons entering the Property under rights derived from an Owner must comply with all of the provisions of this Declaration restricting or regulating the Owner's use, improvement or enjoyment of his or her Lot and other areas within the Property. The Owner is responsible for obtaining such compliance and will be liable for any failure of compliance by such Persons in the same manner and to the same extent as if the failure had been committed by the Owner.

15.6 **Nonwaiver.** Failure by the Association or by any Owner to enforce any covenant or restriction contained in this Declaration will in no event be deemed a waiver of the right to do so thereafter.

15.7 **Construction and Severability.** This Declaration will be liberally construed as an entire document to accomplish the purposes hereof as stated in the introductory paragraphs hereof. Nevertheless, each provision of this Declaration will be deemed independent and severable, and the invalidity or partial invalidity of any provision will not affect the validity or enforceability of the remaining part of that or any other provision.

15.8 **Terminology and Captions.** As used in this Declaration, the singular includes the plural and the plural the singular, and the masculine and neuter each include the masculine, feminine and neuter, as the context requires. All captions used in this Declaration are intended solely for convenience of reference and in no way limit any of the provisions of this Declaration.

15.9 **Notices.** All notices to the Association or to the Board of Directors will be sent care of the manager or, if there is no manager, to the principal office of the Association or to such other address as the Board may designate from time to time. All notices to any Owner will be sent to such address as may have been designated by such Owner from time to time, in writing, to the Board or, if no address has been designated, to the Owner's Lot. In the discretion of the Board, any notice, information or other written material required to be given to an Owner or director under this Declaration or the Bylaws or pursuant to the Oregon Planned Community Act, may be given by electronic mail, facsimile or other form of electronic communication acceptable to the Board, except for the following notices: failure to pay an Assessment, foreclosure of an Association lien under ORS 94.709, or an action the Association may take against an Owner. An Owner or director may decline to receive notice by electronic mail, facsimile or other form of electronic communication and may direct the Board to provide notice in any other manner permitted under this Declaration or the Bylaws or the Oregon Planned Community Act.

15.10 **Private Agreement.** This Declaration and the covenants and agreements contained herein constitute a private agreement among the Owners of Lots in Stafford Meadows. This Declaration does not restrict Clackamas County's authority to adopt or amend its development regulations. It is the duty of every Person engaged in development or remodeling of a Lot and/or Improvement in Stafford Meadows to know the requirements of this Declaration and the covenants and agreements contained herein. There may be conflicting requirements between this Declaration and regulations of Clackamas County. In the event there is a conflict between a regulation of Clackamas County and this Declaration, any question regarding which provision controls will be directed to the Architectural Review Committee. In each case, Clackamas County will limit its review of a development application to the requirements of its regulations and will not be liable for any approvals or permits that are granted in compliance with the regulations of Clackamas County, the state of Oregon or any other jurisdiction, but that are not in compliance with this Declaration. Declarant, the Committee and the Association, or any one of them, will not be liable for any approvals that are granted in compliance with this Declaration, but that are not in compliance with the regulations of Clackamas County, the state of Oregon or any other jurisdiction.

IN WITNESS WHEREOF, Declarant has executed this Declaration on the date set forth above.

__________________ **LLC**,
an Oregon limited liability company

By: WalDen Holding Corp.
an Oregon corporation, its sole member

By: __________________________________
Name/Title: Dennis E. Sackhoff, President

By: __________________________________
Name/Title: Walter E. Remmers, Secretary

STATE OF OREGON)
)ss.
COUNTY OF __________________)

The foregoing instrument was acknowledged before me this ______ day of ____________, 2018, by Dennis E. Sackhoff, President of WalDen Holding Corp., an Oregon corporation, sole member of __________________ LLC, an Oregon limited liability company, on its behalf.

____
Notary Public for Oregon
My commission expires:__________________

STATE OF OREGON)
)ss.
COUNTY OF __________________)

The foregoing instrument was acknowledged before me this ______ day of ____________, 2018, by Walter E. Remmers, Secretary of WalDen Holding Corp., an Oregon corporation, sole member of __________________ LLC, an Oregon limited liability company, on its behalf.

____
Notary Public for Oregon
My commission expires:__________________

Appendix I

Example Building Elevations

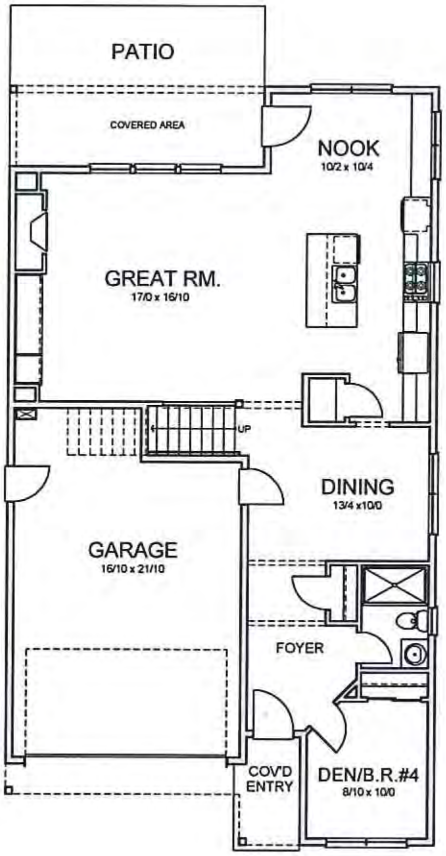
WEST HILLS
HOMES NORTHWEST

2467 HAVERTON FARMHOUSE

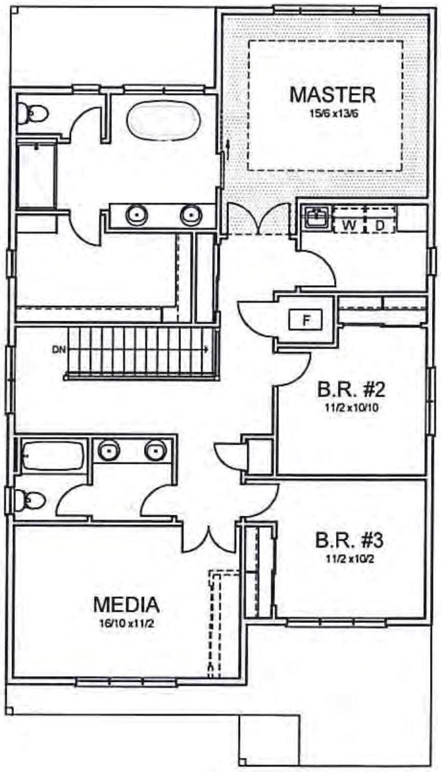
M. FLR.	=	1,088 S.F.
U. FLR.	=	1,461 S.F.
TOTAL	=	2,549 S.F.
GARAGE	=	434 S.F.

PDX E ORE
EVERETT
CUSTOM HOMES

4-BEDROOMS
3-BATHS
MEDIA
2-CAR GARAGE



MAIN LEVEL FLOOR PLAN (9' CLG.)



UPPER LEVEL FLOOR PLAN (8' CLG.)

REV: 7/20/18 DDR

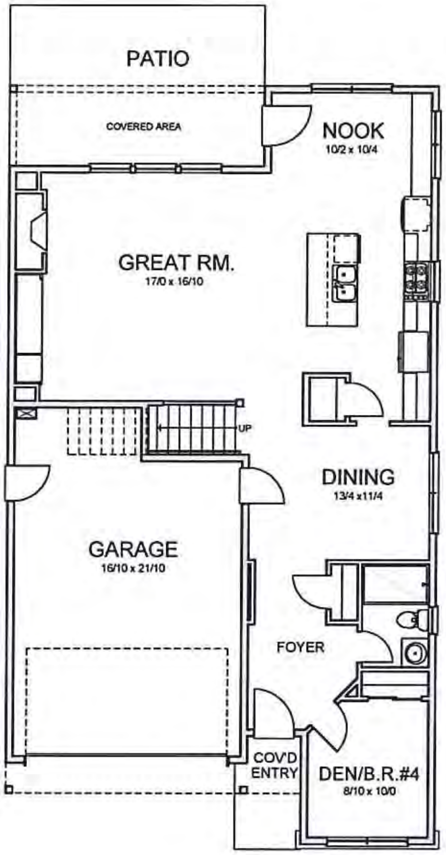
WEST HILLS
HOMES NORTHWEST

2467 HAVERTON
ENGLISH

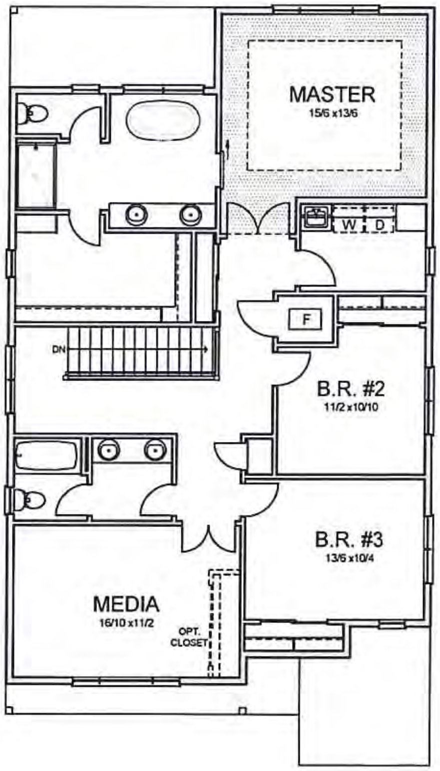
M. FLR. = 1,088 S.F.
U. FLR. = 1,481 S.F.
TOTAL = 2,569 S.F.
GARAGE = 435 S.F.

PDX ORE
EVERETT
CUSTOM HOMES

4-BEDROOMS
3-BATHS
MEDIA
2-CAR GARAGE



MAIN LEVEL FLOOR PLAN (9' CLG.)



UPPER LEVEL FLOOR PLAN (8' CLG.)

REV: 8/29/18 DDR

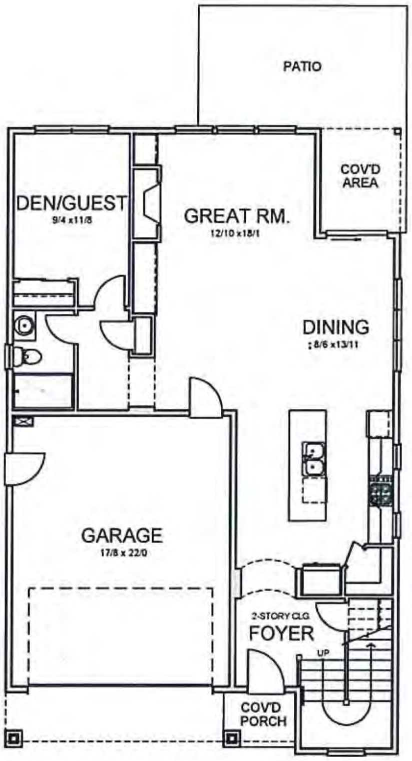
WEST HILLS
HOMES NORTHWEST

2470 BREMERTON FARMHOUSE

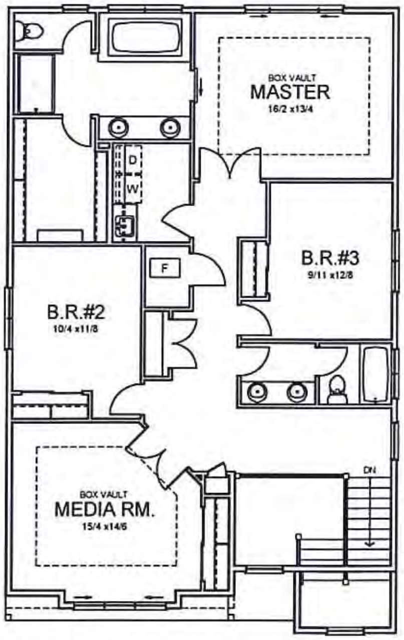
M. FLR.	=	994 S.F.
U. FLR.	=	1,503 S.F.
TOTAL	=	2,497 S.F.
GARAGE	=	411 S.F.

PDX ORE
EVERETT
CUSTOM HOMES

4-BEDROOMS
3-BATHS
MEDIA RM
2-CAR GARAGE



MAIN LEVEL FLOOR PLAN (9' CLG.)



UPPER LEVEL FLOOR PLAN (8' CLG.)

REV: 5/21/18 DDR

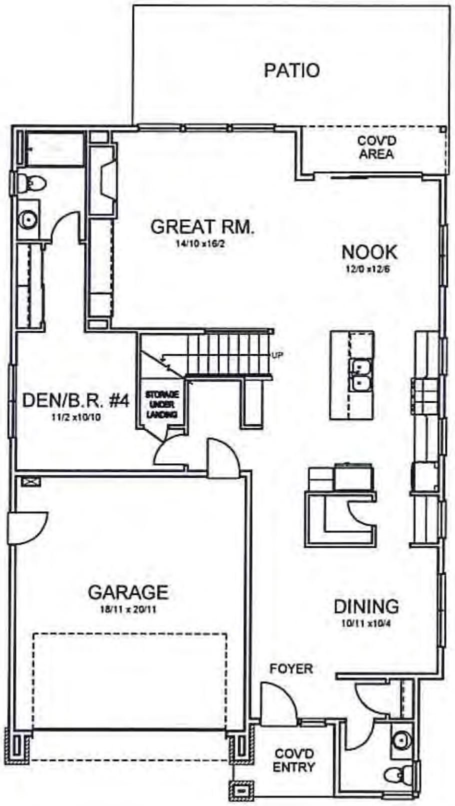
WEST HILLS
HOMES NORTHWEST

2956 SYLVAN PRAIRIE

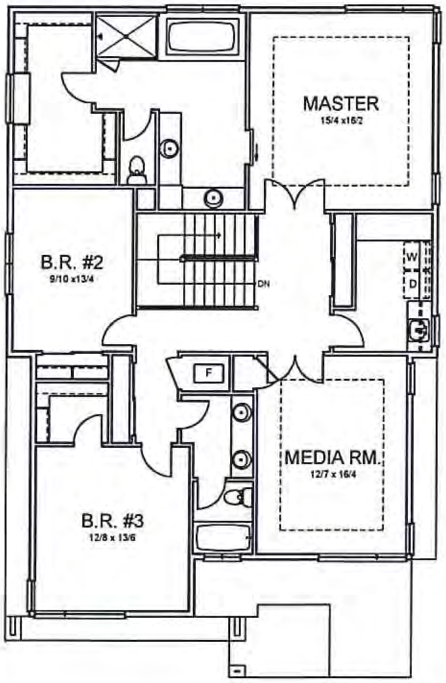
M. FLR.	=	1,312 S.F.
U. FLR.	=	1,645 S.F.
TOTAL	=	2,957 S.F.
GARAGE	=	420 S.F.

PDX E ORE
EVERETT
CUSTOM HOMES

4-BEDROOMS
3.5-BATHS
MEDIA
2-CAR GARAGE



MAIN LEVEL FLOOR PLAN (10' CLG.)



UPPER LEVEL FLOOR PLAN (9' CLG.)

REV: 9/27/18 DDR

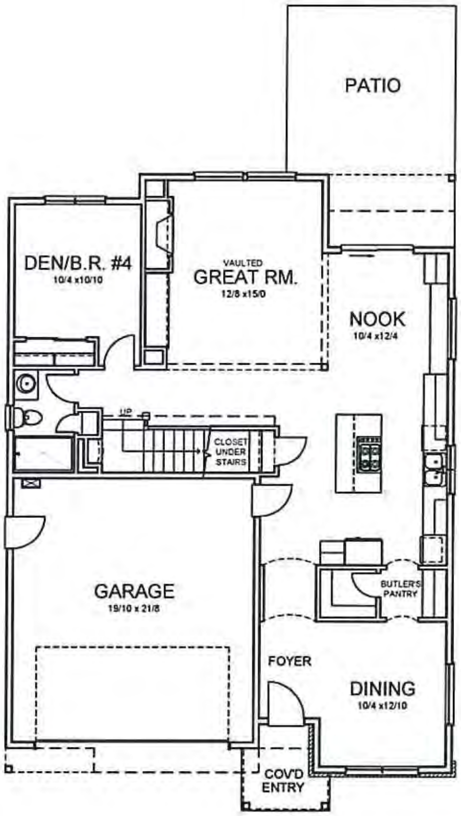
WEST HILLS
HOMES NORTHWEST

2647 BERKSHIRE
FRENCH

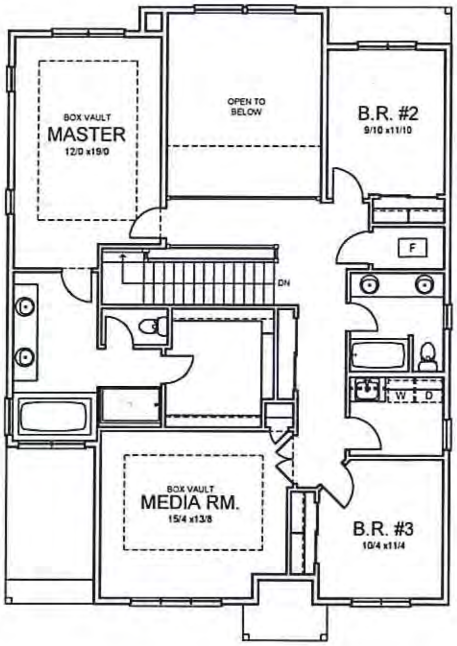
M. FLR.	=	1,192 S.F.
U. FLR.	=	1,455 S.F.
TOTAL	=	2,647 S.F.
GARAGE	=	459 S.F.

PDX ORE
EVERETT
CUSTOM HOMES

4-BEDROOMS
3-BATHS
MEDIA
2-CAR GARAGE



MAIN LEVEL FLOOR PLAN (9' CLG.)



UPPER LEVEL FLOOR PLAN (8' CLG.)

REV: 5/31/18 SHG

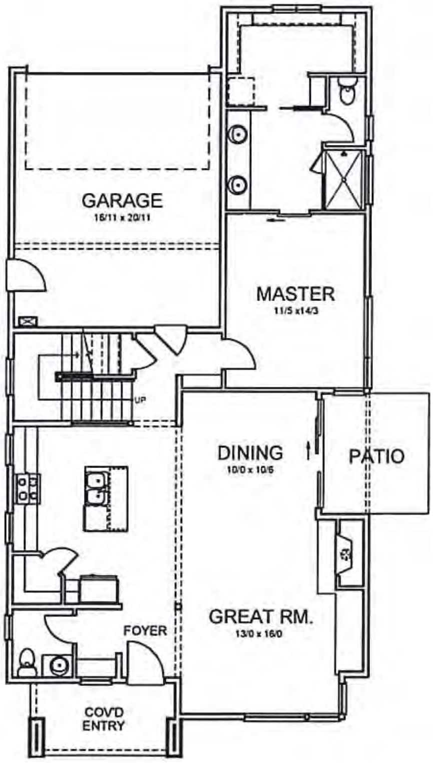
WEST HILLS
HOMES NORTHWEST

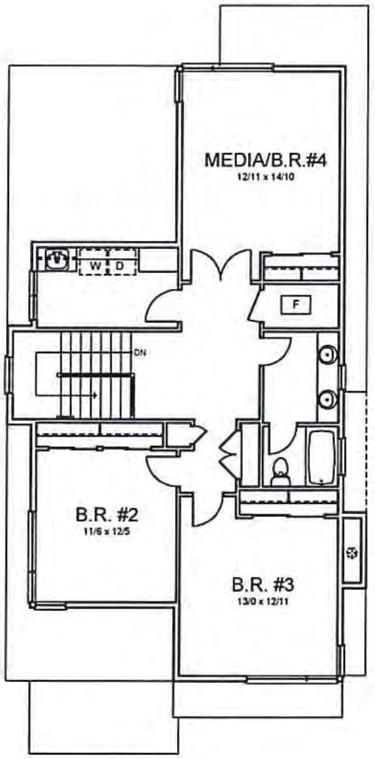
2233 MONT CLAIR
PRAIRIE

M. FLR. = 1,156 S.F.
U. FLR. = 1,095 S.F.
TOTAL = 2,251 S.F.
GARAGE = 378 S.F.

PDX ORE
EVERETT
CUSTOM HOMES

3-BEDROOMS
2.5-BATHS
MEDIA RM/B.R.#4
2-CAR GARAGE





MAIN LEVEL FLOOR PLAN (9' CLG.)

UPPER LEVEL FLOOR PLAN (9' CLG.)

DRAWN: 9/28/18 DDR


1'-0"
2'-0"
4
4


4
4
2'-0"

REPUBLIC
SERVICES

10295 Southwest Ridder Road, Wilsonville, OR 97070
o 503.570.0626 f 503.582.0307 republicservices.com

January 21, 2019

Matt Klym
Otak

Re: Frog Pond Meadows
Wilsonville, OR 97070

Dear Matt,

Thank you, for sending us the site plans for this proposed residential project in Wilsonville.

My Company: Republic Services of Clackamas and Washington Counties has the franchise agreement to service this area with the City of Wilsonville. We will provide complete residential waste removal and recycling services as needed on a weekly basis for this location

The design and location of the temporary tract connection: SW Willow Creek Drive to Private Alley East (tract L) and, temporary connection: SW Larkspur Terrace to SW Marigold Terrace (tract J) should allow adequate clearance for our trucks to service residential customers.

Thank you for your help and concerns for our services prior to this project being developed.

Sincerely,

Kelly Herrod
Operations Supervisor
Republic Services Inc.