Natural Resource Overlay District Report
Phase 1 of The Cove Development Plan
in Oregon City, Oregon

(Township 2 South, Range 2 East, Section 29, Tax Lots 1506, 1507, 1509, 1510, 1700, 2100, 2300, 2800, 2900, 3000, 3100, 3200, 3300, 3400, 3600, 3700 & 3800; Township 2 South, Range 2 East, Section 20, Tax Lot 1100)

Prepared for

Grand Peaks
Attn: Paul Herskowitz
4582 S Ulster St Pkwy, Ste 1200
Denver, CO 80237

and

City of Oregon City
Attn: Laura Terway, AICP
PO Box 3040
625 Center Street
Oregon City, OR 97045

Prepared by

Tina Farrelly, John van Staveren
Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, Oregon 97070
(503) 570-0800
(503) 570-0855 FAX

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1.0 INTRODUCTION

Pacific Habitat Services, Inc. (PHS) conducted a natural resource assessment for the proposed Garden Apartments Project (project) in Oregon City, Oregon. The project includes Phase 1 of the Cove Development Plan. Figure 1 and Figures 2A-2B (Appendix A) show the project vicinity and limits of the study area. All figures are in Appendix A.

This report presents the definitions and the methodology used to assess the natural resource overlay district (NROD) within the project site as required by the City of Oregon City (Chapter 17.49). The field component of the natural resource assessment for this site was completed on March 14, 2006. The existing conditions were reassessed on May 18, 2009, and July 16, 2015. PHS delineated the limits of jurisdictional wetlands and the ordinary high water (OHW) around Clackamette Cove within the project area on March 14, 2006, and January 15, 2009. Trees within proposed impact areas were re-evaluated on August 11, 2015.

2.0 EXISTING CONDITIONS

The Clackamas River, Clackamette Cove, and Wetland A are located within or adjacent to the project area. In 2006 and 2009, PHS delineated OHW of Clackamette Cove and boundary of Wetland A, which were determined to be jurisdictional features, regulated by the Oregon Department of State Lands (DSL) and the US Army Corps of Engineers (Corps) (DSL File #WD10-0027, Corps File # NWP-2009-373, Appendix B). Although the OHW of the Clackamas River was not delineated by PHS, the average elevation of the surveyed OHW of Clackamette Cove (approximately 18 feet NAVD 88) was extended to be the OHW elevation of Clackamas River.

The City's NROD map (Figure 3) includes the Clackamas River and Clackamette Cove, and their associated vegetated corridor (VC), which extend into the project area. Wetland A, as delineated by PHS, is partially within the existing NROD map. As such, Wetland A and its required VC as defined in Table 17.49.110 will be added to the map and regulated pursuant to the standards of Chapter 17.49. During a 2008/2009 Land Use Decision, a reduction in the VC of the Clackamette Cove and Clackamas River in the project area from 200 feet from the OHW to 50 feet from the OHW was approved with conditions (Oregon City Water Resource File Number WR 08-21). The updated VC boundary, as well as the jurisdictional limits of the Clackamas River, Clackamette Cove, and Wetland A are shown on Figure M4.0, Existing Conditions.

Clackamette Cove is a bay-like extension of the Clackamas River that was created by former gravel mining operations. The area was first excavated in 1964, and is connected to the Clackamas River through a dredged channel located just upstream of the Willamette / Clackamas Rivers' confluence. Much of the existing project site south and east of Clackamette Cove consists of vacant industrial lands. South of Clackamette Cove is an existing vacant property formerly occupied by The Glacier Ready Mix Concrete Plant, which ceased operation in 2007 and vacated the site in 2008. All associated buildings were then demolished, though associated pavement and building pads are still present adjacent to Wetland A. East of Clackamette Cove, the Rossman Landfill operated between 1960 and 1969. Afterward, the area was used for the manufacture of asphalt and concrete and as a log loading area. This portion of the site has remained generally undeveloped since 1986.

The site has generally been disturbed by past land uses, with areas of debris (including piles of rock, concrete, and other materials), gravel, remnants of loading docks, buildings and other industrial structures occurring throughout much of the site. A steep bank separates Clackamette Cove from the project site. In general, the site's topography is nearly level to gently sloping, with areas of minor topographic relief resulting from the past land uses. Several old structures, including piers and cantilevered decks are located within the Cove or on the Cove's banks. The Clackamas County sheriff's office has a boat facility on the Cove and an associated gravel parking lot in the eastern portion of the site. The Clackamas River Trail extends from Main Street northeast through the project area. This paved pedestrian/bicycle trail generally parallels the east side of Clackamette Cover and connects Main Street to Washington Street, approximately one mile to the northeast.

Most of the shoreline of the Clackamette Cove is armored with rocks and contains sparse vegetation. Existing riparian vegetation along the banks of Clackamette Cove consists primarily of scattered cottonwood trees (*Populus balsamifera*), red alder (*Alnus rubra*), and willow (*Salix* spp.), supporting a relatively sparse understory of deciduous shrubs including Scot's broom (*Cytisus scoparius*) and Himalayan blackberry (*Rubus armeniacus*). Groundcover is dominated by grasses and weedy forbs typical of disturbed areas.

3.0 DISCUSSION OF NATURAL RESOURCE AREAS

PHS delineated the limits of the wetlands on the site based on the presence of wetland hydrology, hydric soils, and hydrophytic vegetation, in accordance with the Routine On-site Determination, as described in the *Corps of Engineers Wetland Delineation Manual, Wetlands Research Program Technical Report Y-87-1* ("The 1987 Manual") and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region*. The delineation was conducted on March 14, 2006, and January 15, 2009. PHS identified and delineated the limits of ordinary high water (OHW) along Clackamette Cove and one jurisdictional wetland within the study area. Brief descriptions of these resources are provided below.

Clackamette Cove

The shoreline of Clackamette Cove is steeply sloped within the project area. Based on the survey of the OHW flagging, the average elevation of the OHW is approximately 18 feet (NAVD 88). The slopes bordering Clackamette Cove rise 15 to 25 feet above the flagged OHW mark.

Below the OHW line, the shoreline of Clackamette Cove is largely unvegetated and has a substrate dominated by cobbles, gravel, and, in some places, boulders. Above the OHW line, the shoreline is vegetated with cottonwoods, willows, Himalayan blackberry, and various upland herbaceous species. Based on PHS's examination of soils, vegetation, and hydrology, there are no jurisdictional wetlands above the OHW line.

Clackamette Cove is a waterbody formed in a former quarry pit. At some point in the quarry's history, an opening was cut and a dredged connection was created between the quarry and the Clackamas River. Because the limit of tidal influence along the Clackamas River is just upstream of the connection between Clackamette Cove and the Clackamas River, water levels in Clackamette Cove are affected by the tides as well as flows within the Clackamas River. Based on tide data, the mean annual low water elevation, which corresponds to the average annual lowest tide levels, is approximately 5.32 feet.

Wetland A

Wetland A is a palustrine forested, seasonally saturated (PFOE) wetland swale located along the northwestern edge of the former Glacier Ready Mix site. The wetland is in the bottom of a steep-sided ravine formed by the fill slopes of the current and former development located to the east and west. The HGM classification of the wetland is Slope. The total area of Wetland A is approximately 4,158 square feet (0.10 acres). A narrow excavated ditch extends from the northern portion of the swale to a culvert located near the northwestern property corner. This culvert conveys surface water from the swale, under Main Street, and into Clackamette Cove.

Wetland vegetation includes red-osier dogwood (*Cornus sericea*), Scouler's willow (*Salix scouleriana*), Himalayan blackberry, rose (*Rosa* species), reed canarygrass (*Phalaris arundinacea*), curly dock (*Rumex crispus*; FAC), and Canada thistle (*Cirsium arvense*). At the time of the wetland delineation site visit, soils within the wetland swale were saturated, but there was no surface water or evidence of an OHW line within the swale.

Per 17.49.[0]35 *Addition of wetlands to map following adoption*, although Wetland A is not included on the existing NROD map, it is partially within the existing NROD boundary. As such, the entirety of Wetland A and its required vegetated corridor will be added to the NROD map, and shall be regulated pursuant to the standards of Chapter 17.49.

4.0 VEGETATED CORRIDOR ASSESSMENT

4.1 Vegetated Corridor Extent

A total of approximately 582,647 square feet (13.38 acres) of vegetated corridor is present within the defined project area, as shown on Figure M4.0.

The VC associated with the Clackamas River and Clackamette Cove was established to be 50 feet from the edge of bankfull flow (approximately 18 feet NAVD 88) during a 2008/2009 Land Use Decision (Oregon City Water Resource File Number WR 08-21). The VC area associated with the Clackamas River and Clackamette Cove within the project area parcels is 526,956 square feet (12.10 acres).

Slopes are greater than 25 percent adjacent to the delineated edge of Wetland A. Accordingly, the required vegetated corridor for Wetland A is 50 feet from the break in 25 percent slope, and ranges from 50 to 100 horizontal feet from the wetland boundary. The total VC area adjacent to Wetland A is 55,691 square feet (1.28 acres). However, an area approximately 16,559 square feet (0.38 acre) within the VC of Wetland A is existing impervious surface. Development in this area is exempt from review pursuant to Section 17.49.[0]80.J.

4.2 Vegetated Corridor Condition

The condition of the vegetated corridor is defined by the combined coverage of trees, shrubs, and groundcover; overall tree canopy coverage; and the coverage of non-native species. Table 1 details the species present within the vegetated corridor as well as their overall coverage.

Table 1 Vegetated Corridor Plant Species and Percent Coverage

Common Name	Botanical Name	Cover (%)		
		Clackamette Cove E, SE, SW	Clackamette Cove NW*	Wetland A
Trees	**Overall cover**	**36%**	**50%**	**25%**
Cottonwood	*Populus trichocarpa*	44	50	25
Red alder	*Alnus rubra*	30	-	-
Willow sp.	*Salix sp.*	16	-	-
Shrubs	**Overall cover**	**32%**	**82%**	**35%**
Cottonwood	*Populus trichocarpa*	-	50	-
Cut-leaf birch	*Betula pendula***	-	2	-
Himalayan blackberry	*Rubus discolor***	50	10	20
Madrone	*Arbutus menziesii*	-	10	-
Multiflora rose	*Rosa multiflora***	-	-	10
Red-osier dogwood	*Cornus alba*	-	10	-
Scot's broom	*Cytisus scoparius***	50	-	-
Snowberry	*Symphoricarpos albus*	-	-	5
Woody Vines	**Overall cover**	**5%**	**0%**	**0%**
English ivy	*Hedera helix***	100	-	-
Ground Cover	**Overall cover**	**23%**	**34%**	**20%**
Common tansy	*Tanacetum vulgare***	5	10	-
Common vetch	*Vicia sativa***	8	-	-
Few-seed bittercress	*Cardamine oligosperma*	11	-	-
Oxeye daisy	*Leucanthemum vulgare***	5	-	-
Red clover	*Trifolium pratense*	8	-	-
Reed canary grass	*Phalaris arundinacea***	5	-	10
Robert's geranium	*Geranium robertianum***	6	-	-
Spotted cat's ear	*Hypochaeris radicata***	6	-	-
Sticky-willy	*Galium aparine*	-	2	-
Sweetclover	*Melilotus alba***	-	10	-
Teasel	*Dipsacus fullonum***	12	2	-
Thistle	*Cirsium sp.***	6	10	10
Unknown grass	*Grass sp.*	22	-	-
Watson's Willow Herb	*Epilobium watsonii*	6	-	-

*****The assessment of vegetation for Clackamette Cove NW includes the peninsula between the Clackamas River and Clackamette Cove, north of the mouth of Clackamette Cove.

** Oregon City Nuisance Plant List: http://www.orcity.org/sites/default/files/NuisancePlantList.pdf

The vegetated corridor to the east, southeast, and southwest of Clackamette Cove (Clackamette Cove E, SE, SW) and Wetland A has a marginal tree canopy coverage at 36 and 25 percent, but greater than 10 percent coverage of non-native species, bringing the overall condition to **degraded**.

The vegetated corridor to the northwest of Clackamette Cove has marginal to good tree canopy at 50 percent and a good combination of trees, shrubs, and groundcover. However, the 44 percent cover of non-native species degrades the habitat in this area, bringing the overall condition to **marginal**.

5.0 PROPOSED PROJECT

The proposed project will include construction of a multi-family residential mixed-use complex (Garden Apartments), roadway improvements along Main Street (including a new roundabout), excavation at the North Park, stormwater treatment improvements, temporary trailhead parking for the Clackamas River Trail, and shoreline restoration (Figures M5.0, M5.1, and M5.2). The Construction Management Plan for the project is included in Appendix A (Sheet 1).

The proposed project elements are similar to those described in the 2008/2009 Land Use Decision (Oregon City Water Resource File Number WR 08-21). Key differences affecting the NROD include:

- The addition of Wetland A and its VC on Lot 2 to the NROD. Grading and construction of the Garden Apartments site will result in impacts to the VC of Wetland A, subject to Sections 17.49.0[80] and 17.49.130.
- Main Street roadway improvements resulting in impact to the VC of Clackamette Cove, subject to Section 17.49.[0]90.F.
- Grading within the North Park site for floodplain balance will impact the VC of Clackamette Cove, subject to Section 17.49.200. Eighteen trees greater than 6 inches in diameter will be removed from this area.

Garden Apartments

Preparation of the Garden Apartments site will require approximately 108,000 cubic yards of fill in order to raise the proposed site above the base flood elevation (50.7 feet). An equivalent amount of storage will be utilized from within the 100-year floodplain of the Clackamas River; therefore resulting in a balanced cut and fill within the City's Flood Management Overlay District. For additional details on the floodplain balance for the project, refer to the earthwork quantities tables on Civil Grading Plan Sheets C3.0 to C3.6.

Construction of the Garden Apartments and associated Phase I improvements are scheduled to begin in October 2015, with completion in 2016. Additional phases of The Cove Development will likely occur beyond 2016, and are not included in this analysis. The following is a general sequence of proposed construction activities, further detailed discussion is provided in the sections below:

1. Conduct overall project mobilization and implement environmental controls (i.e., erosion and sediment control measures). Wetland A and its remaining vegetated corridor will be isolated from construction activities though sediment fencing along the limits of disturbance as shown on the Construction Management Plan.
2. Clear vegetation, remove existing concrete building pads from site, and begin grading.
3. Construct temporary trailhead parking.
4. Excavate material from the proposed North Park site, Tri-City dirt pile, and Main Street.
5. Construct proposed roadway and stormwater improvements.
6. Complete finish grading at the Garden Apartments and North Park site.
7. Hydro-seed and revegetate disturbed areas, and install mitigation plantings.
8. Construct Garden Apartments and associated buildings.

Roadway Improvements

Proposed roadway improvements along Main Street will include the addition of sidewalks, bike lanes, and planter strips along 650 linear feet of Main Street on the north side of the proposed Garden Apartments, and along 720 feet on the east side of the proposed apartments. In addition, a new roundabout intersection will be constructed at the intersection of Main Street and Agnes Street. Furthermore, a temporary gravel parking lot (consisting of 14 parking spaces) will be constructed at the trailhead of the Clackamas River Trail to accommodate recreational users during proposed construction activities. Proposed roadway improvements will likely be constructed concurrently with the proposed grading activities.

Floodplain Excavation and Fill/North Park Site

Prior to any grading activities within the floodplain, construction limits and no work zones will be clearly demarcated, and erosion control measures (i.e., sediment fencing, straw wattles, etc.) will be placed according to the project Erosion and Sediment Control Plan (ESCP). As stated above, all fill material for construction of the Garden Apartments will be sourced from within the floodplain, including approximately 81,700 cubic yards of excavation from the proposed North Park site (described below) and approximately 3,800 cubic yards of excavation from Lot 1. Approximately 22,500 cubic yards of excess (i.e., "banked") floodplain capacity associated with the Jug Handle Project, an Oregon City an ODOT traffic and safety improvement project at the intersection of Oregon Highway 213 / Washington Street / Clackamas River Drive, will be factored in to the net balance. For additional details on the floodplain balance for the project, refer to the earthwork quantities tables on Civil Grading Plan Sheets C3.0 to C3.6.

Proposed grading activities will not occur below the OHW of Clackamette Cove, and no fill will be placed within the floodway. However, proposed grading will require the removal of riparian trees located along the bank of Clackamette Cove in the proposed North Park Amphitheater excavation area. In addition, proposed excavation and soil removal at the North Park site will require temporary relocation of approximately 920 linear feet of the existing Clackamas River Trail. Grading will be accomplished using excavators and dozers, and all heavy equipment will

access the project site via existing roadways and previously disturbed upland areas. All areas temporarily disturbed during project construction will be stabilized (i.e., hydro-seeded) and revegetated (as necessary).

Stormwater Management

The proposed development of the Garden Apartments and associated roadway improvements will result in approximately seven (7) acres of impervious surface within the project area (Cardno 2015). As such, new stormwater facilities are proposed for treatment of expected pollutants (i.e. oil, PAHs, heavy metals, nutrients, and sediment) associated with roof runoff and vehicle use within the apartment complex and along the improved roadway. Currently, stormwater runoff from the project site (excluding Main Street) consists primarily of overland flow across approximately 6.8 acres of existing concrete and gravel surfaces, with no formal water quality treatment. Stormwater from Main Street currently drains to vegetated ditches located along the roadway that drain into a storm pipe that outfalls into Clackamette Cove.

New stormwater facilities will include a combination of Low Impact Development Approach (LIDA) swales and Contech StormFilters (Cardno 2015). The LIDA swales will collect and treat stormwater runoff through vegetation and soil media, while also providing flow attenuation. The StormFilters will contain cartridges filled with filter media designed to remove stormwater pollutants associated with runoff. The facilities are designed to accept 33% of the 2-year, 24-hour storm event (0.83 inches of precipitation) in accordance with the City Stormwater and Grading Design Standards (Cardno 2015). Stormwater exiting the LIDA swales and StormFilters from the proposed Garden Apartments and roadway improvements will be directed (via pipes) to an existing 36-inch stormwater pipe located along Main Street that outfalls into Clackamette Cove. In addition, a portion of the stormwater generated from the offsite basins surrounding the Garden Apartments will be collected into an existing 15-inch pipe that also outfalls into Clackamette Cove.

Portions of the existing 36-inch stormwater pipe will be upsized to a 48-inch pipe during construction of the proposed Main Street roadway improvements to provide additional stormwater capacity for future development. However, the existing 36-inch and 15-inch outfalls into Clackamette Cove will be retained and no new outfalls are proposed. Stormwater detention will not be required given the relative size of the drainage basin (>100 square miles) for the receiving water body (i.e., Clackamas River).

Shoreline Restoration/Mitigation

Shoreline restoration/mitigation for the proposed impacts within Vegetated Corridor in the project area will include native plantings and invasive species removal at a two-to-one ratio of mitigation area to proposed disturbance area. The mitigation plan is described in section *5.3 Mitigation Plan* below.

5.1 Vegetated Corridor Impacts

Impacts to the NROD for the project result from roadway improvements along Main Street, grading on the Garden Apartments lot, and grading and tree removal in the North Park site, (Figures M5.0-M5.2). The Construction Management plan for the project is included in Appendix A (Sheet 1).

The Main Street roadway improvements will include additional impervious surface within the NROD and installation of an upsized stormwater pipe in Main Street. These improvements will permanently impact 7, 204 square feet (0.17 acre) of the Clackamette Cove VC. (Figure M5.1) and are subject to Section 17.49.[0]90.F.

Grading in the Garden Apartments site will permanently impact 27,666 square feet (0.64 acre) of the vegetated corridor associated with Wetland A (Figure M5.1). However, 16,559 square feet (0.38 acre) of the impact area is considered impervious surface, the alteration of which is exempt from review pursuant to Section 17.49.[0]80.J. The remaining 11,107 square feet (0.25 acre) of impact area will be considered redevelopment subject to *Existing Development Standards* (17.49.130).

Grading in the North Park will disturb 13,326 square feet (0.31 acre) of the VC associated with Clackamette Cove and the Clackamas River, and remove 18 trees greater than six inches in diameter (Figure M5.2). These impacts are subject to the standards of Section 17.49.200. All of the impacted VC will be stabilized and replanted following final grading. Table 2 details the species, trunk diameter, and condition of each of the trees to be removed.

Table 2: Species, diameter, and quality of trees to be removed from the NROD

Tree ID	Species	Diameter (inches)	Condition
79	Black cottonwood (*Populus balsamifera*)	11.5	Fair
5307	Black cottonwood (*Populus balsamifera*)	12	Fair
5308	Black cottonwood (*Populus balsamifera*)	17	Fair
5309	Black cottonwood (*Populus balsamifera*)	14	Fair
5310	Black cottonwood (*Populus balsamifera*)	10	Fair
5311	Black cottonwood (*Populus balsamifera*)	7.5	Fair
5312	Black cottonwood (*Populus balsamifera*)	12.5	Fair
5313	Black cottonwood (*Populus balsamifera*)	12	Fair
5314	Black cottonwood (*Populus balsamifera*)	16.5	Fair
5315	Black cottonwood (*Populus balsamifera*)	9	Fair
5316	Black cottonwood (*Populus balsamifera*)	14	Fair
5317	Black cottonwood (*Populus balsamifera*)	13	Fair
5318	Black cottonwood (*Populus balsamifera*)	21.5	Poor
5319	Black cottonwood (*Populus balsamifera*)	12	Fair

Tree ID	Species	Diameter (inches)	Condition
5322	Black cottonwood (*Populus balsamifera*)	13.5	Fair
6236	Black cottonwood (*Populus balsamifera*)	16.5	Poor
PHS-1	Douglas-fir (*Pseudotsuga menziesii*)	7.5	Good
PHS-2	Willow (*Salix* species)	10	Fair

Proposed mitigation for the total NROD impacts resulting from Phase 1 of the project are described in Section 5.3 below. Mitigation detailed in this report is for NROD impact areas and does not include mitigation for tree protection standards (Chapter 17.41), which is detailed in the application package.

5.2 NROD Development Standards

As the proposed project will result in impacts to the vegetated corridor within the study area, the project must comply with Oregon City Municipal Code, Chapter 17.49, Natural Resource Overlay District. The applicable sections of the code are discussed below.

17.49.[0]60 – Consistency and relationship to other regulations.

Response: No conflicts with the provisions of the Oregon City Municipal Code; other City requirements; or with regional, state or federal law have been identified for the proposed project. The wetland resources within the proposed project area were delineated by PHS in March 2006 and January 15, 2009. The DSL and the Corps concurred with the findings in the spring of 2010 (WD#2010-0027, NWP-2009-373, Appendix B). Although the jurisdictional determinations expired in May (DSL) and March (Corps) 2015, the boundary of Wetland A has not changed as it is confined by steep hillslopes. The OHW has also not changed as it is elevation-based.

Phase 1 of the project does not propose impacts to jurisdictional wetlands or waters that would warrant further coordination with DSL and the Corps. As such, further documentation of coordination with appropriate regulatory/resource agencies, as required in Section 17.49.230C, is not necessary. A DEQ 1200-C NPDES Stormwater Discharge Permit will be submitted once the City provides Conditions of Approval for the Land Use application.

17.49.[0]70 – Prohibited uses

D. Grading, the placement of fill in amounts greater than ten cubic yards, or any other activity that results in the removal of more than ten percent of the existing native vegetation on any lot within the NROD is prohibited, unless part of an approved development activity.

Response: Grading and the placement of greater than ten cubic yards of fill will occur for the North Park site. In addition, 18 trees greater than 6 inches in diameter will be removed from the Clackamette Cove VC during Phase 1. An approval for these development activities is being requested (See 17.49.200 below).

Grading and fill will also occur in association with the Main Street roadway improvements and Garden Apartments site, however, these are either exempt from review (see 17.49.[0]80.J) or are allowed uses under prescribed conditions (see 17.49.130 for Garden Apartments grading and 17.49.150 for roadway improvements).

17.49.[0]80 – Uses allowed outright (exempted)

A. Stream, wetland, riparian, and upland restoration or enhancement projects as authorized by the city.

Response: The applicant will restore and enhance areas within and adjacent to the VC that are impacted in association with the proposed project as authorized by the city (see section *5.3 Mitigation Plan* below).

J. Replacement, additions, alterations and rehabilitation of existing structures, roadways, utilities, etc., where the ground level impervious surface area is not increased.

Response: The applicant will replace existing impervious surface area formerly occupied by the Glacier Ready Mix plant within the Garden Apartments site (for more details on the limits of impervious surface area, refer to the Geotechnical report, Appendix C). This portion of the proposed development within the VC associated with Wetland A is exempt from review pursuant to Section 17.49.[0]80.J. All other development within the VC of Wetland A will be subject to *Section 17.49.130 Existing Development Standards*.

L. Planting of native vegetation and the removal of non-native, invasive vegetation (as identified on the Oregon City Native Plant List), and removal of refuse and fill, provided that:

1. All work is done using hand-held equipment;

2. No existing native vegetation is disturbed or removed; and
3. All work occurs outside of wetlands and the top-of-bank of streams.

Response: The applicant will provide re-vegetation and mitigation including native vegetation planting and non-native species removal for the proposed project impacts as authorized by the city (see section *5.3 Mitigation Plan* below).

17.49.[0]90 – Uses allowed under prescribed conditions.

F. New roadways, bridges/creek crossings, utilities or alterations to such facilities when not exempted by Section 17.49.080.

Response: The Main Street roadway improvements will increase the ground level impervious surface area, precluding exemption by Section 17.49.080. As such, the Main Street roadway improvements are subject to Section 17.49.150 described below.

17.49.100 – General development standards.
The following standards apply to all Uses Allowed under Prescribed Conditions within the NROD with the exception of rights of ways (subject to Section 17.49.150), trails (subject to Section 17.49.170), utility lines (subject to Section 17.49.140), land divisions (subject to Section 17.49.160), and mitigation projects (subject to Section 17.49.180 or 17.49.190):

A. Native trees may be removed only if they occur within ten feet of any proposed structures or within five feet of new driveways or if deemed not wind-safe by a certified arborist. Trees listed on the Oregon City Nuisance Plant List or Prohibited Plant List are exempt from this standard and may be removed. A protective covenant shall be required for any native trees that remain;

Response: An adjustment from the standards of this Section is being requested as 18 trees greater than 6 inches in diameter will be removed during grading of the North Park site. Refer to Section 17.49.200 below and the Tree Condition Report (Appendix D).

B. The community development director may allow the landscaping requirements of the base zone, other than landscaping required for parking lots, to be met by preserving, restoring and permanently protecting habitat on development sites in the Natural Resource Overlay District.

Response: No landscaping requirements of the base zone will be met within the NROD.

C. All vegetation planted in the NROD shall be native and listed on the Oregon City Native Plant List;

Response: All vegetation proposed to be planted within the NROD is native and listed on the Oregon City Native Plant List. Refer to section *5.3 Mitigation Plan* for the proposed planting details.

D. Grading is subject to installation of erosion control measures required by the City of Oregon City;

Response: Erosion control measures required by the City of Oregon City will be installed prior to site mobilization and grading activities (see Construction Management Plan sheet, Appendix A).

E. The minimum front, street, or garage setbacks of the base zone may be reduced to any distance between the base zone minimum and zero in order to minimize the disturbance area within the NROD portion of the lot;

Response: Minimum setback reductions are not being requested.

F. Any maximum required setback in any zone, such as for multi-family, commercial or institutional development, may be increased to any distance between the maximum and the distance necessary to minimize the disturbance area within the NROD portion of the lot;

Response: Maximum setback increases are not being requested.

G. Fences are allowed only within the disturbance area;

Response: Fences are not proposed within the undisturbed NROD.

H. Incandescent lights exceeding two hundred watts (or other light types exceeding the brightness of a two hundred watt incandescent light) shall be placed or shielded so that they do not shine directly into resource areas;

Response: Lights are not proposed for within the undisturbed NROD area; lights adjacent to the NROD will be shielded so that they do not shine directly into resource areas.

I. *If development will occur within the one hundred-year floodplain, the FEMA floodplain standards of Chapter 17.42 shall be met; and*

Response: Development will occur within the one hundred year floodplain. As such, the FEMA floodplain standards of Chapter 17.42 will be met.

J. *Mitigation of impacts to the regulated buffer is required, subject to Section 17.49.180 or 17.49.190.*

Response: Mitigation of impacts will be provided subject to Section 17.49.180, Mitigation Planting Option 2. Refer to section *5.3 Mitigation Plan* for details.

17.49.130 – Existing development standards.

Response: As described above, the Garden Apartments site was formerly developed by the Glacier Ready Mix Concrete plant. All of the proposed grading and development within the VC of Wetland A is within existing development that has either been previously graded and/or contains impervious surfaces. Development proposed within 16,559 square feet of existing impervious surface area within the VC of Wetland A is exempt from review pursuant to *Section 17.49.080J* (for more details on the limits of impervious surface area, refer to the Geotechnical report, Appendix D).

A total of 11,107 square feet of development is proposed within areas that have been previously graded within the VC of Wetland A. This development is considered an alteration of existing development subject to the standards of this section. The impervious surface area within the VC of Wetland A will be increased by greater than 500 square feet. As such, the proposed development will be processed as a Type III permit pursuant to Section 17.49.200 below. Mitigation for this development will be provided as described in section *5.3 Mitigation Plan* below.

17.49.150 – Standards for vehicular or pedestrian paths and roads.

Response: The Main Street roadway improvements do not call for stream crossings or work below the OHW of Clackamette Cover or within Wetland A. Mitigation for the 7,204 square feet (0.17 acre) of impacts associated with the improvements will be provided as required and detailed in *Section 5.3 Mitigation Plan* below.

17.49.180 – Mitigation standards.

Response: The applicant will provide mitigation for project-related impacts pursuant to the standards of this section using Mitigation Planting Option 2. The mitigation plan and requirements of this section are covered in greater detail in *5.3 Mitigation Plan* below.

17.49.200 – Adjustment from standards.

A. *There are no feasible alternatives for the proposed use or activity to be located outside the NROD area or to be located inside the NROD area and to be designed in a way that will meet all of the applicable NROD development standards.*

Response: The project proposes the minimum amount of disturbance inside the NROD while still meeting project specific criteria detailed in the application package. Grading within the North Park site is being conducted to balance cut and fill within the development area and adhere to the FEMA floodplain standards of Chapter 17.42 for development within the 100-year floodplain. Areas graded within the NROD will be stabilized and revegetated.

B. The proposal has fewer adverse impacts on significant resources and resource functions found in the local NROD area than actions that would meet the applicable environmental development standards.

Response: The proposed project largely avoids adverse impacts to NROD resources and their functions within the parcel by minimizing impacts within the NROD and surrounding environment. Minimization and avoidance measures include:

- Avoiding impacting wetlands or areas below the OHW.
- Proposing to remove invasive, non-native plant species from the development area.
- Balancing cuts and fills within the development area.
- Proposing a stormwater treatment and conveyance system that will utilize pervious pavement throughout the site, bioswales within the public right-of-way, and rain gardens in building area.
- Leaving the majority of the site in open space or as parks to assist with the protection of the aquatic and terrestrial habitat.

The NROD within the project area is in degraded condition. The mitigation proposed for the project, which includes removing invasive plant species and increasing tree canopy, vegetation structure, and native plant diversity, is expected to create a higher functioning NROD area than currently exists within the project area.

C. The proposed use or activity proposes the minimum intrusion into the NROD area that is necessary to meet development objectives.

Response: As stated above, the proposed project has been designed to address project specific criteria while minimizing impacts to natural resources. Site constraints limit the potential location of areas suitable for cut/fill balance within the floodplain. The proposed grading within the North Park site has been minimized to the extent practicable. Further, the area will be stabilized and revegetated following final grading.

D. Fish and wildlife passage will not be impeded.

Response: The impacts to the NROD are not expected to impede fish and wildlife passage. As no work is proposed below the OHW of the Clackamas River or Clackamette Cove fish passage should not be impeded. A majority of the NROD area will remain intact and/or will be improved in function. The riparian area of the Clackamas River and Clackamette Cove adjacent to the development area is expected to improve through the required mitigation measures. The proposed project is not anticipated to cause additional wildlife passage impacts within the NROD other than those already present from the existing developments within the project vicinity.

E. With the exception of the standard(s) subject to the adjustment request, all other applicable NROD standards can be met.

Response: All standards will be met with the exception of the standard where an adjustment has been requested (Section 17.49.200), as described in the responses provided to *Section 17.49.100 – General development standards, Section 17.49.130 – Existing development standards,* and *Section 17.49.150 – Standards for vehicular or pedestrian paths and roads*.

F. The applicant has proposed adequate mitigation to offset the impact of the adjustment.

Response: As described in the mitigation plan below, the proposed project will provide adequate mitigation to offset the impact of the adjustment to the development standards.

5.3 Mitigation Plan

An area of 48,196 square feet (1.11 acres) will be disturbed within the NROD and 18 trees greater than 6-inches diameter will be removed from the North Park site during grading. Of the total impact area, 16,559 square feet (0.38 acre) of existing impervious surface is exempt from review pursuant to Section 17.49.080J and will not require mitigation. The required mitigation for the remaining 31,637 square feet (0.73 acre) of impact area is described in this section. Specific mitigation for Phase 2 of The Cove will be addressed separately.

Mitigation Standards require that Option 1 or Option 2 under Section 17.49.180 be selected based on which option will result in more trees planted, except where the disturbance area is one acre or more, Mitigation Option 2 is required. Both mitigation options require a minimum of two times the mitigation area for the proposed NROD disturbance area.

Mitigation Option 1

The number of trees and shrubs to be planted using Option 1 is based on the number and size of the trees to be removed. Table 3 details the size of the 18 trees that will be removed from the NROD, as well as the required number of replacement trees and shrubs. The species and condition of the trees to be removed are listed in Table 2, in *5.1 Vegetated Corridor Impacts* above.

Table 3. Trees to be removed from the NROD and required mitigation plantings.

Tree ID	Tree Diameter (inches)	Replacement Trees	Replacement Shrubs
79	11.5	2	3
5307	12	2	3
5308	17	3	6
5309	14	3	6
5310	10	2	3
5311	7.5	2	3
5312	12.5	3	6

Tree ID	Tree Diameter (inches)	Replacement Trees	Replacement Shrubs
5313	12	2	3
5314	16.5	3	6
5315	9	2	3
5316	14	3	6
5317	13	3	6
5318	21.5	5	12
5319	12	2	3
5322	13.5	3	6
6236	16.5	3	6
PHS-1	7.5	2	3
PHS-2	10	2	3
	Total	**47**	**87**

Mitigation Option 2

The number of trees and shrubs to be planted using Option 2 is calculated based on the size of the disturbance area within the NROD. Native trees and shrubs from the Oregon City Native Plant List are required to be planted at a rate of five trees and twenty-five shrubs per every five hundred square feet of disturbance area. The total disturbance area for the proposed project, not including impacts to existing impervious surfaces, is 31,637 square feet, which results in 316 trees and 1,582 shrubs to be planted.

Option 2 will be used for the mitigation plan as it results in a greater number of trees and shrubs to be planted than Option 1. The plant species listed on Figure M6.0 are subject to adjustment based on site conditions and plant availability at the time of planting. However, no more than one-third of the trees will be of the same genus, and shrubs will consist of at least three different species, as required in Section 17.49.180(E)(2)(e). All plantings will be a minimum of twelve inches in height and will be live cuttings, bare root stock, and/or container stock. Trees will be planted at average intervals of seven feet on center. Shrubs will be planted in single-species groups of no more than four plants, with clusters planted on average between eight and ten feet on center.

The mitigation will be conducted on the subject parcels where possible, and adjacent to subject parcels where the impact is within right-of-way, as required under Section 17.49.180B. For the North Park site, the required 26,652 square-foot mitigation area will be within tax lots 1100 (22E20) and 3600 (22E29) between the proposed alignment of the Clackamas River Trail and the OHW of the Clackamas River and/or Clackamette Cove. For the Main Street roadway improvements, 10,495 square feet of the required 14,408 square-foot mitigation area will be within tax lot 3600 (22E29), between the Main Street easement and the OHW of the Clackamette Cove. For the Garden Apartments site, 21,546 square feet of the required 22,214 square-foot mitigation area will be within tax lot 2900 (22E29), adjacent to Wetland A. The remaining 3,913 square feet of required mitigation area for the Main Street impacts and the

remaining 668 square feet of required mitigation area for the Garden Apartment impacts will be sited on tax lot 3600 adjacent to the mitigation area for the North Park site.

As described above, most of the VC within the project area is in degraded condition. The exception is the VC to the northwest of Clackamette Cove, which is in marginal condition. However, the entire VC has greater than 10 percent coverage of non-native, invasive plant species. It is anticipated that the mitigation will improve the functional value of the vegetated corridor by removing invasive species and increasing native plant diversity and coverage. As required for the mitigation plan report (Section 17.49.230), a written response to each applicable Mitigation Standard described in Section 17.49.180 indicating how the proposed development complies with the mitigation standards follows:

A. *Mitigation shall occur at a two-to-one ratio of mitigation area to proposed NROD disturbance area […].*

Response: The proposed disturbance area, excluding disturbance to existing impervious surface areas is 31,637 square feet (0.73 acre), which requires 63,274 square feet of mitigation. The proposed mitigation areas total 69,931 square feet (1.61 acres). As such, this standard will be exceeded by 6,657 square feet of mitigation area.

D. Invasive and nuisance vegetation shall be removed within the mitigation area.

Response: Invasive vegetation listed on the Oregon City Nuisance Plant List including, but not limited to cut-leaf birch, Himalayan blackberry, multiflora rose, Scot's broom, English ivy, common tansy, common vetch, oxeye daisy, reed canarygrass, Robert's geranium, spotted cat's ear, sweet clover, and common teasel will be removed within the mitigation area.

E. Required Mitigation Planting. An applicant shall meet Mitigation Planting Option 1 or 2 below, whichever option results in more tree plantings, except that where the disturbance area is one acre or more, Mitigation Option 2 shall be required. All trees, shrubs, and groundcover shall be selected from the Oregon City Native Plant List.

Response: Mitigation Planting Option 2 will be used as it results in more tree plantings. All trees, shrubs, and herbaceous (groundcover) selected for the mitigation plan are from the Oregon City Native Plant List. The plant species listed in Table 4 and shown on Figure M6.0 are subject to adjustment based on site conditions and plant availability at the time of planting. However, no more than one-third of the trees will be of the same genus, and shrubs will consist of at least three different species.

Table 4. Proposed plant list for mitigation plantings.

Botanical Name	**Common Name**
TREES (minimum of 316 plantings)	
Abies grandis	Grand fir
Acer macrophyllum	Big-leaf maple
Alnus rubra	Red alder
Arbutus menziesii	Madrone

Botanical Name	Common Name
Fraxinus latifolia	Oregon ash
Malus fusca	Oregon crabapple
Populus balsamifera	Black cottonwood
Pseudotsuga menziesii	Douglas-fir
Salix scouleriana	Scouler's willow
SHRUBS (minimum of 1,582 plantings)	
Acer circinatum	Vine maple
Amelanchier alnifolia	Western serviceberry
Berberis aquifolium	Tall Oregon grape
Crataegus douglasii	Black hawthorn
Ribes sanguineum	Red flowering currant
Rubus parviflorus	Thimbleberry
Spiraea douglasii	Douglas' spirea
Symphoricarpos albus	snowberry
HERBACEOUS	
Agrostis exerata	Spike bentgrass
Bromus carinatus	California brome
Deschampsia cespitosa	Tufted hairgrass

2. Mitigation Planting Option 2.

Response: The mitigation planting quantity is based on the disturbance area within the NROD. Three hundred and sixteen (316) replacement trees and one-thousand, five-hundred and eighty-two (1,582) replacement shrubs will be planted according to the size, spacing, and diversity standards of this section. Bare ground will be planted or seeded with native grasses and ground cover species. New plantings will be mulched and planting areas will be watered for a minimum of three years following planting.

F. Monitoring and Maintenance.

Response: The proposed mitigation will be monitored and maintained for a minimum of five years, with approved annual progress reports submitted to the City's planning division. Mulching and irrigation will be applied in the amounts necessary to ensure eighty percent survival at the end of the required five-year monitoring period. The Garden Apartments mitigation area will be irrigated through the Garden Apartments irrigation system. Plantings in the Main Street Mitigation area and North Park mitigation areas will require either hand water or water truck service for the duration of the maintenance and monitoring period.

The mitigation area will be inspected annually during the active growing season. During site monitoring, survival rates of planted trees and shrubs and invasive plant species cover will be

documented. This information, along with photo-documentation of the mitigation area, will be used to inform the annual progress report. Should survival rate drop below 80 percent or invasive plant coverage exceed 10 percent at any time during the maintenance period, immediate remedial action will be taken. Monitoring and maintenance is the on-going responsibility of the property owner, assign, or designee.

G. Covenant or Conservation Easement. Applicant shall record a restrictive covenant or conservation easement, in a form provided by the city, requiring the owners and assigns of properties subject to this section to comply with the applicable mitigation requirements of this section. Said covenant shall run with the land, and permit the city to complete mitigation work in the event of default by the responsible party. Costs borne by the city for such mitigation shall be borne by the owner.

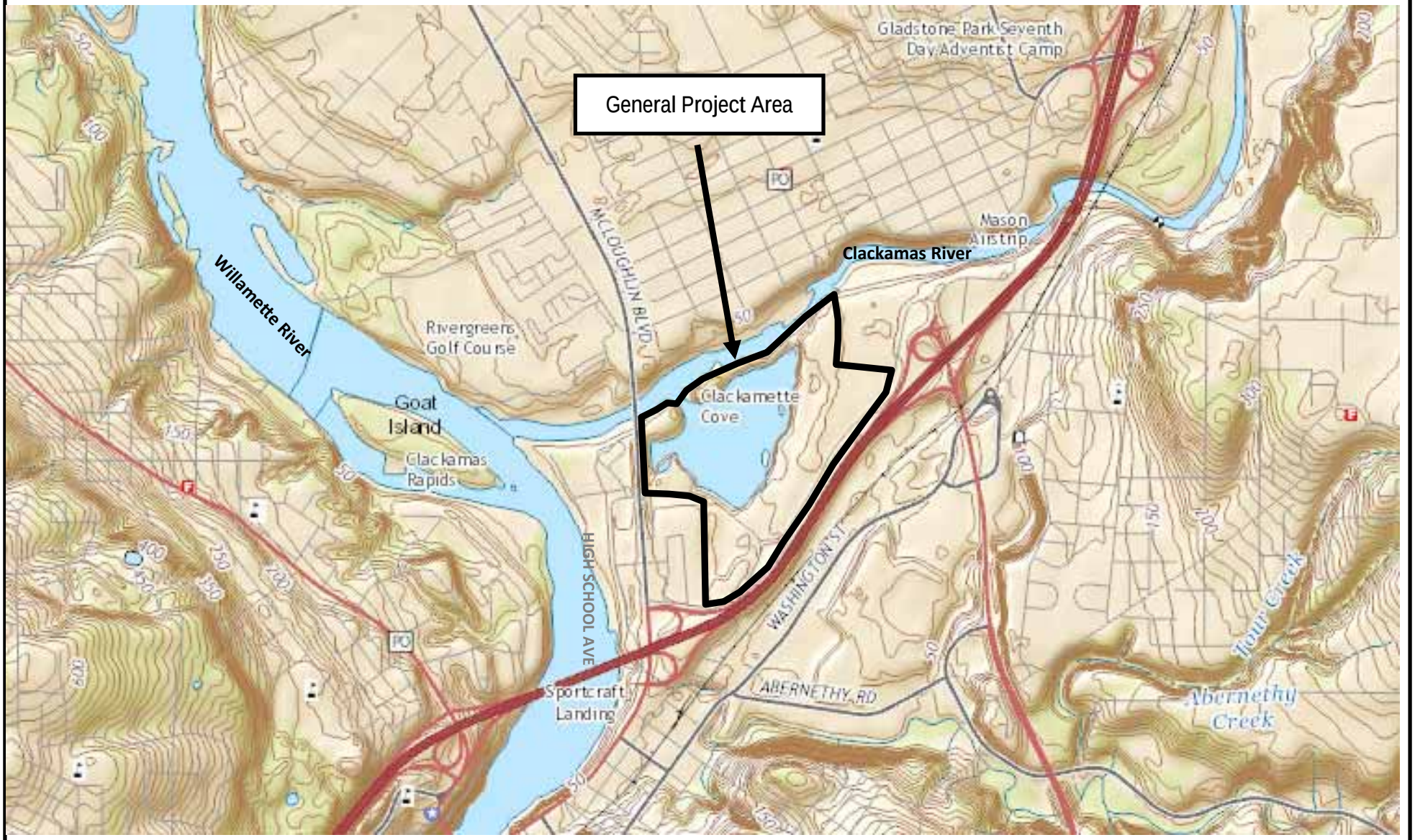
Response: The applicant will record a restrictive covenant or conservation easement in the form provided by the City that will require owners and assigns of the property to comply with the applicable mitigation requirements. The covenant or easement will run with the land and permit the City to complete mitigation work in the event of default by the responsible party. Should the city need to complete the mitigation work, such cost will be borne by the owner. The covenant or conservation easement is the responsibility of the property owner, assign, or designee.

H. Financial Guarantee. A financial guarantee for establishment of the mitigation area, in a form approved by the city, shall be submitted before development within the NROD disturbance area commences. The city will release the guarantee at the end of the five-year monitoring period, or before, upon its determination that the mitigation plan has been satisfactorily implemented pursuant to this section.

Response: A financial guarantee will be provided to the city prior to development within the NROD disturbance area. The financial guarantee is the responsibility of the property owner, assign, or designee.

Appendix A

Figures



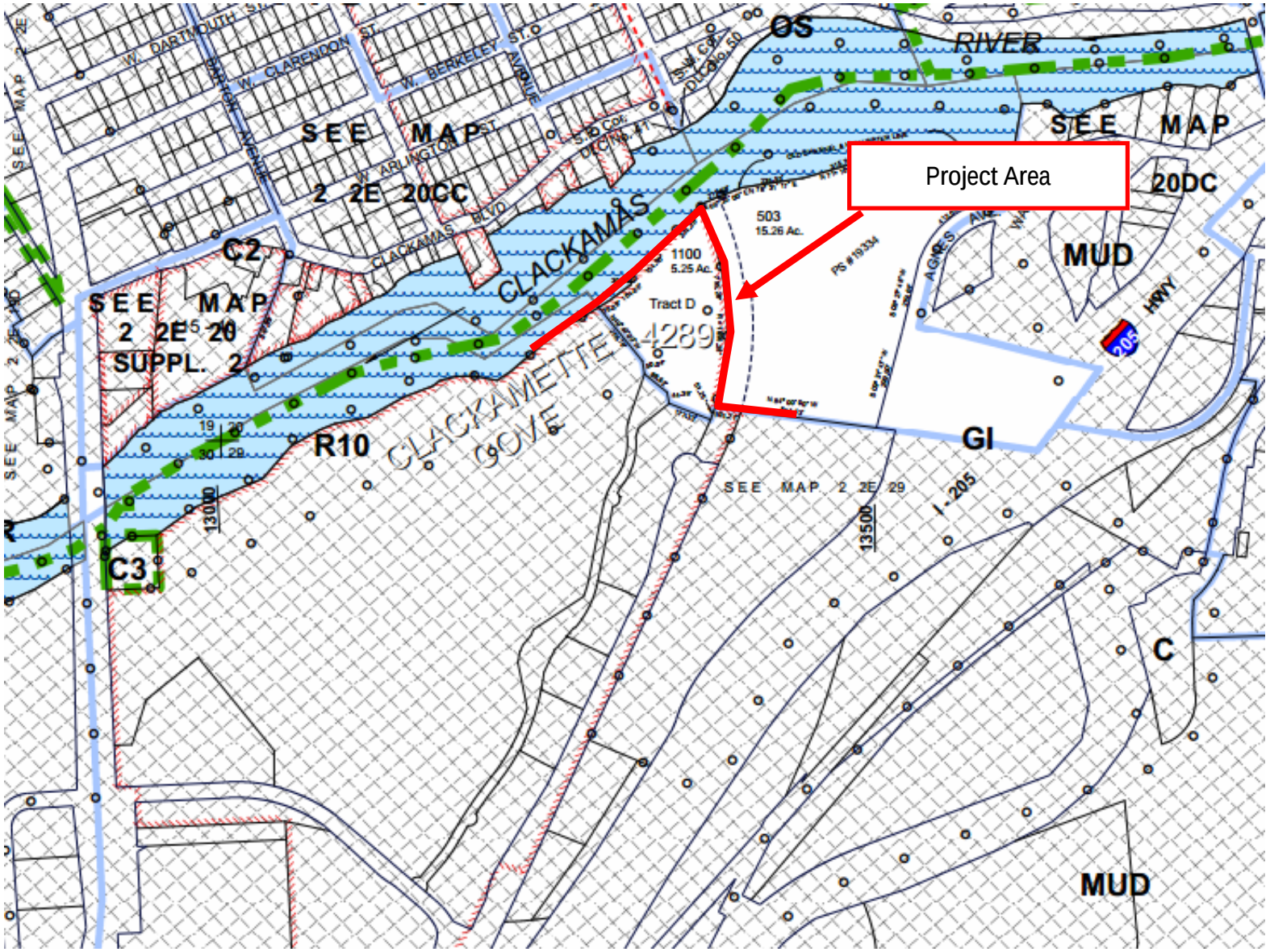
5511
6/29/15

PHS

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Location and General topography
The Cove— Phase 1, Oregon City, Oregon
(USGS The National Map Viewer, Oregon City, Oregon quadrangle, 2015)

FIGURE
1

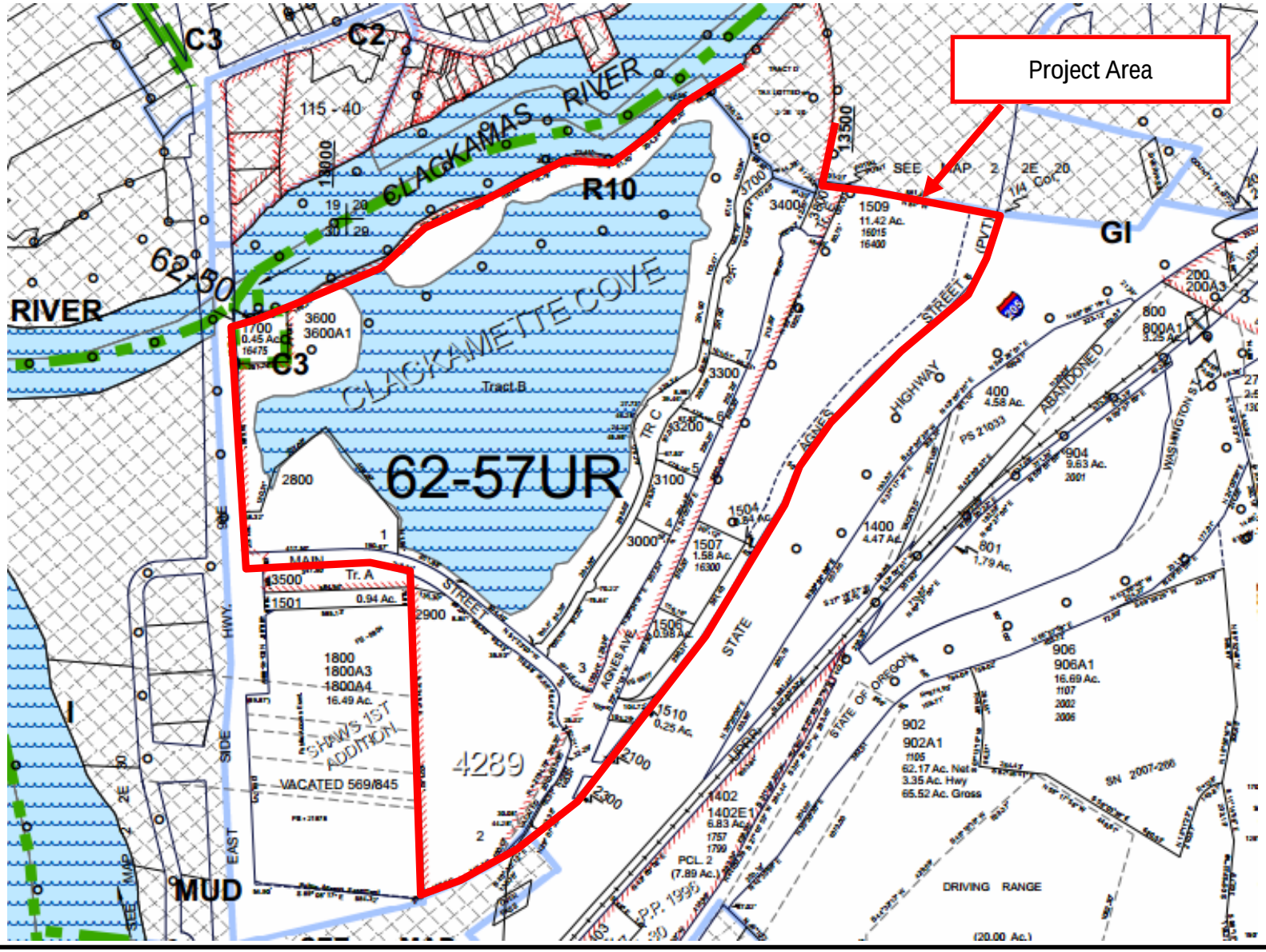


5511
6/29/15

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Tax Lot map 2 2E 20, Clackamas County Oregon
The Cove—Phase 1, Oregon City, Oregon
(ormap.net, 2015)

FIGURE
2A



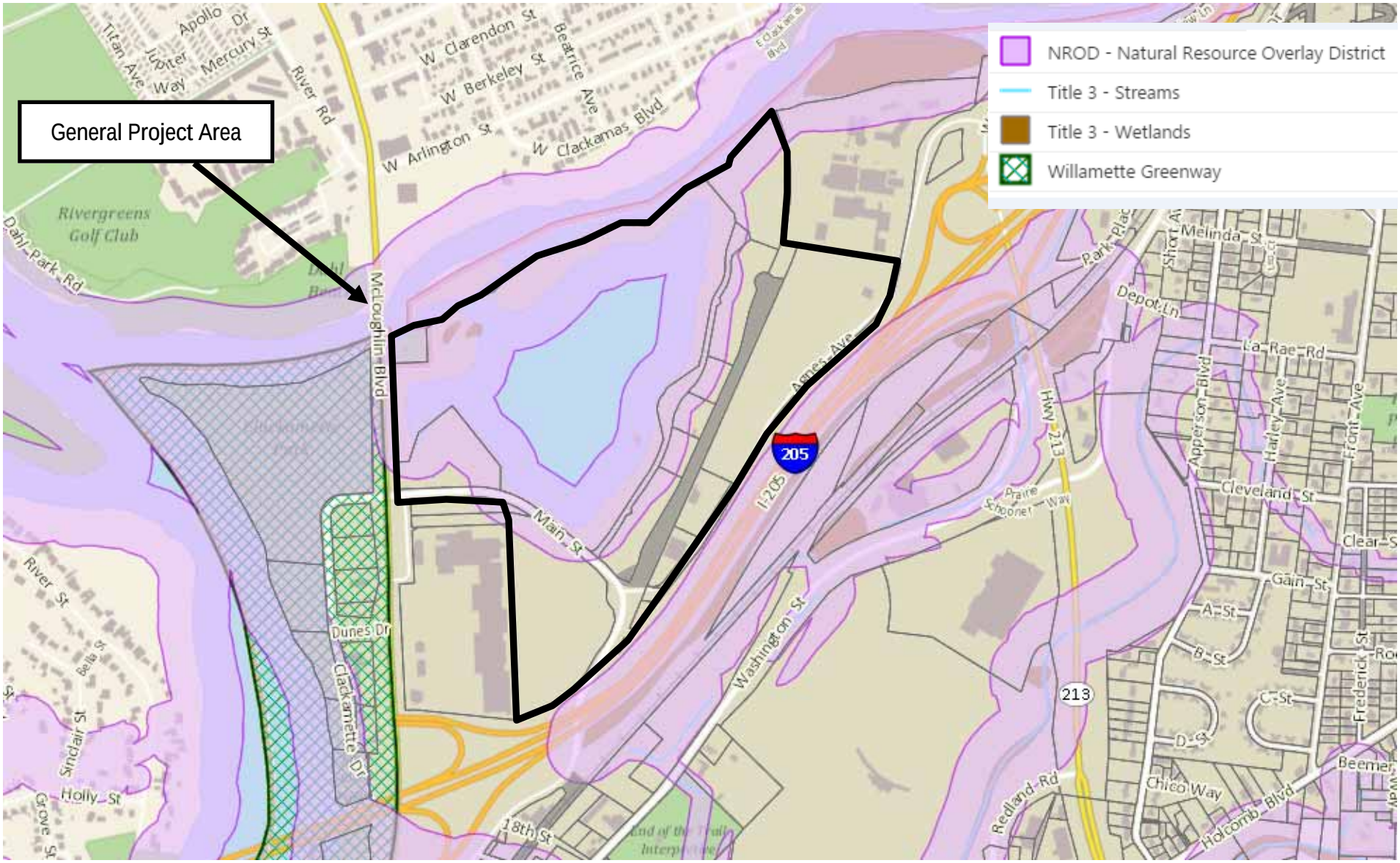
5511
6/29/15

PHS

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Tax Lot map 2 2E 29, Clackamas County Oregon
The Cove—Phase 1, Oregon City, Oregon
(ormap.net, 2015)

FIGURE
2B



5511
6/29/15

Pacific Habitat Services, Inc.
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Wilsonville, OR 97070

Natural Resources Overlay District map
The Cove—Phase 1, Oregon City, Oregon
(Oregon City Web Maps, 2015)

FIGURE
3

Clackamette Cove/
Clackamas River
Vegetated Corridor
(526,956 / 12.10 ac)

Clackamas River
Ordinary High Water Line
(18 feet NAVD 88)

Clackamas River

Existing
Clackamas River Trail

Clackamette Cove

Clackamette Cove
Ordinary High Water Line
(18 feet NAVD 88)

Approximate Location
of Sherrif's Office and
Boat Facility

Clackamette Cove/
Clackamas River
Vegetated Corridor
(526,956 sf / 12.10 ac)

MAIN STREET

Delineated
Wetland A

Wetland A
Vegetated Corridor
(55,691 sf/ 1.28 ac)

Former Glacier Ready Mix
Concrete Plant Site
Existing Impervious
Surface Within Wetland A
Vegetated Corridor
(16,559 sf / 0.38 ac)
Exempt from review
pursuant to Section
17.49.080J

MAIN STREET

AGNES AVENUE

HIGHWAY 205

N

0 150 300 600

SCALE IN FEET

Survey provided by CARDNO.

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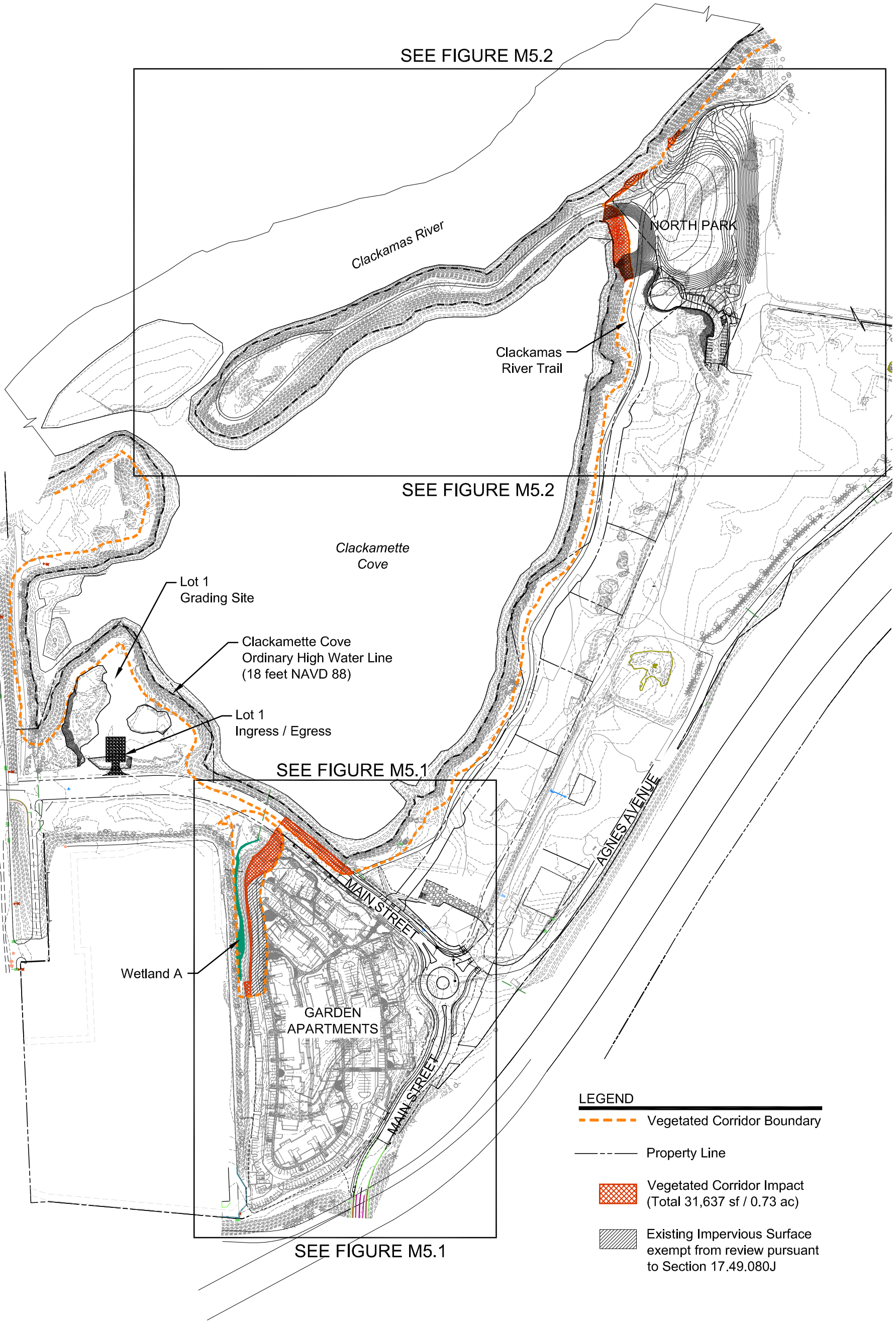
Pacific Habitat Services,Inc.
9450 SW Commerce Circle, Suite 180 Wilsonville, Oregon 97070
Phone: (503) 570-0800 Fax (503) 570-0855

Existing Conditions Overview
The Cove, Phase 1 - Oregon City, Oregon

FIGURE
M4.0

8-18-2015



Site Plan provided by CARDNO

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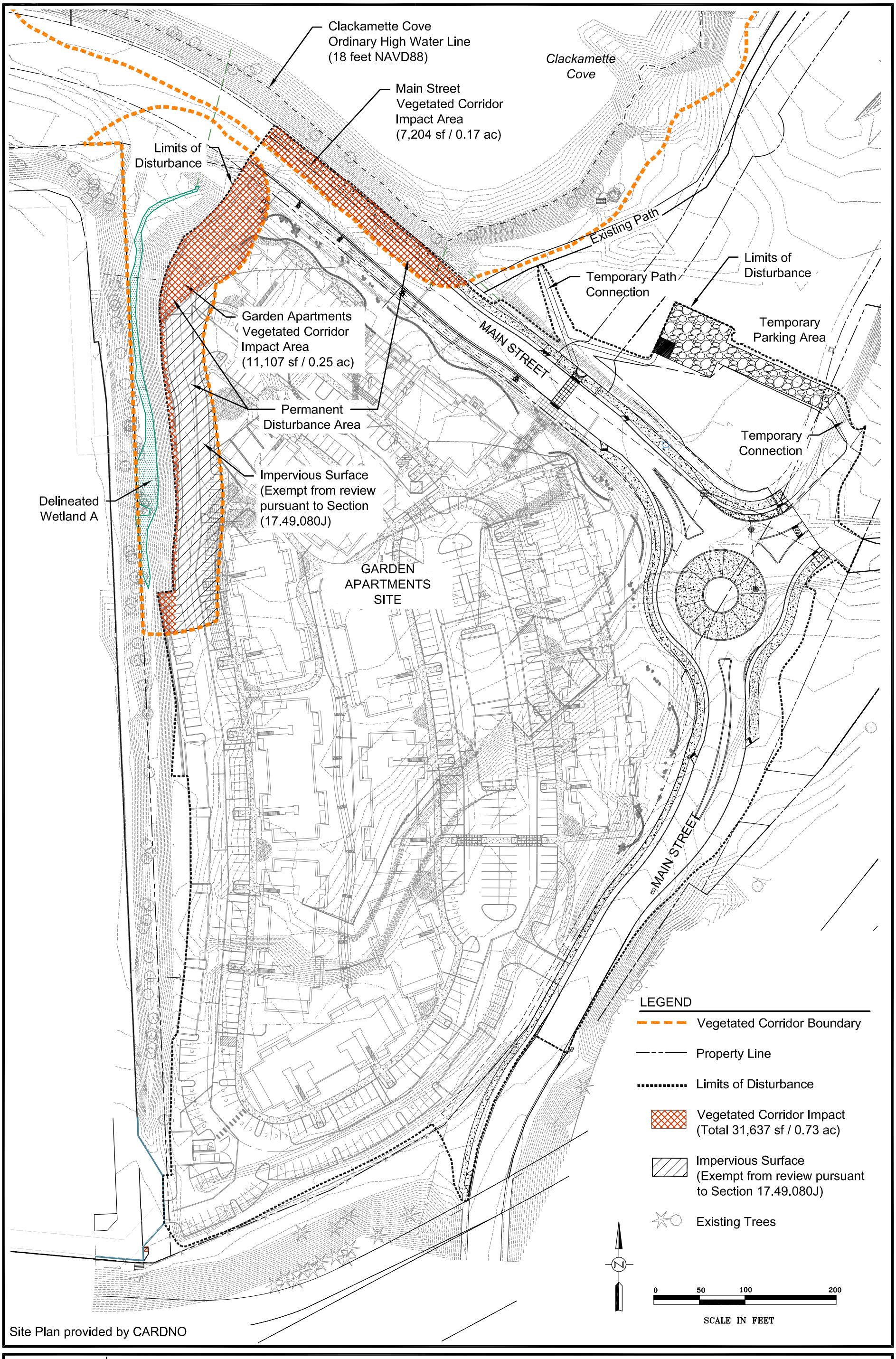
9450 SW Commerce Circle, Suite 180 Wilsonville, Oregon 97070
Phone: (503) 570-0800 Fax (503) 570-0855

Garden Park Apartments Site Plan and NROD Encroachment - Overview

The Cove, Phase 1 - Oregon City Oregon

FIGURE
M5.0

8-26-2015



Site Plan provided by CARDNO

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9450 SW Commerce Circle, Suite 180 Wilsonville, Oregon 97070
Phone: (503) 570-0800 Fax (503) 570-0855

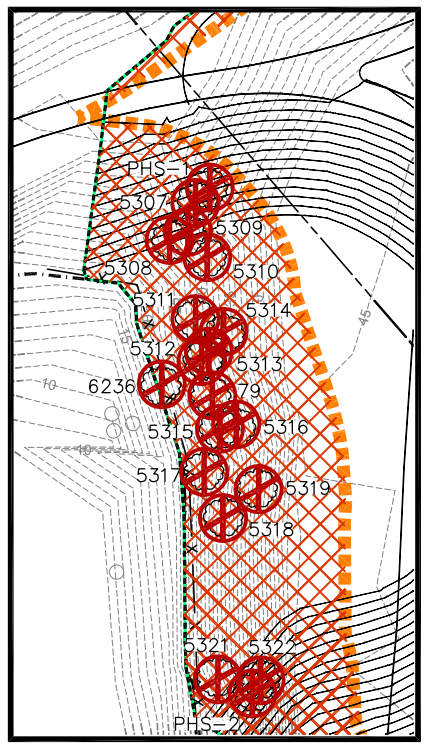
Garden Park Apartments Site Plan and NROD Encroachment
The Cove, Phase 1 - Oregon City Oregon

FIGURE
M5.1

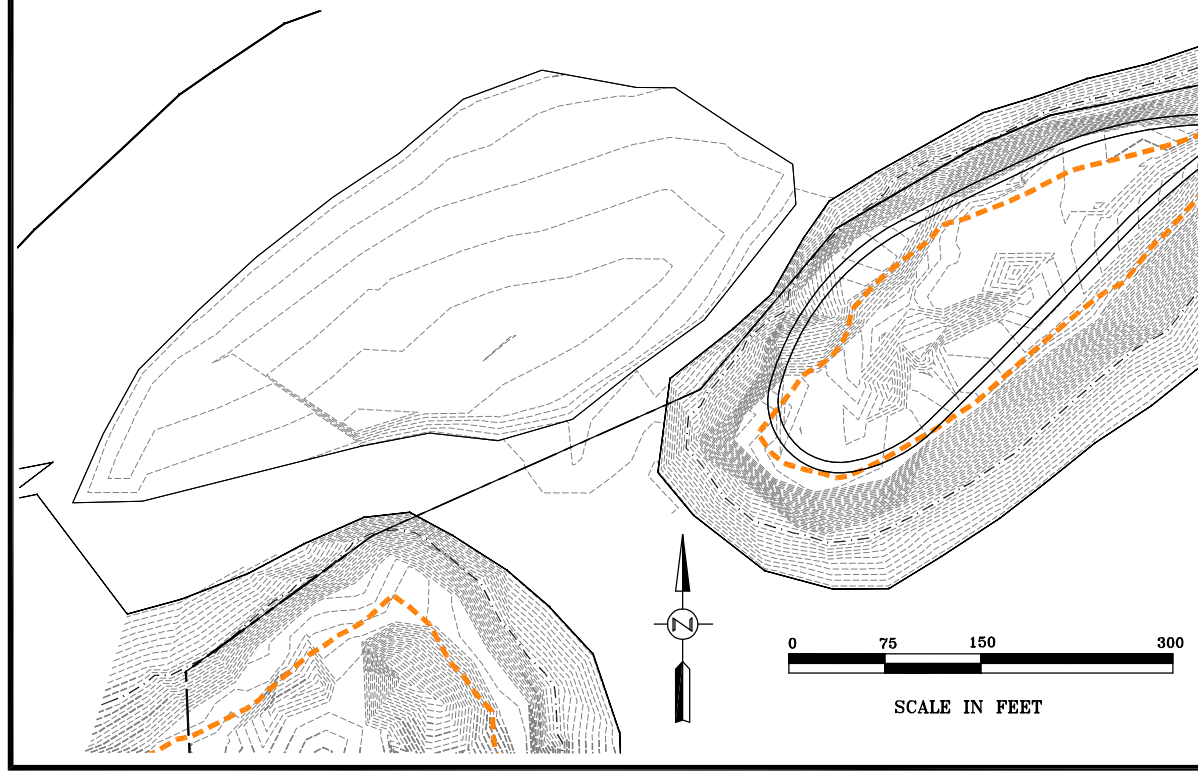
8-14-2015

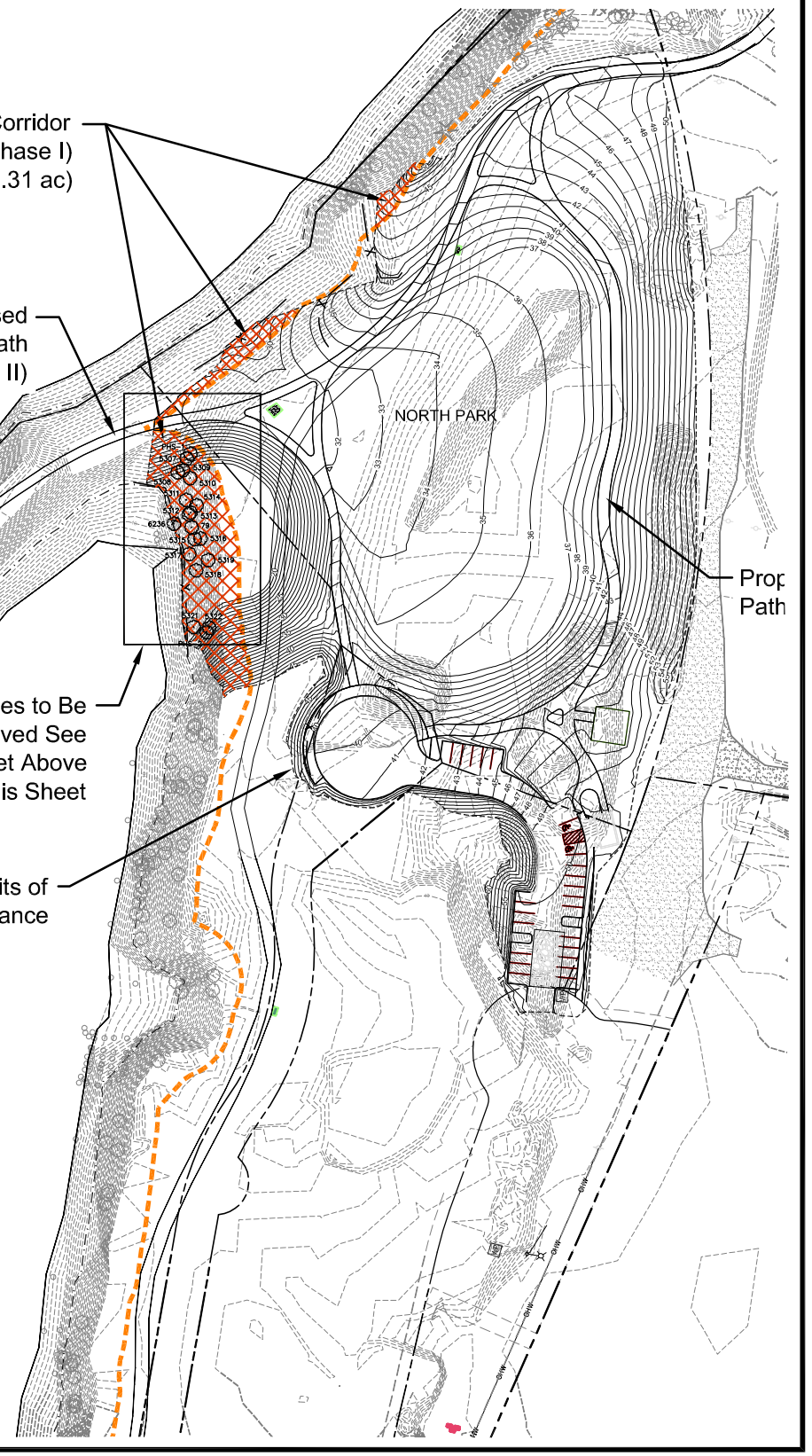
Table 2. Species, diameter, and quality of trees to be removed from the NROD

Tree ID	Species	Diameter (in)	Condition
79	Black cottonwood (*Populus balsamifera*)	11.5	Fair
5307	Black cottonwood (*Populus balsamifera*)	12	Fair
5308	Black cottonwood (*Populus balsamifera*)	17	Fair
5309	Black cottonwood (*Populus balsamifera*)	14	Fair
5310	Black cottonwood (*Populus balsamifera*)	10	Fair
5311	Black cottonwood (*Populus balsamifera*)	7.5	Fair
5312	Black cottonwood (*Populus balsamifera*)	12.5	Fair
5313	Black cottonwood (*Populus balsamifera*)	12	Fair
5314	Black cottonwood (*Populus balsamifera*)	16.5	Fair
5315	Black cottonwood (*Populus balsamifera*)	9	Fair
5316	Black cottonwood (*Populus balsamifera*)	14	Fair
5317	Black cottonwood (*Populus balsamifera*)	13	Fair
5318	Black cottonwood (*Populus balsamifera*)	21.5	Poor
5319	Black cottonwood (*Populus balsamifera*)	12	Fair
5322	Black cottonwood (*Populus balsamifera*)	13.5	Fair
6236	Black cottonwood (*Populus balsamifera*)	16.5	Poor
PHS-1	Douglas-fir (*Pseudotsuga menziesii*)	7.5	Good
PHS-2	Willow (*Salix* species)	10	Fair



Tree Removal Inset
Scale: 1"=30'





LEGEND

- Vegetated Corridor Boundary
- Property Line
- Limits of Disturbance
- Vegetated Corridor Impact (Total 31,637 sf / 0.73 ac)
- Existing Trees
- 0000 Tree To Be Removed

Pacific Habitat Services,Inc.
9450 SW Commerce Circle, Suite 180 Wilsonville, Oregon 97070
Phone: (503) 570-0800 Fax (503) 570-0855

Site Plan provided by CARDNO

North Park Site Plan and NROD Encroachment
The Cove, Phase 1 - Oregon City Oregon

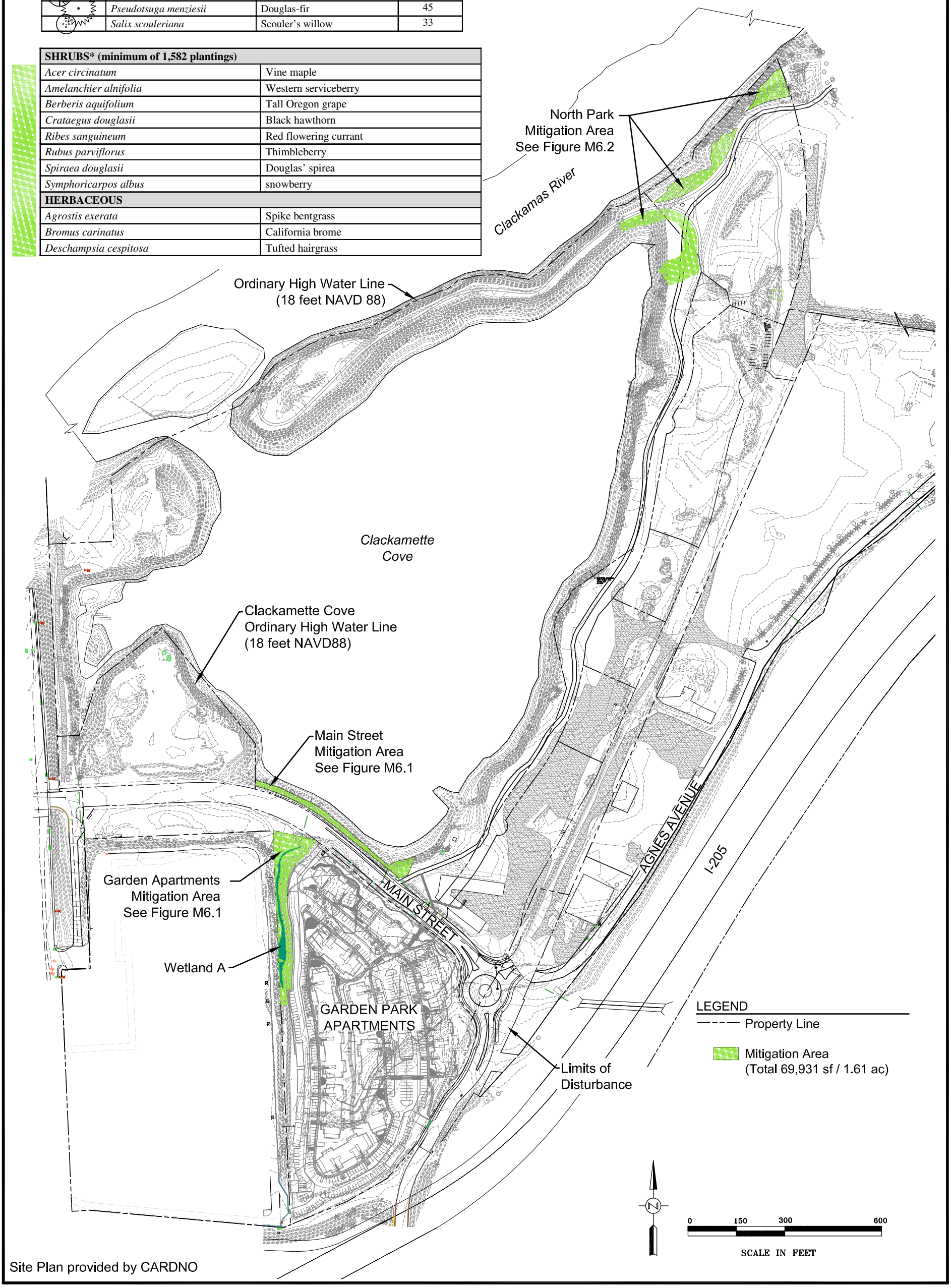
FIGURE
M5.2

8-18-2015

Symbol	Botanical Name	Common Name	Quantity
TREES* (minimum of 316 plantings)			
	Abies grandis	Grand fir	45
	Acer macrophyllum	Big-leaf maple	45
	Alnus rubra	Red alder	40
	Arbutus menziesii	Madrone	15
	Fraxinus latifolia	Oregon ash	33
	Malus fusca	Oregon crabapple	20
	Populus balsamifera	Black cottonwood	40
	Pseudotsuga menziesii	Douglas-fir	45
	Salix scouleriana	Scouler's willow	33

SHRUBS* (minimum of 1,582 plantings)	
Acer circinatum	Vine maple
Amelanchier alnifolia	Western serviceberry
Berberis aquifolium	Tall Oregon grape
Crataegus douglasii	Black hawthorn
Ribes sanguineum	Red flowering currant
Rubus parviflorus	Thimbleberry
Spiraea douglasii	Douglas' spirea
Symphoricarpos albus	snowberry
HERBACEOUS	
Agrostis exerata	Spike bentgrass
Bromus carinatus	California brome
Deschampsia cespitosa	Tufted hairgrass

*The owner's representative will approve individual plant material and location of plantings prior to installation. Plantings may vary in size dependent on whether they are live cuttings, bare root stock, or container stock, however, no initial plantings may be shorter than twelve inches in height. No more than one-third of the trees may be of the same genus and shrubs shall consist of at least three different species.



Site Plan provided by CARDNO

PHS
Pacific Habitat Services,Inc.
9450 SW Commerce Circle, Suite 180 Wilsonville, Oregon 97070
Phone: (503) 570-0800 Fax (503) 570-0855

Garden Park Apartments NROD Mitigation Areas - Overview
The Cove, Phase 1 - Oregon City Oregon

FIGURE
M6.0

8-26-2015

Clackamette Cove
Ordinary High Water Line
(18 feet NAVD88)

Main Street
Mitigation Area
(10,495 sf / 0.24 ac)
(See Figure M6.0
For Plant Tables)

LEGEND

Mitigation Area
(Total 69,931 sf / 1.61 ac)

Existing Trees

Clackamette Cove

Garden Apartments
Mitigation Area
(21,546 sf / 0.49 ac)
(See Figure M6.0
For Plant Tables)

MAIN STREET

Proposed
Roadside
Swale

Wetland A

GARDEN PARK
APARTMENTS

GV

GV

N

0 30 60 120

SCALE IN FEET

Site Plan provided by CARDNO

PHS
Pacific Habitat Services,Inc.
9450 SW Commerce Circle, Suite 180 Wilsonville, Oregon 97070
Phone: (503) 570-0800 Fax (503) 570-0855

Garden Park Apartments and Main Street NROD Mitigation Areas
The Cove, Phase 1 - Oregon City Oregon

FIGURE
M6.1

8-26-2015

LEGEND

Mitigation Area
(Total 69,931 sf / 1.61 ac)

Existing Trees

0 75 150 300

SCALE IN FEET

Balance of Garden Park
Mitigation Area
(3,913 sf / 0.09 ac
See Figure M6.0
For Plant Tables and
Figure M6.1 for Primary
Mitigation Area)

Clackamas River

Balance of Main Street
Mitigation Area
(668 sf / 0.02 ac
See Figure M6.0
For Plant Tables and
Figure M6.1 for Primary
Mitigation Area)

Clackamas River
Ordinary High Water Line
(18 feet NAVD88)

North Park
Mitigation Area
(33,309 sf / 0.76 ac
See Figure M6.0
For Plant Tables)

Proposed Path
(Phase II)

Clackamette
Cove Ordinary
High Water Line
(18 feet NAVD88)

Clackamette
Cove

Site Plan provided by CARDNO

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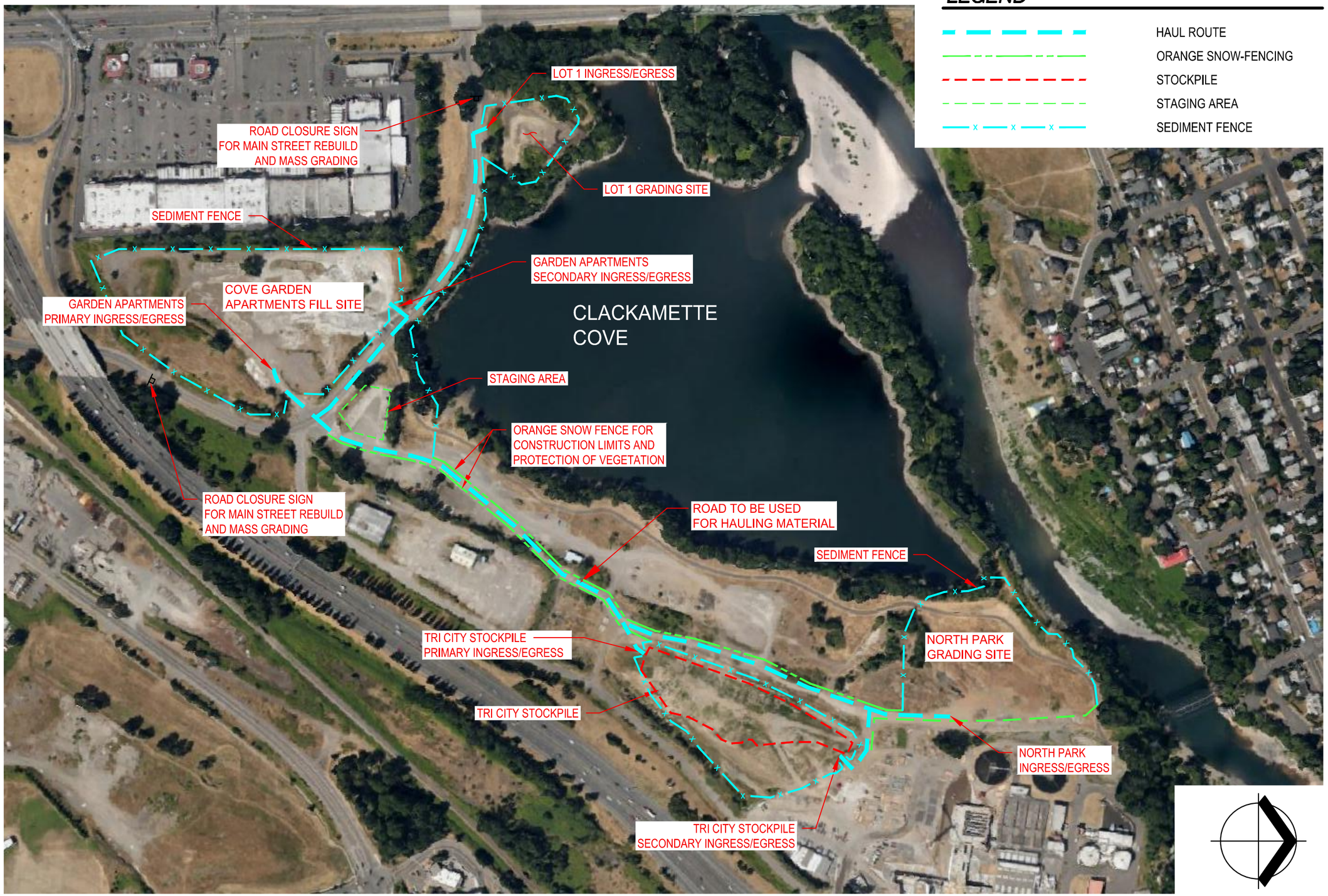
Phone: (503) 570-0800 Fax (503) 570-0855

North Park Mitigation Areas
The Cove, Phase 1 - Oregon City Oregon

FIGURE
M6.2

8-14-2015



LEGEND

- HAUL ROUTE
- ORANGE SNOW-FENCING
- STOCKPILE
- STAGING AREA
- SEDIMENT FENCE

NOT TO SCALE

CONSTRUCTION MANAGEMENT PLAN
COVE GARDEN APARMENTS

GRAND COVE, LLC
OREGON CITY, OREGON

PROJECT NO. 21509220
DATE: 8/24/2015
BY: KRG
SHEET NO. 1

Appendix B

Wetland Delineation Concurrence Letters

Oregon
Theodore R. Kulongoski, Governor

Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
(503) 986-5200
FAX (503) 378-4844
www.oregonstatelands.us.

May 13, 2010

Edward Darrow
Pacific Property Search, LLC
23535 SW Gage Street
Wilsonville, OR 97070

Re: Wetland Delineation Report for The Cove in Oregon City, Clackamas County; T2S R2E Sec. 20, Portion of Tax Lot 502; Sec. 29, Tax Lots 1500, 1505, 1508, 1509, 1600, 1601, 1900, and Portion of 1503; Sec. 29CB, Tax Lot 100; WD #10-0027; App. #41641 and App. #43457; City of Oregon City Local Wetlands Inventory, Clackamette Cove

Dear Mr. Darrow:

The Department of State Lands has reviewed the wetland delineation report prepared by Pacific Habitat Services, Inc. for the site referenced above. Based upon our review, we concur with their delineation (Figures 8 and 8A-8H) and conclusions. Within the study area, 2 wetlands, 1 pond, and Clackamette Cove were identified. Of these features, Wetland A (totaling approximately 0.1 acres) and Clackamette Cove are subject to the permit requirements of the state Removal-Fill Law. The remaining two features, an artificially created wetland (0.08 acres) and pond (0.07 acres), are exempt per OAR 141-085-0515(6) and not subject to the state law. Under current regulations, a state permit is required for cumulative fill or annual excavation of 50 cubic yards or more in wetlands or below the ordinary high water line (OHWL) of a waterway (or the 2 year recurrence interval flood elevation if OHWL cannot be determined). In addition, Clackamette Cove is designated an essential salmonid water; therefore, fill or removal of any amount of material below the OHWL, will require a state permit.

This concurrence is for purposes of the state Removal-Fill Law only. Federal or local permit requirements may apply as well. This concurrence is based on information provided to the agency. The jurisdictional determination is valid for five years from the date of this letter, unless new information necessitates a revision. Circumstances under which the Department may change a determination are found in OAR 141-090-0045 (available on our web site or upon request). In addition, laws enacted by the legislature and/or rules adopted by the Department may result in a change in jurisdiction; individuals and applicants are subject to the regulations that are in effect at the time of the removal-fill activity or complete permit application. The applicant, landowner, or agent may submit a request for reconsideration of this determination in writing within six months of the date of this letter.

Thank you for having the site evaluated. Please phone me at (503) 986-5232 if you have any questions.

Sincerely,

Peter Ryan, PWS
Wetland Specialist

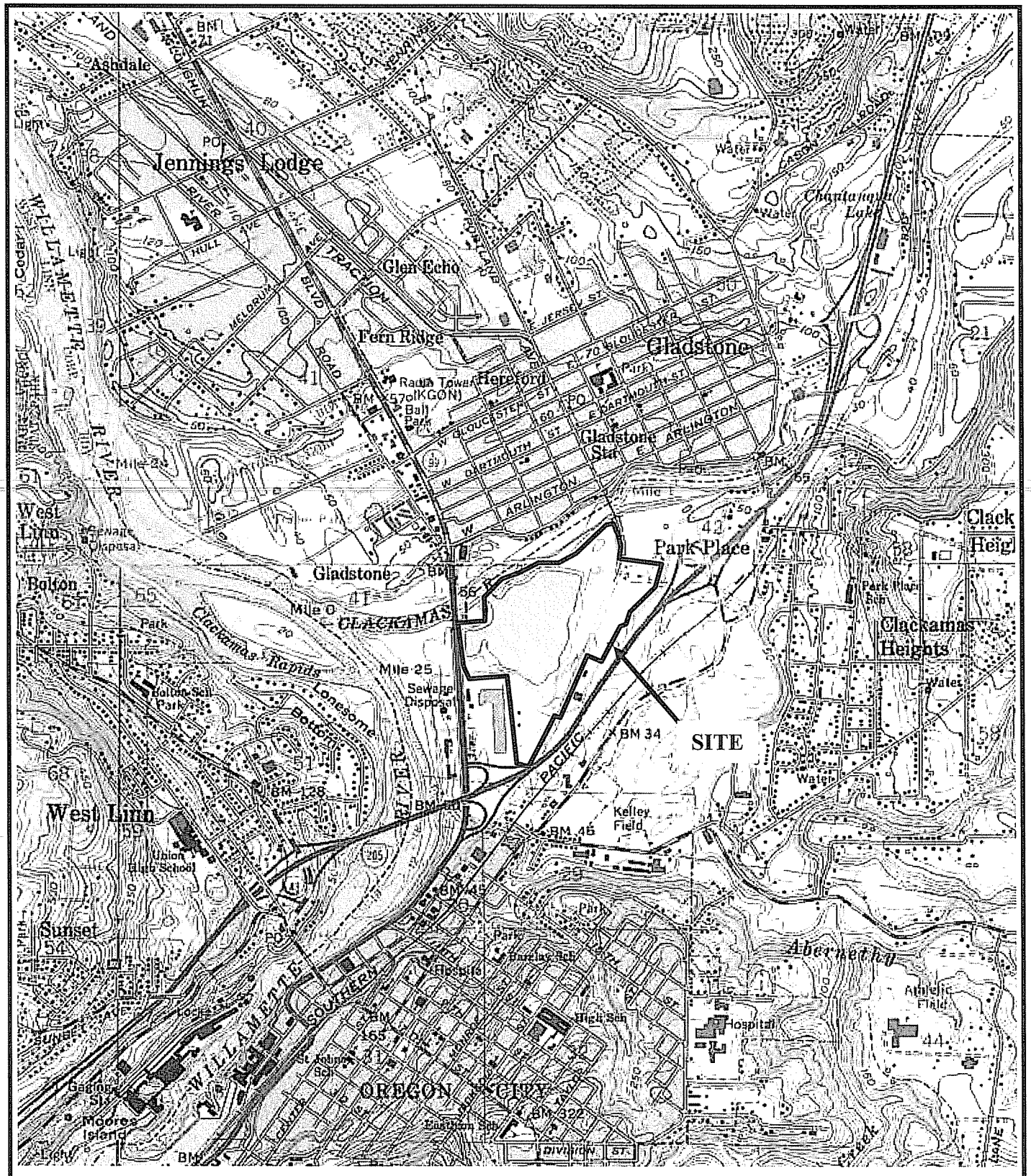
Approved by

Kathy Verble, CPSS
Acting Wetlands Program Manager

Enclosures

ec: Craig Tumer, Pacific Habitat Services, Inc.
City of Oregon City Planning Department (Map enclosed for updating LWI)
Charlie Hanner, Corps of Engineers
Anita Huffman, DSL

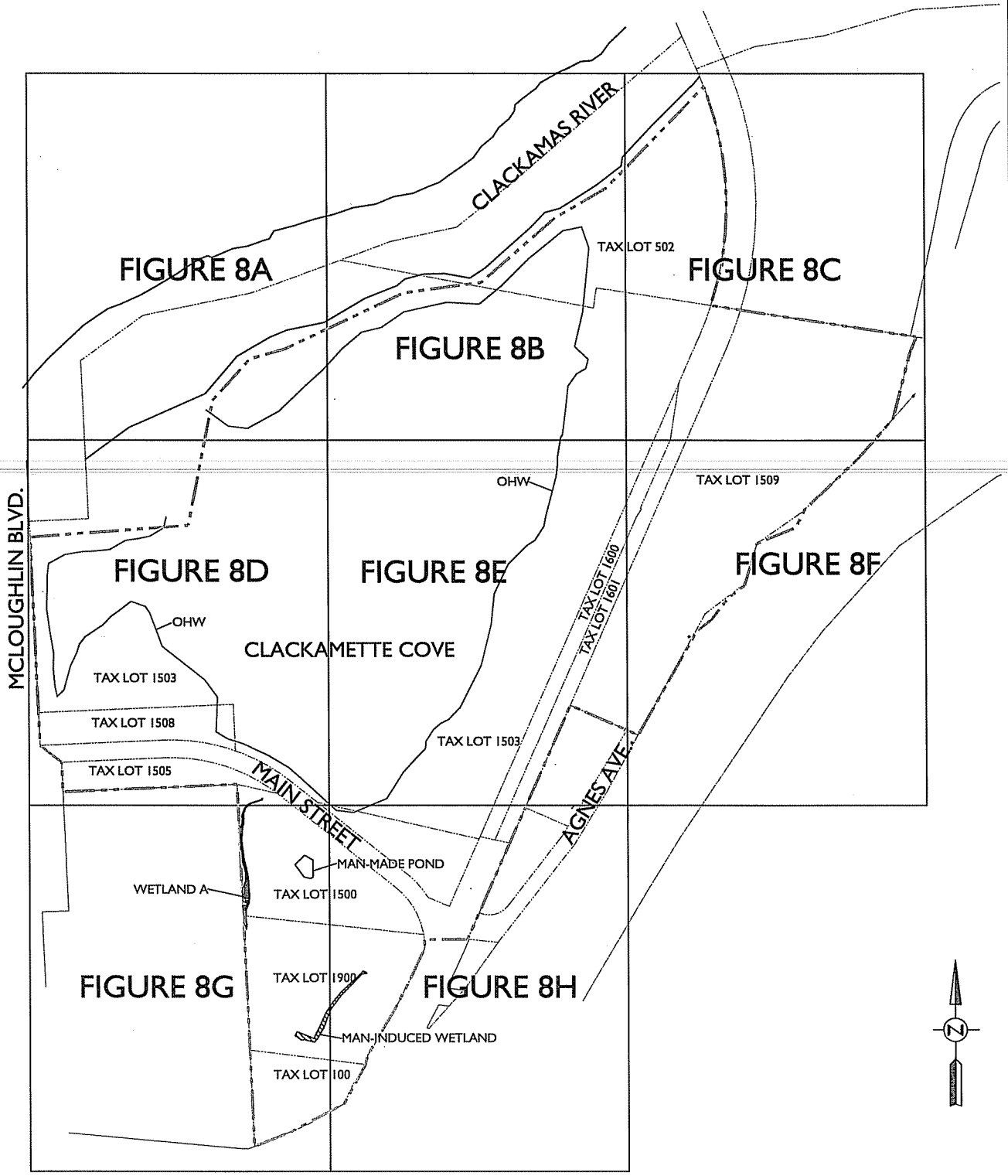
WD#10-0027



Location and general topography for The Cove project in Oregon City, Oregon (USGS OR City, OR and Gladstone, OR quadrangles; 1961 photos revised 1985 and 1984 respectively).

FIGURE 1

WD#10-0027

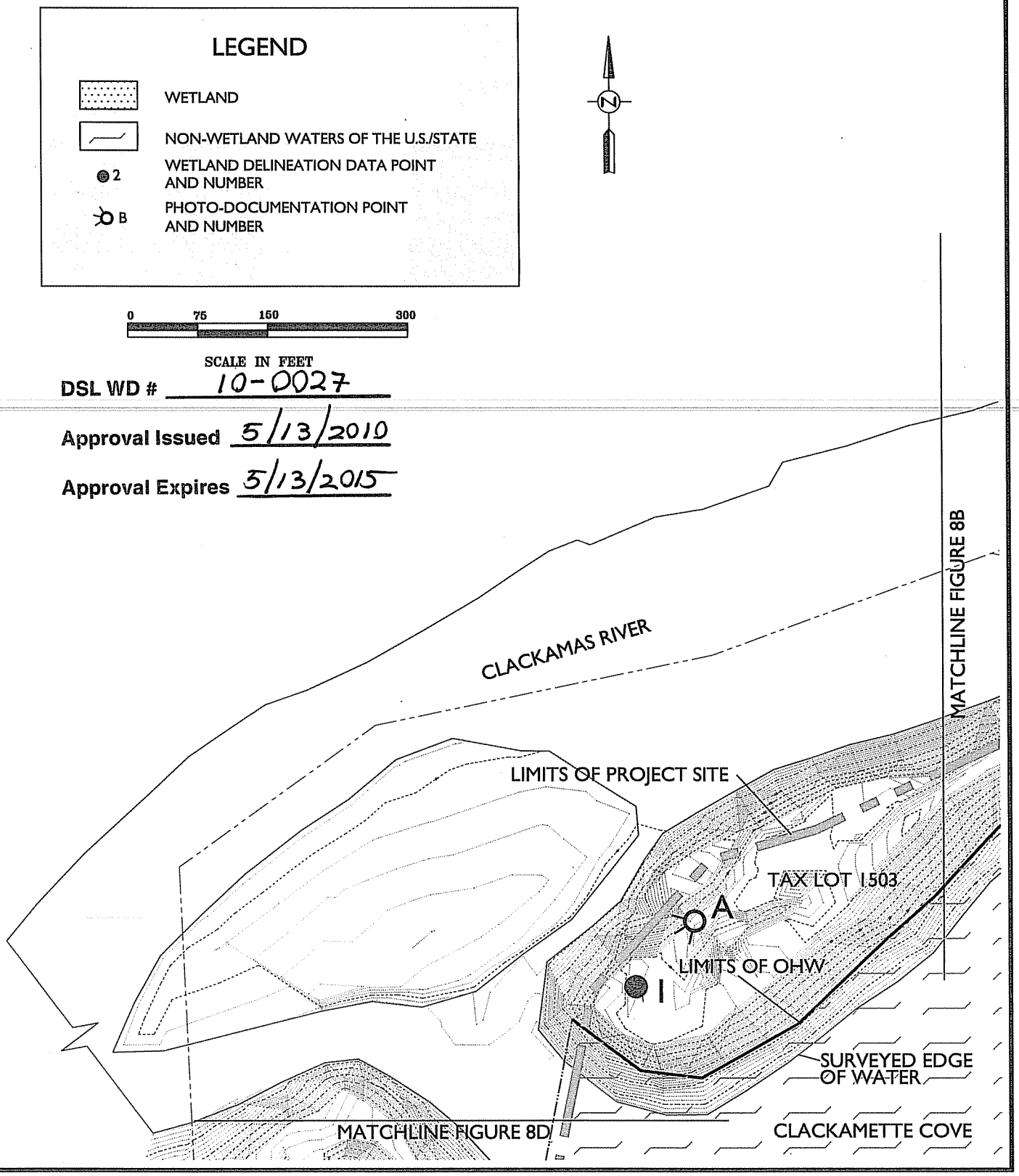


8–24–2009
PHS #3602

Wetland Delineation Map Figure Index

FIGURE 8

Pacific Habitat Services, Inc.



8-24-2009
PHS #3602

Existing conditions, data point locations, and photo-documentation points for The Cove site in Oregon City, Oregon. Survey and base map provided by CardnoWRG. Estimated survey accuracy is sub-centimeter.

FIGURE 8A

Pacific Habitat Services, Inc.

DSL WD # 10-0027

Approval Issued 5/13/2010

Approval Expires 5/13/2015

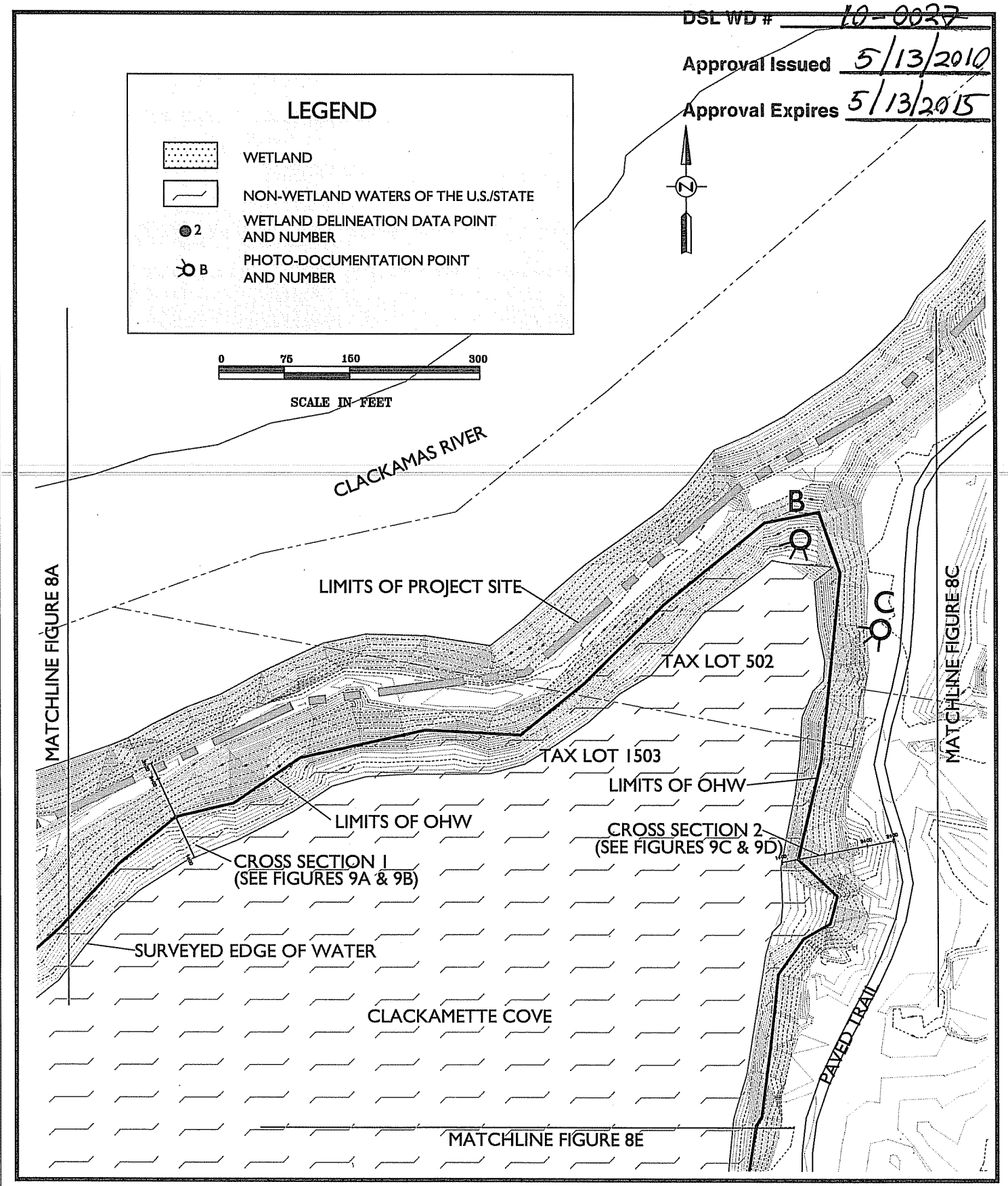


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FIGURE 8B

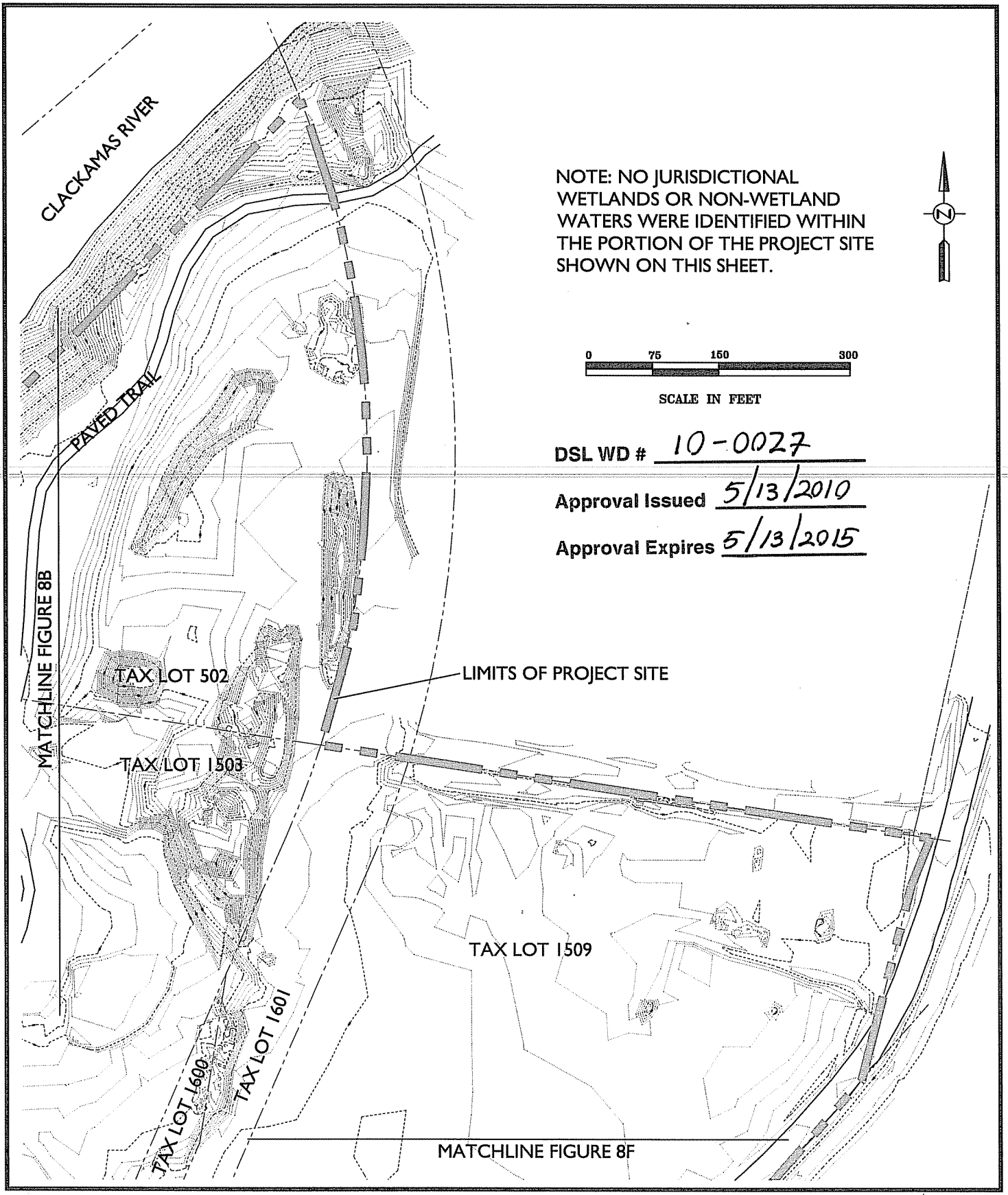

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FIGURE 8C

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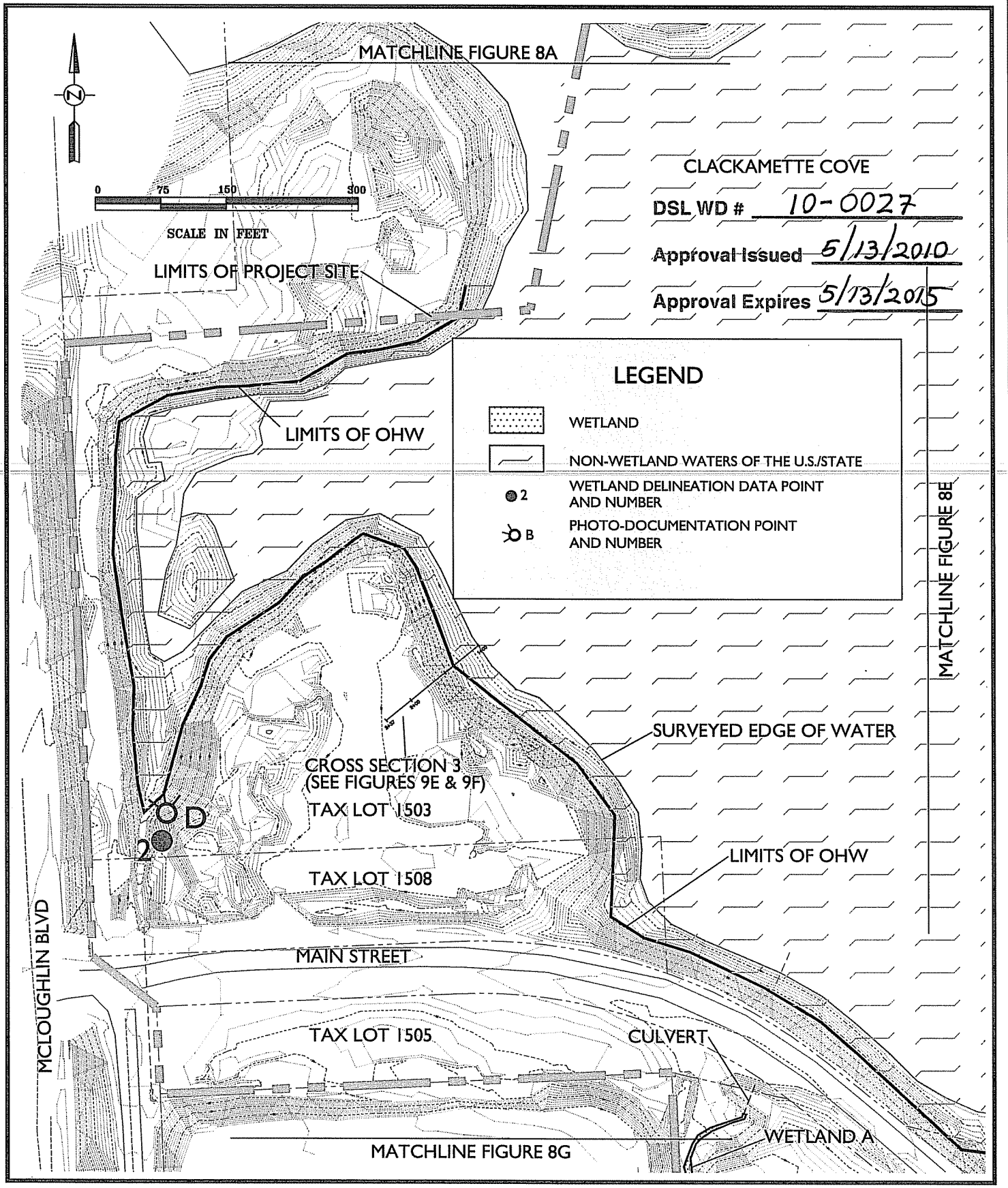

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FIGURE 8D

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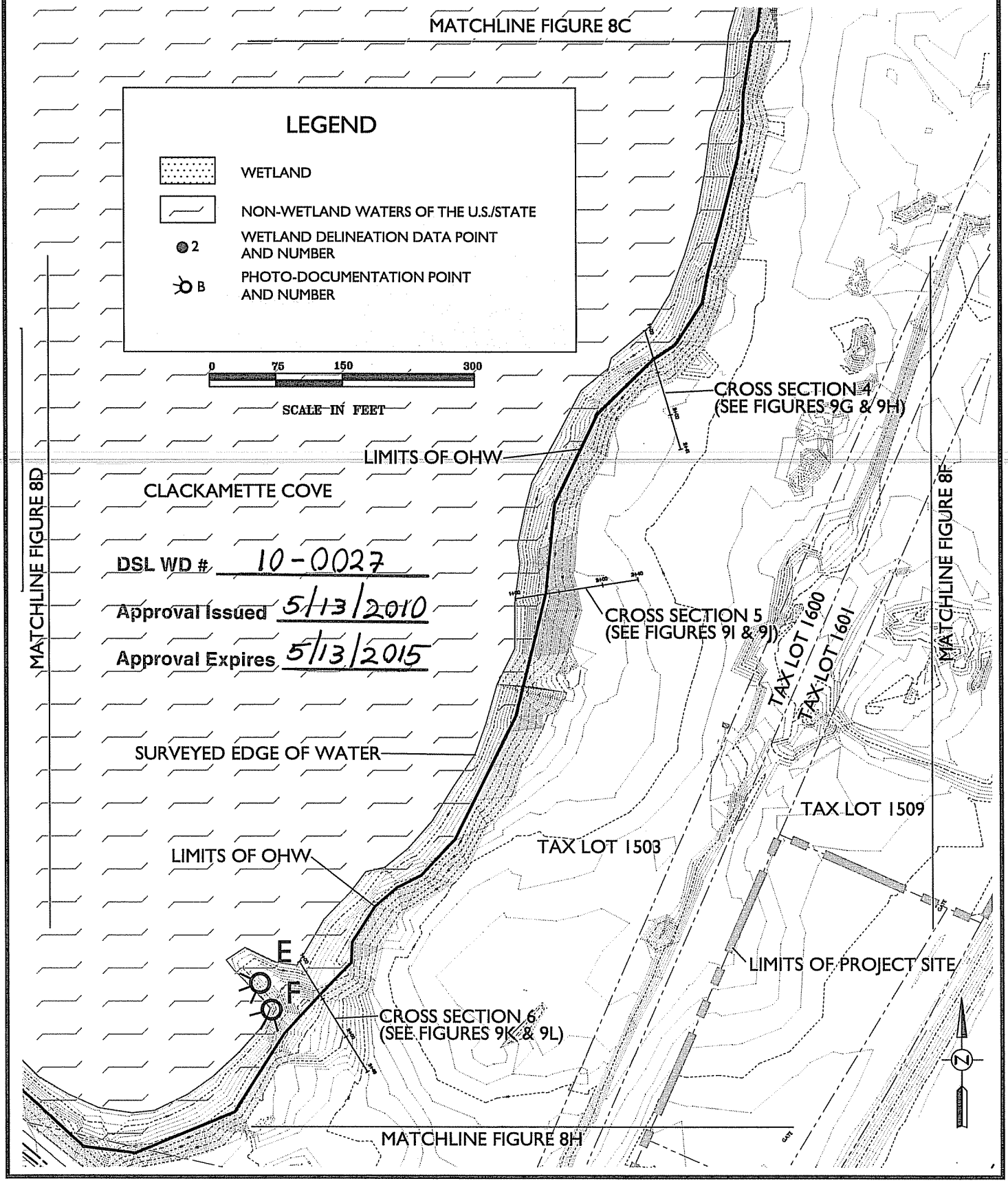

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FIGURE 8E

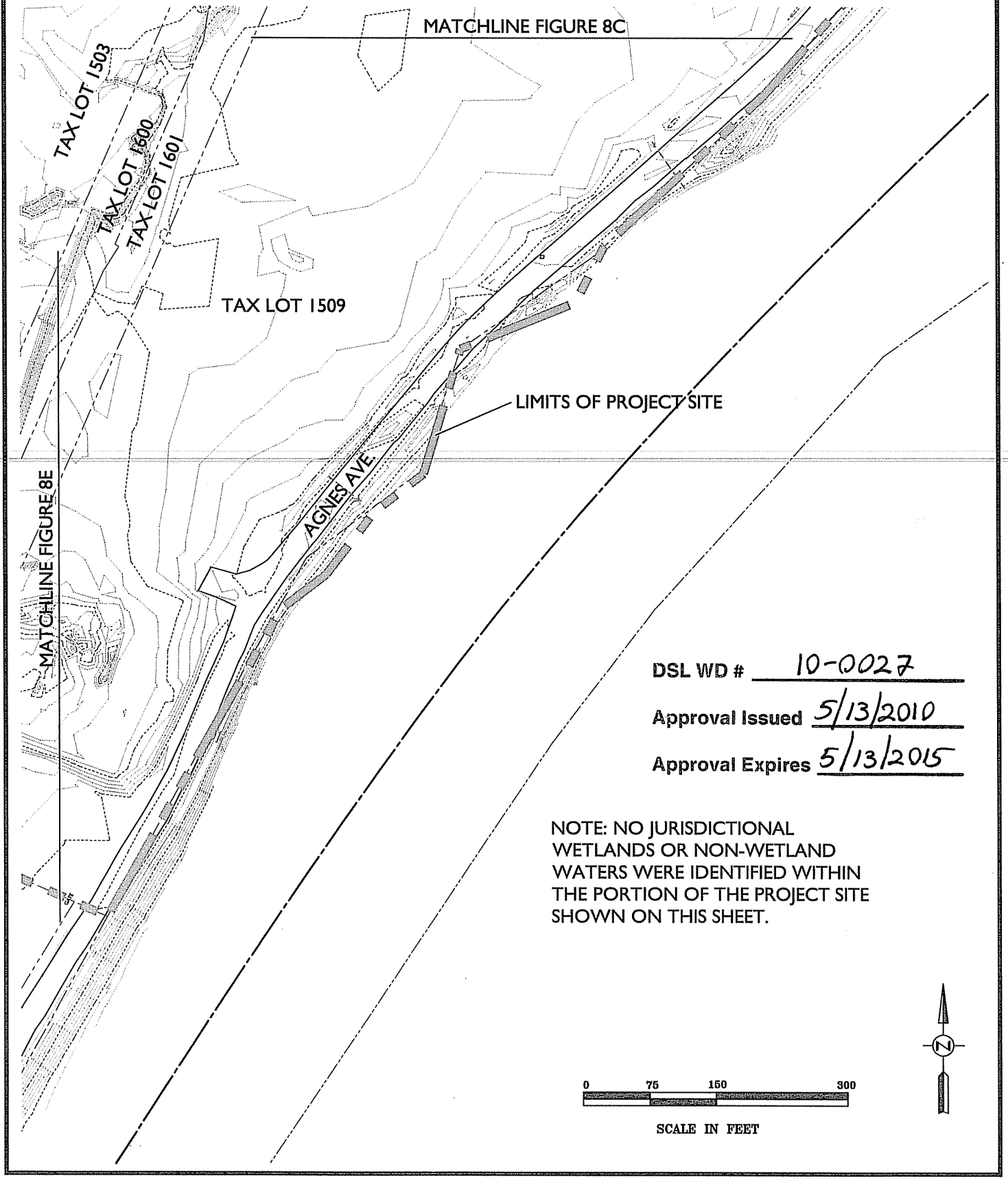

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FIGURE 8F

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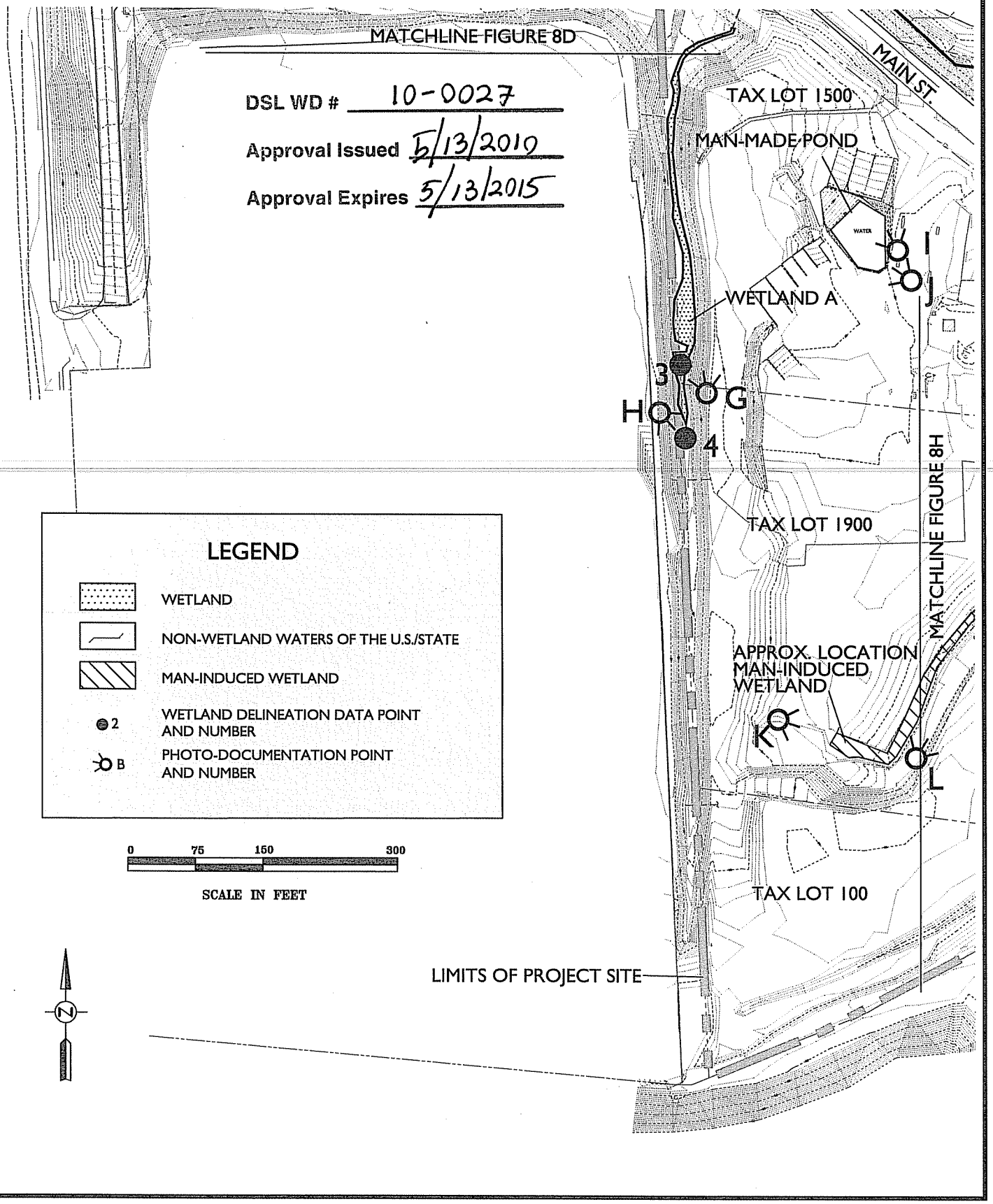

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FIGURE 8G

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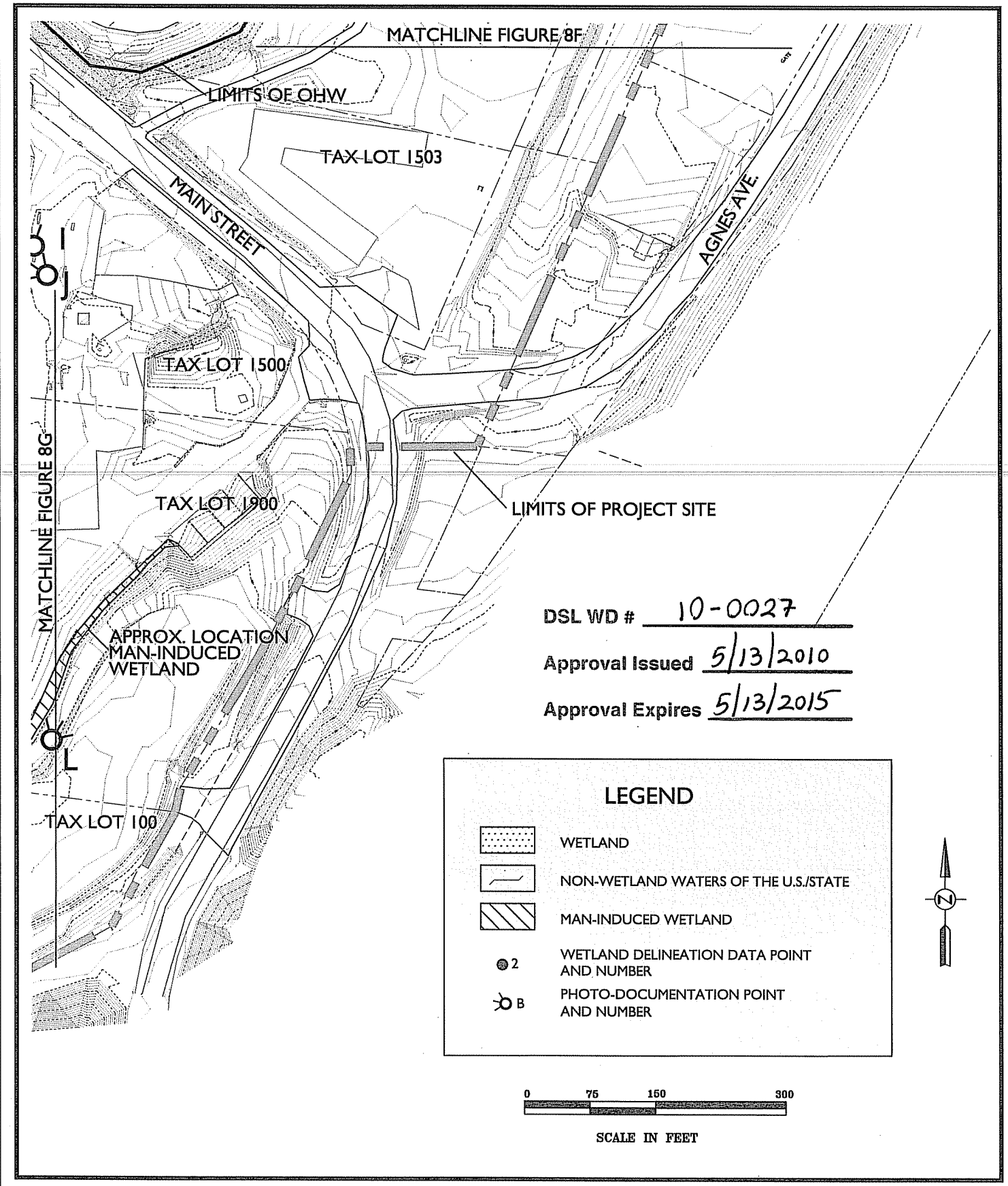

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Pacific Habitat Services, Inc.

FIGURE 8H

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2946
PORTLAND, OREGON 97208-2946

March 23, 2010

REPLY TO
ATTENTION OF:

Operations Division
Regulatory Branch
Corps No.: NWP-2009-373

Mr. Randy Tyler
Pacific Property Search, LLC
23535 SW Gage Street
Wilsonville, OR 97070

Dear Mr. Tyler:

The U.S. Army Corps of Engineers (Corps) received your request for an approved jurisdictional determination on the waterways shown in Enclosure 1. The site is located at Clackamette Cove110, in the City of Oregon City, Clackamas County, Oregon (Section 29, Township 2 South, and Range 2 East). The project area reviewed by the Corps, and addressed in this letter and accompanying documentation, is shown on Figure 8 (Page 2 of Enclosure 1).

The Corps determined that the wetlands and other waters shown in Figures 8A to 8 H and 9A to 9 L are waters of the U.S. A total of 0.095 acres of wetlands (Wetland A) and approximately 40.1 acres (Clackamette Cove) of other waters will be regulated as "waters of the United States". The placement of dredged or fill material into these waters identified in the Figures may require a Department of the Army permit under Section 404 of the Clean Water Act

Enclosure 2 is the approved jurisdictional determination (JD) form that identifies the basis for asserting jurisdiction. If you are not in agreement with that approved JD, you can make an administrative appeal under 33 CFR 331. Please see the enclosed Notification of Administrative Appeal Options and Process and Request for Appeal for further information about that process (Enclosure 3). This approved JD is valid for 5 years from the date of this letter unless new information warrants revision of the determination.

If you have any questions regarding our regulatory authority, please contact me at the letterhead address, by telephone at (503) 808-4385 or by email at james.a.holm@usace.army.mil.

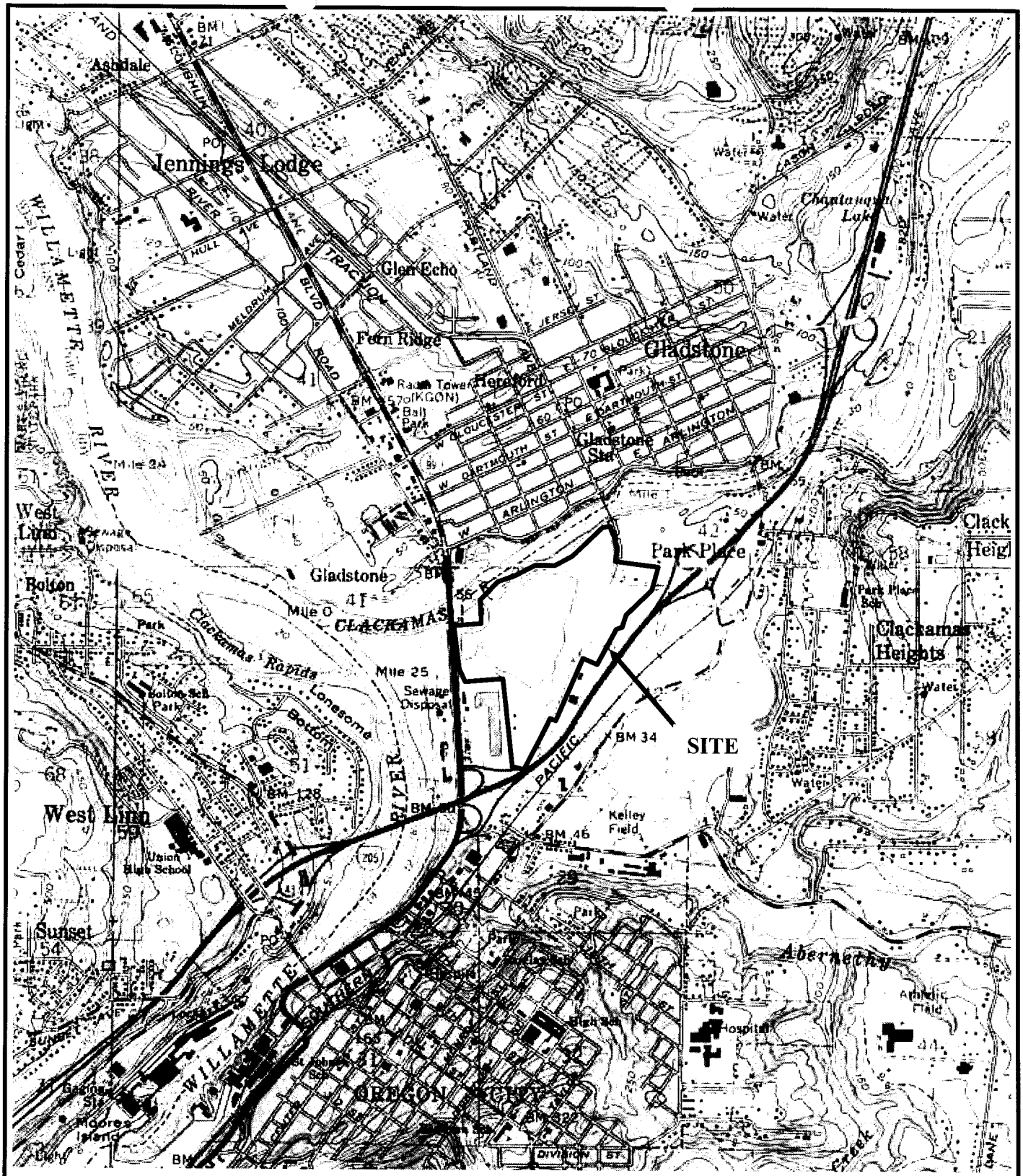
Sincerely,

James A. Holm
Project Manager, Regulatory Branch

Enclosures

Copy Furnished:

Oregon Department of State Lands (Landrum)
Pacific Habitat Services, Inc.



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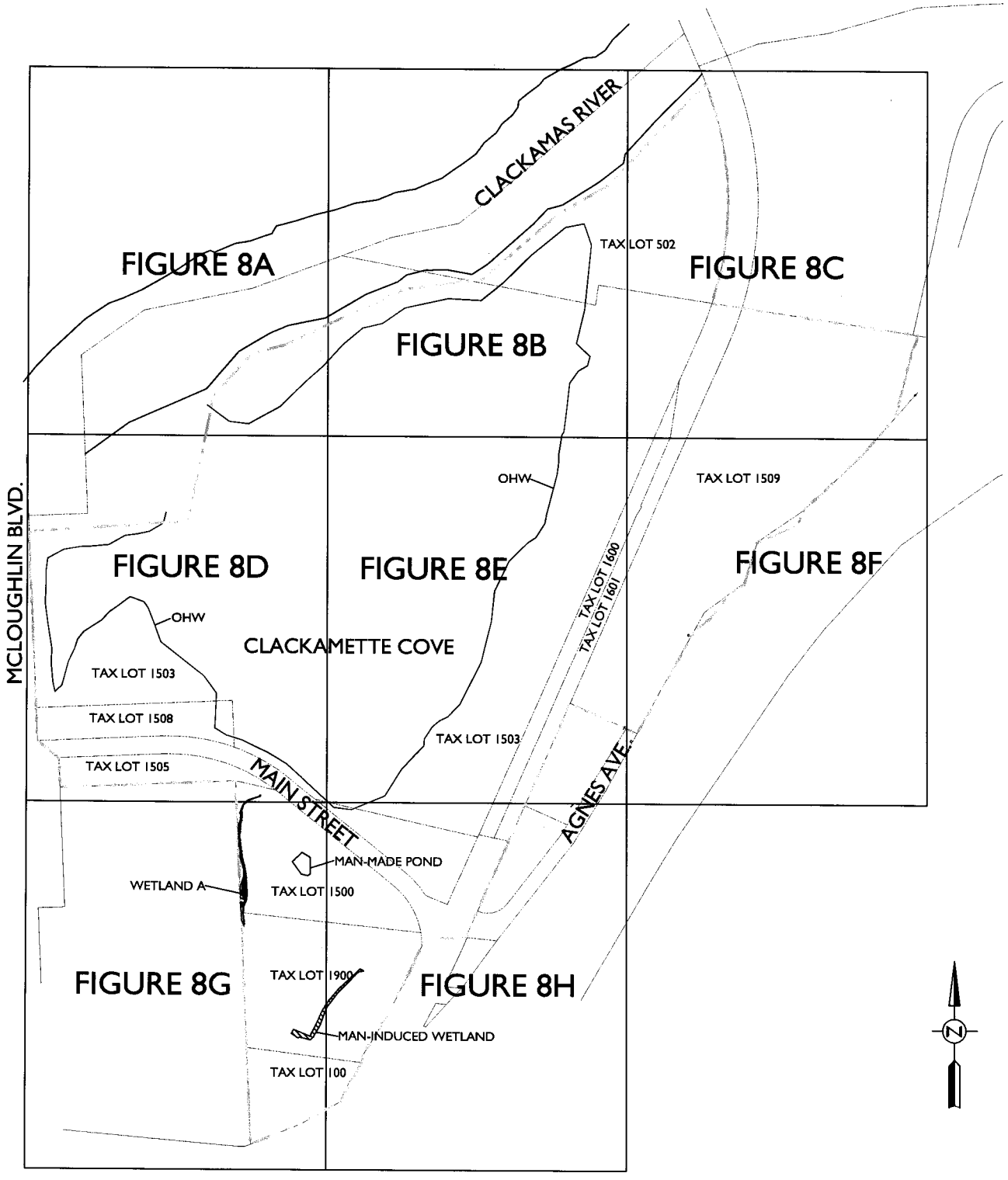
Location and general topography for The Cove project in Oregon City, Oregon (USGS OR City, OR and Gladstone, OR quadrangles; 1961 photos revised 1985 and 1984 respectively).

FIGURE 1



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Wetland Delineation Map Figure Index

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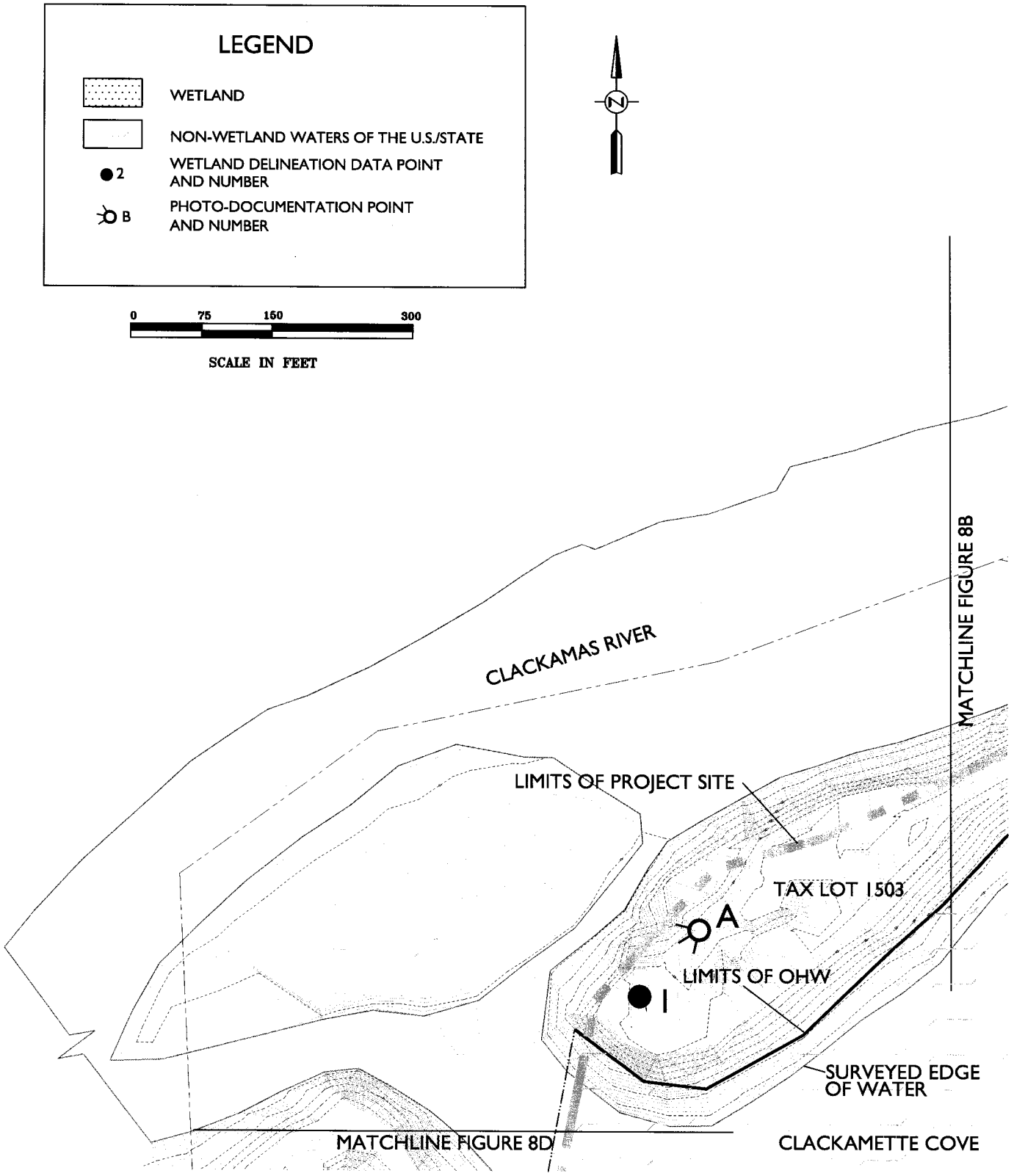

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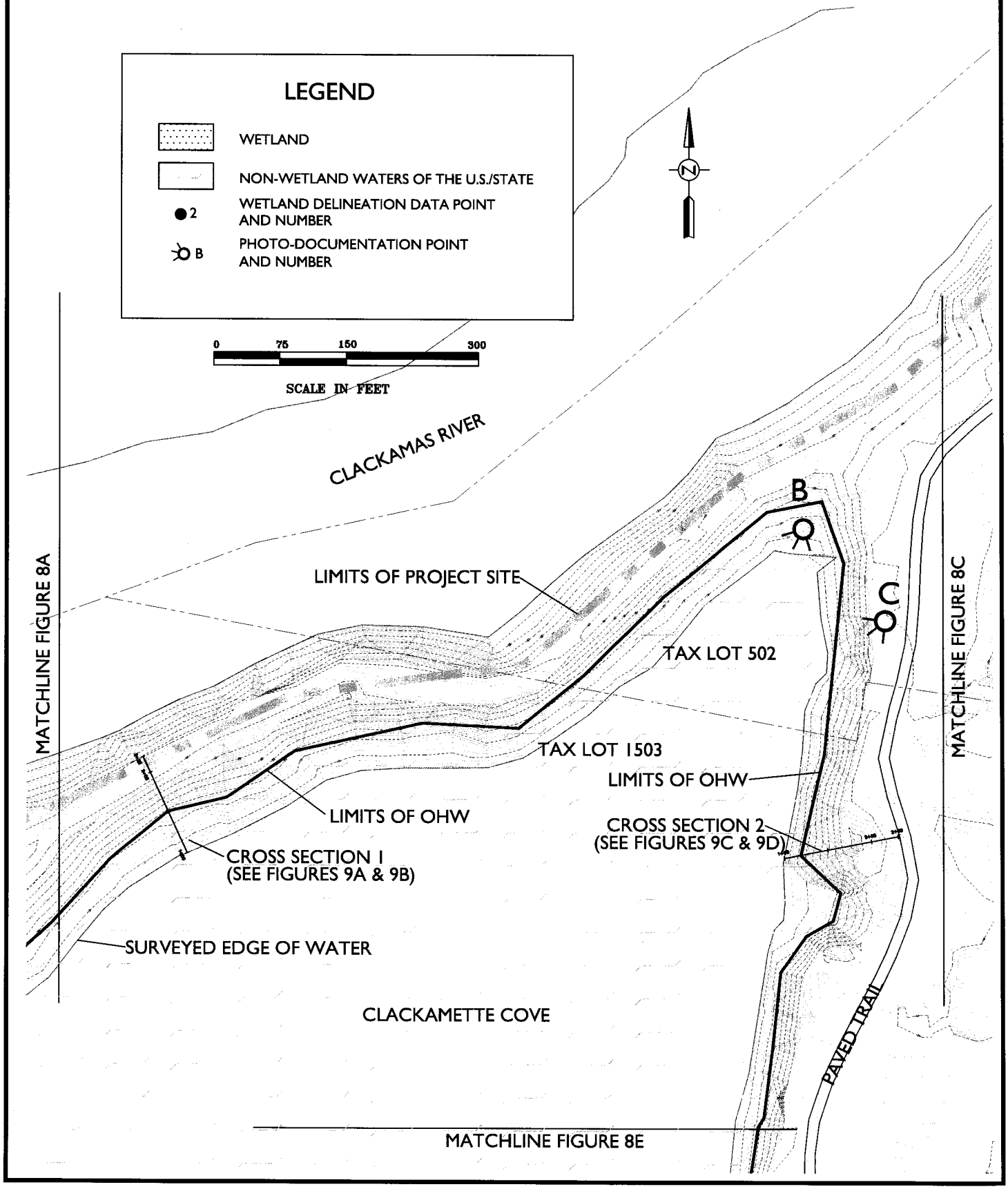

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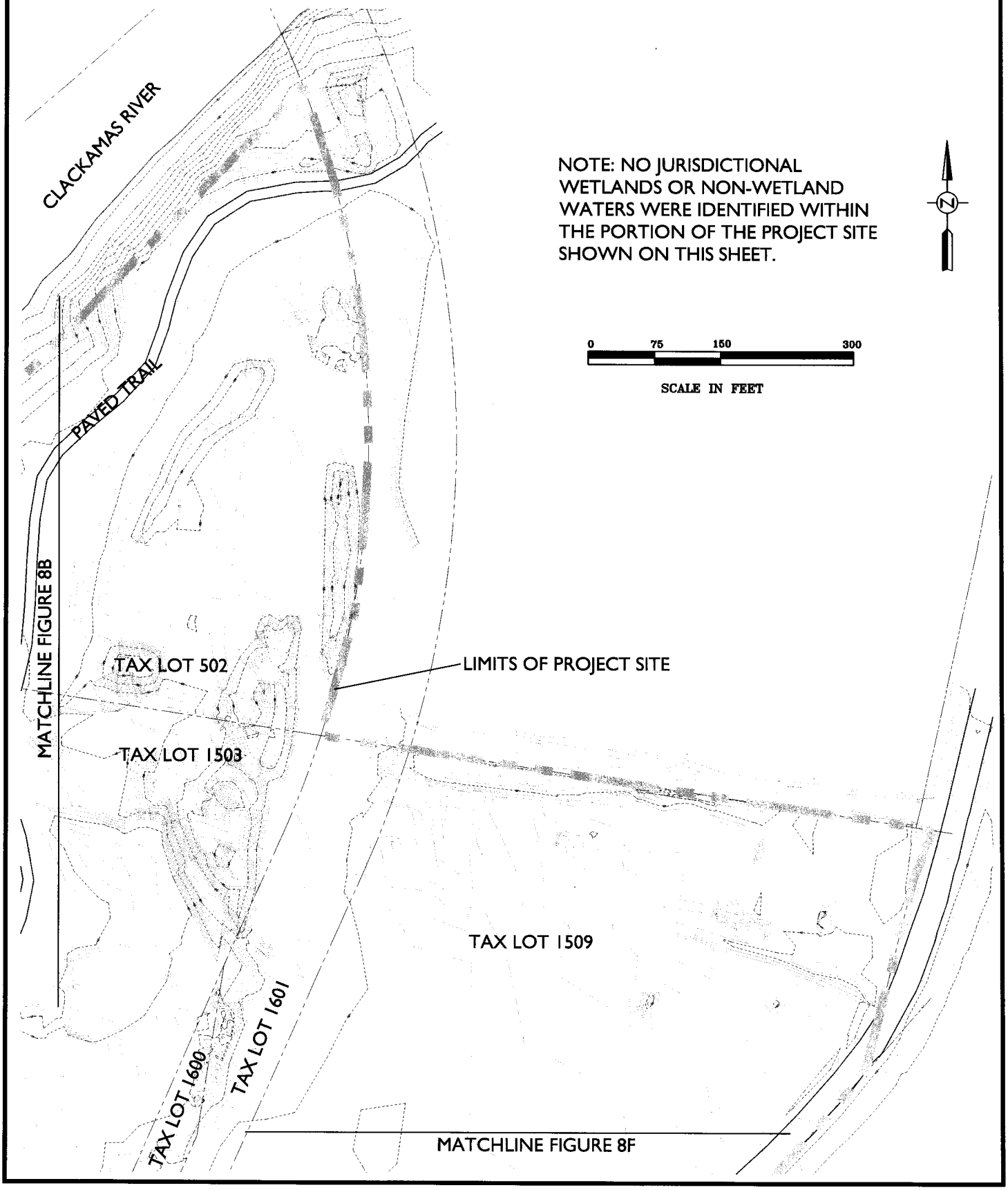

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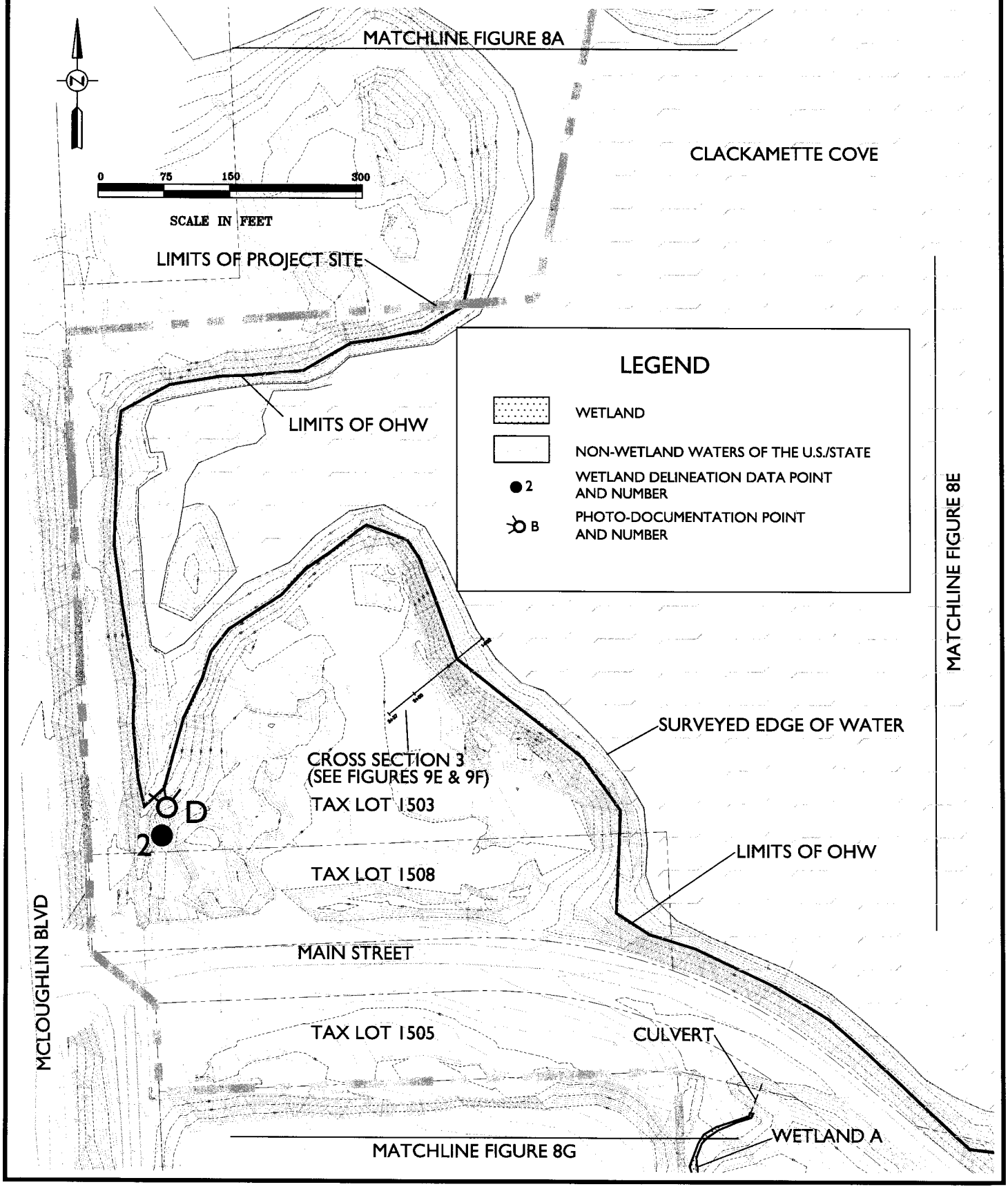

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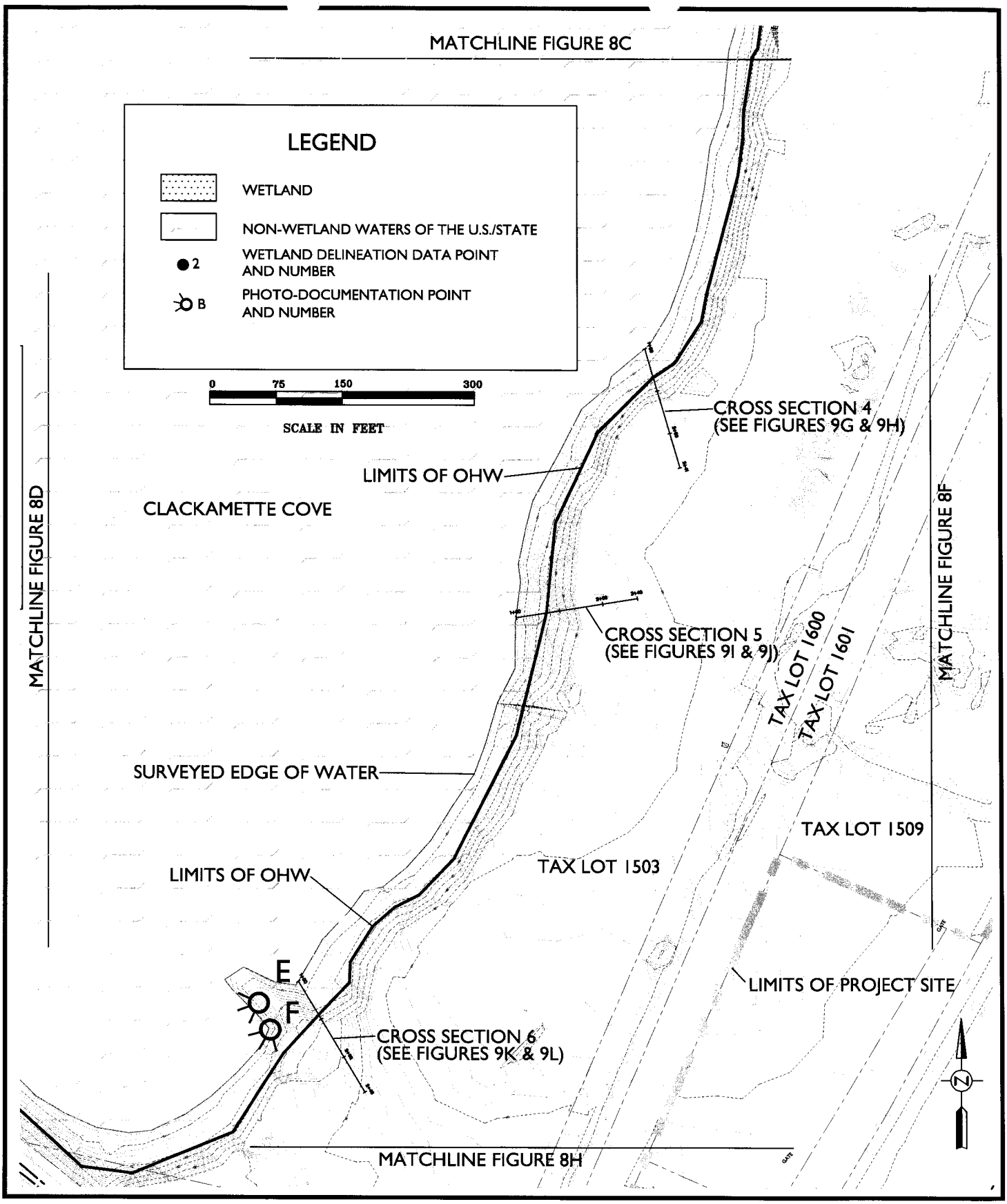

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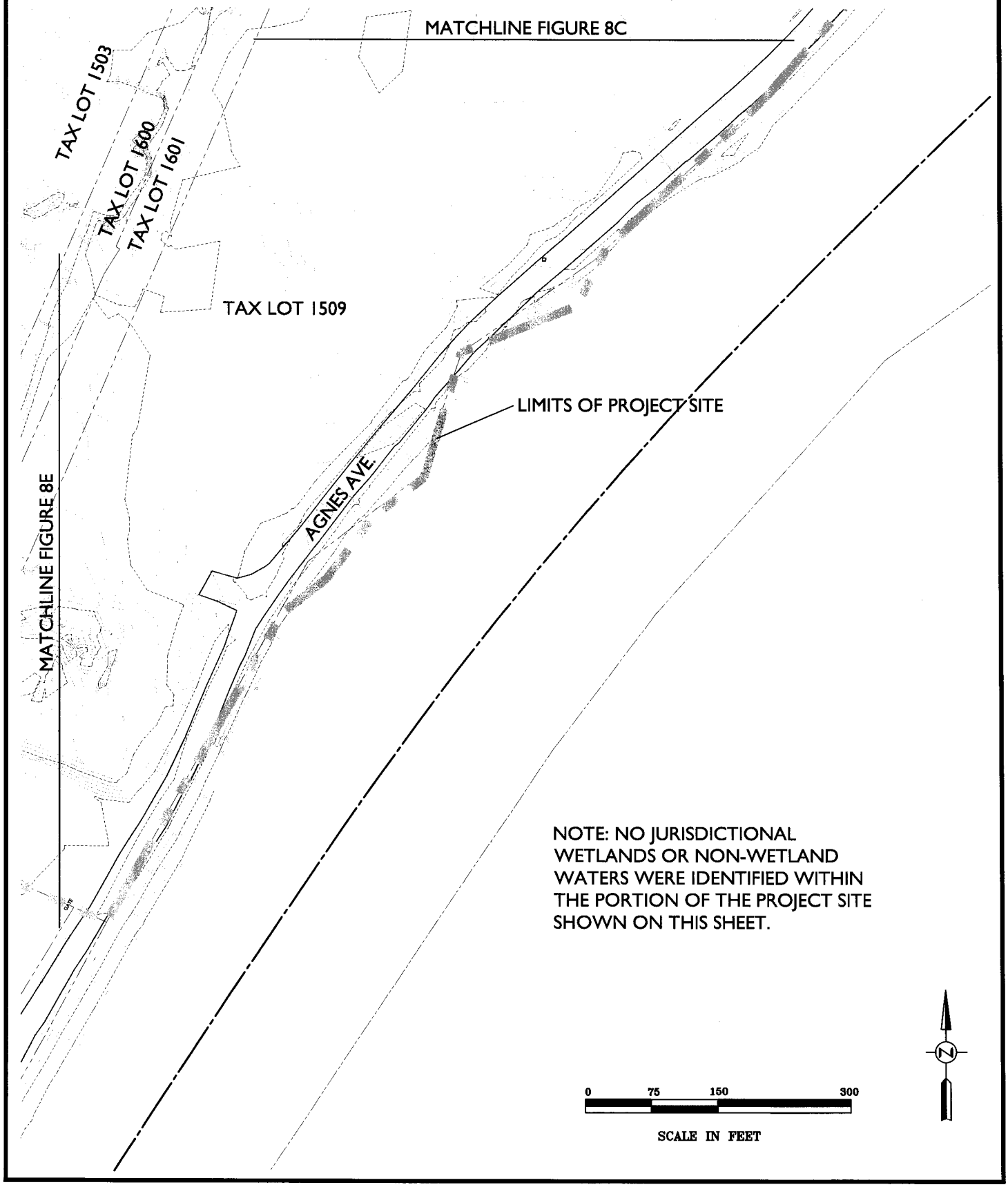

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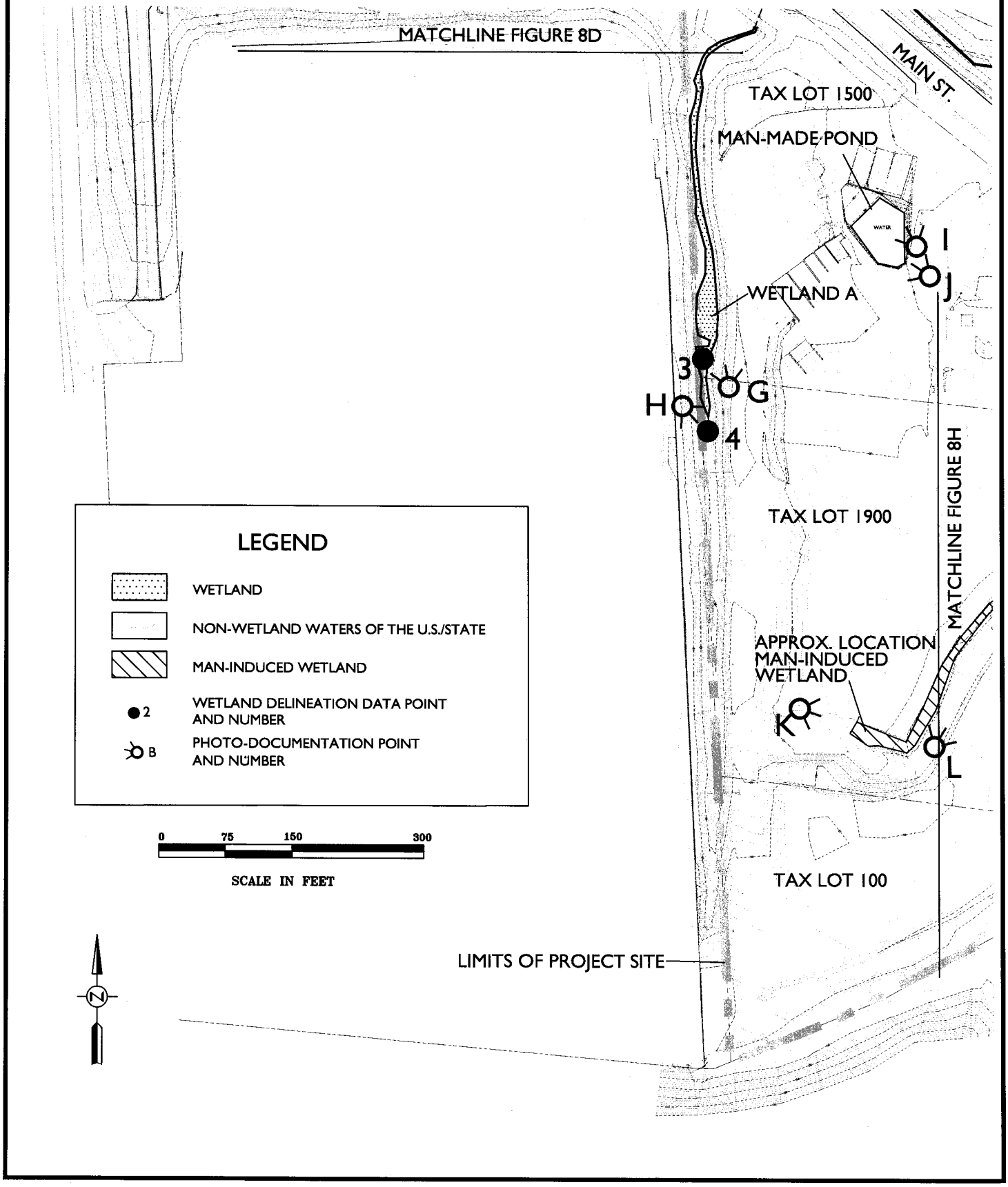

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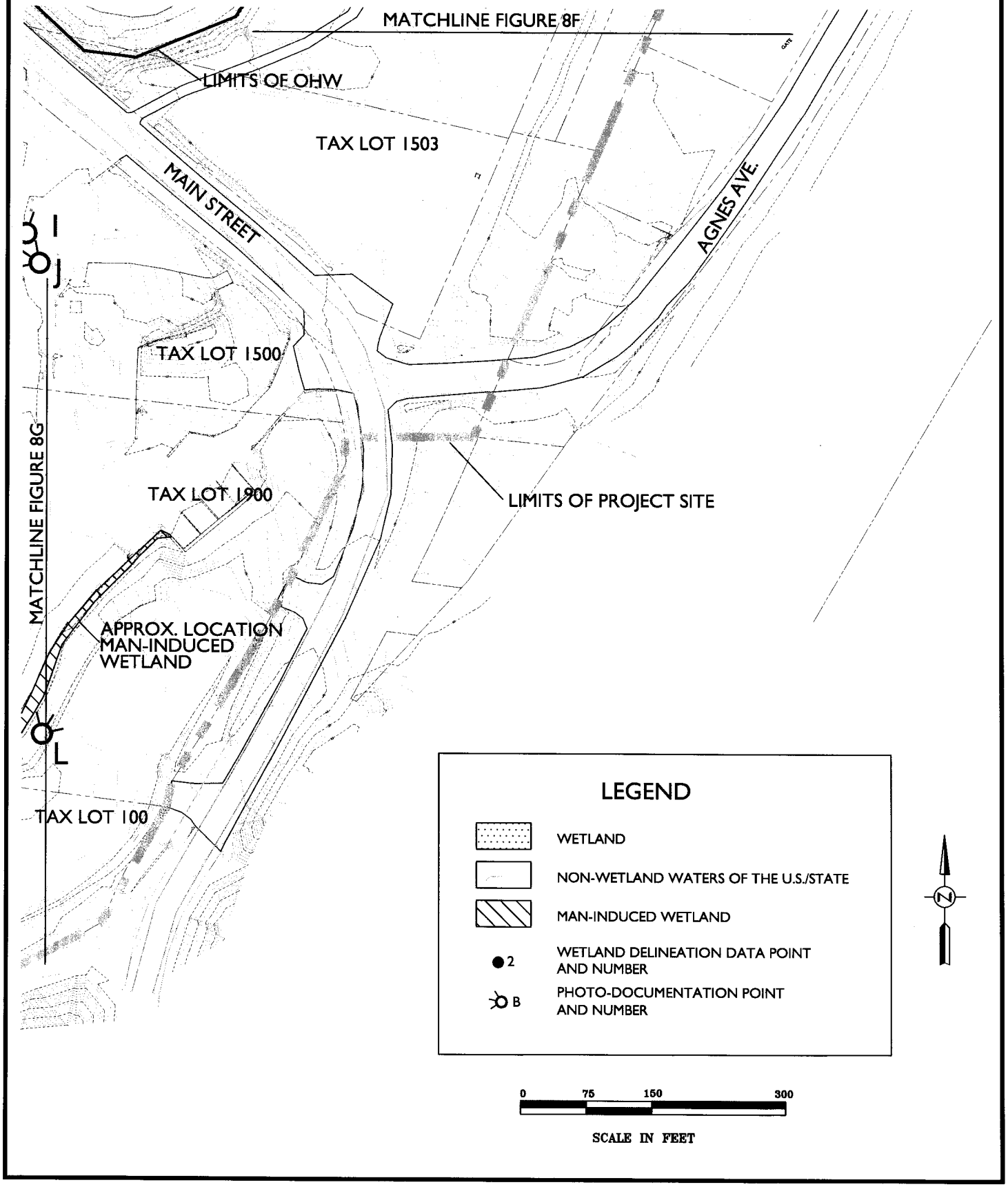

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Pacific Habitat Services, Inc.

FIGURE 8H

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): March 12, 2010

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: Portland District, Clackamette Cove, NWP-2009-373

C. PROJECT LOCATION AND BACKGROUND INFORMATION:
State: Oregon County/parish/borough: Clackamas City: Oregon City
Center coordinates of site (lat/long in degree decimal format): Lat. 45.377319° N, Long. 122.595864° W.
Universal Transverse Mercator:
Name of nearest waterbody: Clackamas River
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Clackamas River
Name of watershed or Hydrologic Unit Code (HUC):
☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):
☒ Office (Desk) Determination. Date: 9 February 2010
☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** *"navigable waters of the U.S."* within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]
☐ Waters subject to the ebb and flow of the tide.
☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.
Explain:

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **are and are not** *"waters of the U.S."* within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   ☐ TNWs, including territorial seas
   ☐ Wetlands adjacent to TNWs
   ☒ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   ☐ Non-RPWs that flow directly or indirectly into TNWs
   ☒ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   ☐ Impoundments of jurisdictional waters
   ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: Approximately linear feet: width (ft) and/or Approximately 40.1 acres.
   Wetlands: 0.095 acres.

   c. **Limits (boundaries) of jurisdiction** based on: Established by OHWM, 1987 manual, and Western Mountains, Valleys, and Coast regional supplement.
   Elevation of established OHWM (if known): 16 to 18 feet (average approximately 16.8 feet), NAVD 88.

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   ☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional.
   Explain: **An excavated wetland (0.08 acre) in the southern portion of the review area is isolated from both the Willamette River and the Clackamas River and is not jurisdictional. The wetland is located at an elevation of approximately 35 feet NAVD 88; the OHW of the Clackamas is at approximately 16 to 18 feet NAVD 88. Soils in the**

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g. typically 3 months).
[3] Supporting documentation is presented in Section III.F.

vicinity of the wetland are mapped as "urban land." Review of the Web Soil Survey indicates that soils underlying the urban lands would have consisted of either the Newberg fine sandy loam or the Chehalis silt loam. Both these soil units are well drained and have depths to the water table of greater than 80 inches. These soils were likely heavily disturbed by former industrial activities, as indicated by the presence of fill material throughout the site. It appears as if the wetland is perched on a compacted horizon, and that the wetland is not connected to the water table associated with the Clackamas or Willamette Rivers. As such, the wetland lacks a surface or shallow subsurface hydrologic connection to other waters of the U.S. The wetland is not separated from the other waters by berms or barriers; rather it is an excavated feature that would not exist were it not for wholesale alteration of the review area. The wetland also appears to lack an ecological interconnection with other waters. It does have some vegetation, but it is surrounded by an expanse of urban land uses which make it unlikely that species move between the wetland and other waters.

The review area includes one additional non-jurisdictional feature: a created pond approximately 200 feet south of Clackamette Cove. The pond was excavated and is not an impoundment of a water of the U.S. Therefore it does not fit any of the categories of waters of the U.S. defined in 33 CFR 328.3. There are no wetlands adjacent to the pond.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW .

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) **General Area Conditions:**
   Watershed size: Pick List
   Drainage area: Pick List
   Average annual rainfall: inches
   Average annual snowfall: inches

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.

(ii) Physical Characteristics:

(a) Relationship with TNW:

☐ Tributary flows directly into TNW.

☐ Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **Pick List** river miles from TNW.
Project waters are **Pick List** river miles from RPW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Project waters are **Pick List** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain:

Identify flow route to TNW[5]:
Tributary stream order, if known:

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain:
☐ Manipulated (man-altered). Explain:

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts ☐ Sands ☐ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain:

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:
Presence of run/riffle/pool complexes. Explain:
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:

Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime:
Other information on duration and volume:

Surface flow is: **Pick List.** Characteristics:

Subsurface flow: **Pick List**. Explain findings:
☐ Dye (or other) test performed:

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☐ sediment deposition ☐ multiple observed or predicted flow events
☐ water staining ☐ abrupt change in plant community
☐ other (list):

☐ Discontinuous OHWM.[7] Explain:

[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.
[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] [illegible]

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

- ☐ High Tide Line indicated by:
  - ☐ oil or scum line along shore objects
  - ☐ fine shell or debris deposits (foreshore)
  - ☐ physical markings/characteristics
  - ☐ tidal gauges
  - ☐ other (list):
- ☐ Mean High Water Mark indicated by:
  - ☐ survey to available datum;
  - ☐ physical markings;
  - ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

(iv) Biological Characteristics. Channel supports (check all that apply):

- ☐ Riparian corridor. Characteristics (type, average width): .
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. **Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW**

(i) Physical Characteristics:

(a) General Wetland Characteristics:
Properties:
Wetland size: acres
Wetland type. Explain: .
Wetland quality. Explain: .
Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:
Flow is: **Pick List**. Explain: .

Surface flow is: **Pick List**
Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
- ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:
- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW
Project wetlands are **Pick List** river miles from TNW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Flow is from: **Pick List.**
Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .
Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

- ☐ Riparian buffer. Characteristics (type, average width): .
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .

☐ Aquatic/wildlife diversity. Explain findings:

3. **Characteristics of all wetlands adjacent to the tributary (if any)**
All wetland(s) being considered in the cumulative analysis: **Pick List**
Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D:

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D:

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
☐ TNWs: linear feet width (ft), Or, acres.
☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: The Clackamas River (including Clackamette Cove) is a large perennial river.
☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally:

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☒ Other non-wetland waters: **Approximately 40.1** acres.
Identify type(s) of waters: **Embayment of the Clackamas River (within the OHW of the river).**

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☒ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☒ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **Wetland A has a continuous surface connection with the Clackamas River, via a culvert that conveys surface water from the wetland into Clackamette Cove.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: **0.095** acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. **ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]**
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

---

[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.***

Provide estimates for jurisdictional waters in the review area (check all that apply):
- ☐ Tributary waters: linear feet width (ft).
- ☐ Other non-wetland waters: acres.
  - Identify type(s) of waters: .
- ☐ Wetlands: acres.

E. **NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):**
- ☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
- ☒ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
  - ☒ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
- ☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
- ☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
- ☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource: .
- ☒ Wetlands: 0.08 acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
- ☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
- ☐ Lakes/ponds: acres.
- ☐ Other non-wetland waters: acres. List type of aquatic resource: .
- ☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. **SUPPORTING DATA. Data reviewed for JD (check all that apply** - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
- ☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: Wetland delineation datd August 26, 2009.
- ☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☒ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps: .
- ☐ Corps navigable waters' study: .
- ☐ U.S. Geological Survey Hydrologic Atlas: .
  - ☐ USGS NHD data.
  - ☐ USGS 8 and 12 digit HUC maps.
- ☒ U.S. Geological Survey map(s). Cite scale & quad name: Oregon City and Gladstone, 1:24000.
- ☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Web Soil Survey.
- ☐ National wetlands inventory map(s). Cite name: .
- ☐ State/Local wetland inventory map(s): .
- ☐ FEMA/FIRM maps: .
- ☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
- ☐ Photographs: ☐ Aerial (Name & Date): .
  - or ☐ Other (Name & Date): .
- ☐ Previous determination(s). File no. and date of response letter: .
- ☐ Applicable/supporting case law: .
- ☐ Applicable/supporting scientific literature: .
- ☐ Other information (please specify): .

B. **ADDITIONAL COMMENTS TO SUPPORT JD:** The Clackamas River is a Section 10 navigable river for its lower 0.5 mile (from its confluence with the Willamette River to a point 0.1 mile upstream from the Highway 99 bridge). The project area is upstream from the upper limit of Section 10 navigability.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Pacific Property Search LLC		File Number: NWP-2009-373	Date: 03/22/2010
Attached is:			See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of permission)		B
	PERMIT DENIAL		C
XX	APPROVED JURISDICTIONAL DETERMINATION		D
	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://usace.army.mil/inet/functions/cw/cecwo/reg or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice. Also, see Section II.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also, you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record. If you believe you have additional information pertinent to an approved jurisdictional determination {see Part D} with which you disagree, that new information should first be sent to the Portland District for reconsideration. Following the District's reconsideration, the approved jurisdictional determination can still be appealed as noted in Part D)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you decide to appeal an action under Parts B, C or D above, send a copy of each page to:
Mr. Michele Hanson U.S. Army Corps of Engineers Portland District Office Eugene Field Office 1600 Executive Parkway Suite 210 Eugene, Oregon 97201-2156	Division Engineer Ms. Karen Kochenbach Regulatory Program Manager P.O. Box 2870 Portland, OR 97208-2870 Telephone: 503-808-3888

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

	Date:	Telephone number:
_____ Signature of appellant or agent.		

DEPARTMENT OF THE ARMY
PORTLAND DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2946
PORTLAND, OREGON 97208-2946

November 16, 2010

REPLY TO
ATTENTION OF:

Operations Division
Regulatory Branch
Corps No.: NWP-2009-373

Mr. Randy Tyler
Pacific Property Search, LLC
23535 SW Gage Street
Wilsonville, OR 97070

Dear Mr. Tyler:

The U.S. Army Corps of Engineers (Corps) transmitted to you an approved jurisdictional determination (JD) for Clackamette Cove and nearby wetlands on March 23, 2010. The site is located at Clackamette Cove, in the City of Oregon City, Clackamas County, Oregon (Section 29, Township 2 S, and Range 2 E). The Corps' jurisdiction was also the subject of an explanatory letter dated June 30, 2010.

The Corps reevaluated our March 12, 2010 jurisdictional determination in response to concerns raised by members of the public. After careful consideration the Corps has determined Clackamette Cove is within the segment of the Clackamas River designated navigable under Section 10 of the Rivers and Harbors Act of 1899. The purpose of this letter is to transmit a revised JD that asserts jurisdiction over the Cove pursuant to both Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act (Enclosure 1). This letter and the revised JD supersede the previous JD.

In the course of reevaluating the JD, the Corps conducted a site visit and validated the ordinary high water mark (OHWM) elevation previously documented within the project area. Our Section 10 authority extends to the elevation of the OHWM. The placement of dredged or fill material into waters of the United States may require a Department of the Army permit under Section 404 of the Clean Water Act. Further, a Department of the Army permit is required for any work or structures in or affecting navigable waters under Section 10 of the Rivers and Harbors Act.

If you are not in agreement with that approved JD, you can make an administrative appeal under 33 CFR 331. Please see the enclosed Notification of Administrative Appeal Options and Process and Request for Appeal for further information about that process (Enclosure 2). This approved JD is valid for 5 years from the date of this letter unless new information warrants revision of the determination.

Jerry Hermann
River Resource Museum, President
P.O. Box 67
West Linn, OR 97068

Paul Edgar
211 5th Avenue
Oregon City, Oregon 97045

Andrew Hawley
Northwest Environmental Defense Center
10015 SW Terwilliger Boulevard
Portland, OR 97219

Cheryl McGinnis
Clackamas River Basin Council
P.O. Box 1869
Clackamas, OR 97015

Appendix C

Geotechnical Report

Real-World Geotechnical Solutions
Investigation • Design • Construction Support

Preliminary Geotechnical Engineering Report

The Cove Garden Apartments
Oregon City, Oregon

GeoPacific Engineering, Inc. Job No. 15-3719
July 14, 2015

14835 SW 72nd Avenue
Portland, Oregon 97224

Tel (503) 598-8445
Fax (503) 941-9281

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July 14, 2015
Project No. 15-3719

Mr. Paul Herskowitz
Grand Peak Properties
4582 S Ulster Street, Ste. 1200
Denver, Colorado 80237
Phone: (720) 889-9209

SUBJECT: Preliminary Geotechnical Engineering Report
The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

PROJECT INFORMATION

This report presents the results of a geotechnical engineering study conducted by GeoPacific Engineering, Inc. (GeoPacific) for the above-referenced project. The purpose of our investigation was to evaluate subsurface conditions at the site, and to provide preliminary geotechnical recommendations for site development. This geotechnical study was performed in accordance with GeoPacific Proposal No. P-5168, dated March 27, 2015, and your subsequent authorization of our proposal and *General Conditions for Geotechnical Services*.

Location:	Tax Parcel 05022763 Located due west of the intersection of Main Street and S Agnes Avenue Oregon City, Oregon 97045 (see Figures 1 and 2)
Property Owner:	Grand Peak Properties 4582 S Ulster Street, Ste. 1200 Denver, Colorado 80237 Phone: (720) 889-9209
Civil Engineer:	Cardno 5415 SW Westgate Drive, Ste. 100 Portland, Oregon 97221 Phone: (503) 419-2500
Jurisdictional Agency:	City of Oregon City, Oregon
Prepared By:	GeoPacific Engineering, Inc 14835 SW 72nd Avenue Portland, Oregon 97224 Tel (503) 598-8445 Fax (503) 941-9281

SITE AND PROJECT DESCRIPTION

As indicated on Figures 1 through 3, the subject site is located west of the intersection of Main Street and S Agnes Avenue in Oregon City, Oregon. The site is comprised of tax parcel 05022763 totaling approximately 11.46-acres, and is irregular in shape. The site is bordered by Main Street to the north and east, by the Oregon City Shopping Plaza to the west, and by Interstate 205 to the south. Clackamette Cove is located to the north of the site, opposite Main Street. The site is dominated by irregular, uneven terrain with site elevations ranging from approximately 35 feet to 55 feet above mean sea level (amsl). The site is located within the FEMA 100 year flood plain and was most recently inundated with flood waters during 1996. The approximate site latitude and longitude are N 45° 22' 07" and W 122° 35' 48", and the legal description is a portion of the SW ¼ of Section 9, T2S, R2E, Willamette Meridian. The regulatory jurisdictional agency is the City of Oregon City, Oregon.

Historically the site has was utilized for agricultural purposes until the 1950's. During the 1950's the site was utilized for aggregate mining by Pit Rock Products, which resulted in the excavation and creation of Clackamette Cove. The site is located at the southern end of the modern day limit of Clackamette Cove, however it appears that mining operations once extended to the approximate southern boundary of the site. From the 1960's to approximately 2007 a concrete production company operated at the site. Historical land use operations since the 1950's resulted in extensive topographic changes to the site which included the apparent removal of 30 to 50 feet of existing soil and gravel, followed by infill with various soils, debris, and extensive concrete placement. Currently the site contains extensive undocumented fill including areas of gravel stockpiles, buried debris, asphalt, metal, and plastic. In addition, the majority of the site is surfaced with concrete which includes remnant building foundations, random concrete clean out piles, concrete surfaced drive areas, and piles of large concrete blocks. Two ponds are present at the site which were observed to be lined with concrete and filled with water during our site visit. One pond is located in the northern portion of the site and appears to have been used as a settling pond. The other pond is located in the east-central portion of the site and appears to have been used as a wheel wash for concrete trucks. Both ponds were observed to have been filled with large, rectangular, concrete blocks. A drainage ravine is located along the western margin of the site which appears to flow north to the Clackamette Cove. Undocumented fill was observed to be present in the bottom of the drainage swale.

Several monitoring wells were installed in 2009 following closing of the concrete plant. Review of available well logs from the site indicate that concrete rubble and infill is present to depths of approximately 20 feet in the lower elevation portions of the site.

GeoPacific understands that final development planning for the site has not been completed at this time. However based upon review of preliminary site plans, and communication with the client, the civil engineer, and the architect, we understand that proposed development at the subject site will consist of site grading to achieve elevations above the FEMA 100 year flood plain elevation, and construction of 12, three to four-story apartment buildings, garages, parking and drive areas, and associated underground utility improvements. We understand that a proposed final grading elevation of approximately 52 feet amsl has been proposed, which will result in up to 17 feet of engineered fill placement at the site. We understand that in addition to utilization of onsite fill materials, import of several thousand yards of fill material will be obtained from soil stockpiles

located to the northeast of the site. Prior to engineered fill placement, extensive demolition, concrete crushing, and unsuitable fill excavation will be conducted.

REGIONAL GEOLOGIC SETTING

Regionally, the subject site lies within the Willamette Valley/Puget Sound lowland, a broad structural depression situated between the Coast Range on the west and the Cascade Range on the east. A series of discontinuous faults subdivide the Willamette Valley into a mosaic of fault-bounded, structural blocks (Yeats et al., 1996). Uplifted structural blocks form bedrock highlands, while down-warped structural blocks form sedimentary basins.

According to the *Generalized Geologic Map of the Willamette Lowland, (U.S. Department of the Interior, U.S. Geological Survey, Marshal W. Gannett and Rodney R. Caldwell, 1998)* the site is underlain by upper-Pleistocene-aged, rhythmically bedded, fine-grained periglacial, silt and sand deposits derived from catastrophic outburst floods of Glacial Lake Missoula (Qs).

The Web Soil Survey (United States Department of Agriculture, Natural Resource Conservation Service (USDA NRCS 2015 Website), indicates that near-surface soils primarily consist of Urban Land Development. The designation of Urban Land Development soils indicate that the native soil conditions have been altered.

REGIONAL SEISMIC SETTING

At least four major fault zones capable of generating damaging earthquakes are thought to exist in the vicinity of the subject site. These include the Portland Hills Fault Zone, the Lacamas Creek/Sandy River Fault Zone, the Gales Creek-Newberg-Mt. Angel Structural Zone, and the Cascadia Subduction Zone.

Portland Hills Fault Zone

The Portland Hills Fault Zone is a series of NW-trending faults that include the central Portland Hills Fault, the western Oatfield Fault, and the eastern East Bank Fault. These faults occur in a northwest-trending zone that varies in width between 3 and 5 miles. The combined three faults reportedly vertically displace the Columbia River Basalt by 1,130 feet and appear to control thickness changes in late Pleistocene (approx. 780,000 years) sediment (Madin, 1990). The Portland Hills Fault occurs along the Willamette River at the base of the Portland Hills, and is located approximately 1.7 miles northeast of the site. The Oatfield Fault occurs along the western side of the Portland Hills, and is located approximately 1 mile northeast of the site. The East Bank Fault occurs along the eastern margin of the Willamette River, and is located approximately 6.2 miles northeast of the site. The accuracy of the fault mapping is stated to be within 500 meters (Wong, et al., 2000).

According to the USGS Earthquake Hazards Program, the fault was originally mapped as a down-to-the-northeast normal fault, but has also been mapped as part of a regional-scale zone of right-lateral, oblique slip faults, and as a steep escarpment caused by asymmetrical folding above a south-west dipping, blind thrust fault. The Portland Hills fault offsets Miocene Columbia River Basalts, and Miocene to Pliocene sedimentary rocks of the Troutdale Formation. No fault scarps

on surficial Quaternary deposits have been described along the fault trace, and the fault is mapped as buried by the Pleistocene aged Missoula flood deposits. No historical seismicity is correlated with the mapped portion of the Portland Hills Fault Zone, but in 1991 a M3.5 earthquake occurred on a NW-trending shear plane located 1.3 miles east of the fault (Yelin, 1992). Although there is no definitive evidence of recent activity, the Portland Hills Fault Zone is assumed to be potentially active (Geomatrix Consultants, 1995).

Lacamas Creek / Sandy River Fault Zone

The northwest trending Lacamas Creek Fault intersects the northeast trending Sandy River Fault north of Camas, Washington at Lacamas Lake, approximately 18 miles northeast of the subject site. According to the USGS Earthquake Hazards Program the fault has been mapped as a normal fault with down-to-the-southwest displacement, and has also been described as a steeply northeast or southwest-dipping, oblique, right-lateral, slip-fault. The trace of the Lacamas Lake fault is marked by the very linear lower reach of Lacamas Creek. No fault scarps on Quaternary surficial deposits have been described. The Lacamas Lake fault offsets Pliocene-aged sedimentary conglomerates generally identified as the Troutdale formation, and Pliocene to Pleistocene aged basalts generally identified as the Boring Lava formation. Recent seismic reflection data across the probable trace of the fault under the Columbia River yielded no unequivocal evidence of displacement underlying the Missoula flood deposits, however, recorded mild seismic activity during the recent past indicates this area may be potentially seismogenic.

Gales Creek-Newberg-Mt. Angel Structural Zone

The Gales Creek-Newberg-Mt. Angel Structural Zone is a 50-mile-long zone of discontinuous, NW-trending faults that lies about 19 miles southwest of the subject site. These faults are recognized in the subsurface by vertical separation of the Columbia River Basalt and offset seismic reflectors in the overlying basin sediment (Yeats et al., 1996; Werner et al., 1992). A geologic reconnaissance and photogeologic analysis study conducted for the Scoggins Dam site in the Tualatin Basin revealed no evidence of deformed geomorphic surfaces along the structural zone (Unruh et al., 1994). No seismicity has been recorded on the Gales Creek Fault or Newberg Fault (the fault closest to the subject site); however, these faults are considered to be potentially active because they may connect with the seismically active Mount Angel Fault and the rupture plane of the 1993 M5.6 Scotts Mills earthquake (Werner et al. 1992; Geomatrix Consultants, 1995).

According to the USGS Earthquake Hazards Program, the Mount Angel fault is mapped as a high-angle, reverse-oblique fault, which offsets Miocene rocks of the Columbia River Basalts, and Miocene and Pliocene sedimentary rocks. The fault appears to have controlled emplacement of the Frenchman Spring Member of the Wanapum Basalts, and thus must have a history that predates the Miocene age of these rocks. No unequivocal evidence of deformation of Quaternary deposits has been described, but a thick sequence of sediments deposited by the Missoula floods covers much of the southern part of the fault trace.

Cascadia Subduction Zone

The Cascadia Subduction Zone is a 680-mile-long zone of active tectonic convergence where oceanic crust of the Juan de Fuca Plate is subducting beneath the North American continent at a

rate of 4 cm per year (Goldfinger et al., 1996). A growing body of geologic evidence suggests that prehistoric subduction zone earthquakes have occurred (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). This evidence includes: (1) buried tidal marshes recording episodic, sudden subsidence along the coast of northern California, Oregon, and Washington, (2) burial of subsided tidal marshes by tsunami wave deposits, (3) paleoliquefaction features, and (4) geodetic uplift patterns on the Oregon coast. Radiocarbon dates on buried tidal marshes indicate a recurrence interval for major subduction zone earthquakes of 250 to 650 years with the last event occurring 300 years ago (Atwater, 1992; Carver, 1992; Peterson et al., 1993; Geomatrix Consultants, 1995). The inferred seismogenic portion of the plate interface lies approximately along the Oregon Coast at depths of between 20 and 40 kilometers below the surface.

FIELD EXPLORATION AND SUBSURFACE CONDITIONS

Our site-specific explorations for this report were conducted on April 17, and June 30, 2015. A total of twenty six exploratory test pits (TP-1 through TP-26) were excavated at the site to a maximum depth of 15 feet below ground surface (bgs) using a rubber-tired excavator subcontracted by GeoPacific, and hydraulic rock chipper and track-mounted excavator provided by the client. In addition to the test pit explorations, GeoPacific reviewed available well logs from monitoring wells installed across the site during 2009. The approximate locations of the explorations are indicated on Figure 2. It should be noted that exploration locations were located 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. During the explorations, GeoPacific observed and recorded pertinent soil information such as color, stratigraphy, strength, and soil moisture content. Soils were classified in general accordance with the Unified Soil Classification System (USCS). At the completion of each test, the test pits were backfilled loosely with onsite soil. Soil conditions were found to be variable across the site. Extensive areas of undocumented fill are present, from highly varied fine-grained soil to gravel, concrete, and debris. Soil and groundwater conditions encountered in the explorations are summarized below.

Soil

Undocumented Fill: Undocumented fill was encountered in all subsurface explorations conducted at the site to beyond the depths explored. Fill soils were observed to consist of highly variable soil types which included Sandy SILT, Sand and Gravel, processed Sand and Gravel, Clayey Gravel with Sand, concrete, asphalt, metal, plastic, woody debris, and bricks. Much of the site is surfaced with concrete, particularly in the north and central portions. Concrete is present at locations of remnant building foundations, in areas where the concrete batch plant disposed of large quantities of apparent reject batch material, and apparent drive areas. The presence of concrete fill prohibited subsurface exploration with an excavator in much of the northern and central portions of the site, and limited the depths of exploration in adjacent areas. Photographic logs are attached in the appendix of the report. Figure 3 presents a generalized delineation showing similar types of undocumented fill present at the site, and geotechnical concerns associated with each type, based upon our site observations, review of historical aerial photography, and subsurface soils encountered during site investigation. The boundaries of soil types indicated on the map should be considered approximate.

In general the northern and central portions of the site are surfaced with concrete. Based upon review of historical aerial photography the concrete batch plant primarily operated in these portions of the site.

The west and southern margins of the site contained fine-grained fill soils consisting of silt and sandy silt, and contained various quantities of debris and trash. Based upon review of historical aerial photography, it appears that much of the fine grained soils were placed during operation of the concrete batch plant as many large concrete fragments and buried concrete slabs were encountered within these soils. These soils were observed to contain concrete, asphalt, bricks, metal debris, woody debris, paper, fabric, and basaltic boulders. The fine-grained soils varied greatly in soil strength from soft/loose, to stiff/dense. These soils will likely present poor foundational support for structures, roads, and underground utilities, and should be considered susceptible to static settlement.

The southern and eastern portion of the site contains areas which appeared to be remnant crushed aggregate stockpiles. The crushed aggregate was observed to generally consist of ¾"-0 to 1½-0 sand and gravel mixtures. In many locations, such as the southern portion of the site, the gravels were observed to be dense to very dense, and caused refusal of excavation. Based upon review of historical aerial photos it appears that some of the stockpiles were placed prior to the operation of the concrete plant, however, extensive earth movement from the concrete batch plant included placement of fill in the area (see historical aerial photograph from 1963).

Soils laboratory testing was conducted upon soil samples obtained from test pits TP-4, TP-5, TP-9, TP-19, and TP-21.

Soils tested from a depth of 5 feet at the location of test pit TP-4 indicated that soils consist of Silty SAND with Gravel. Sieve analysis indicated approximately 14.3 percent by weight passing the No. 200 sieve, and an in-situ moisture content of 7.5 percent. Atterberg testing indicated the soil type is non-plastic. The soil type classified as SM, Silty SAND with GRAVEL according to USCS specifications, and A-1(a) according to AASHTO specifications.

Soils tested from a depth of 6 feet at the location of test pit TP-5 indicated that soils consist of Clayey GRAVEL with Sand. Sieve analysis indicated approximately 44.1 percent by weight passing the No. 200 sieve, and an in-situ moisture content of 22.3 percent. Atterberg testing indicated a liquid limit of 41 and a plasticity index of 22. The soil type classified as GC, Clayey GRAVEL with Sand according to USCS specifications, and A-7-6(5) according to AASHTO specifications.

Soils tested from a depth of 12 feet at the location of test pit TP-9 indicated that soils consist of Clayey GRAVEL with Sand. Sieve analysis indicated approximately 46.7 percent by weight passing the No. 200 sieve, and an in-situ moisture content of 19.8 percent. Atterberg testing indicated a liquid limit of 47 and a plasticity index of 21. The soil type classified as GC, Clayey GRAVEL with Sand according to USCS specifications, and A-7-6(7) according to AASHTO specifications.

Soils tested from a depth of 4 feet at the location of test pit TP-19 indicated that soils consist of Elastic SILT. Sieve analysis indicated approximately 91.8 percent by weight passing the No. 200

sieve, and an in-situ moisture content of 29.9 percent. Atterberg testing indicated a liquid limit of 65 and a plasticity index of 30. The soil type classified as MH, Elastic SILT according to USCS specifications, and A-7-5(34) according to AASHTO specifications.

Soils tested from a depth of 6 feet at the location of test pit TP-21 indicated that soils consist of SILT with Sand. Sieve analysis indicated approximately 72.0 percent by weight passing the No. 200 sieve, and an in-situ moisture content of 30.7 percent. Atterberg testing indicated a liquid limit of 47 and a plasticity index of 16. The soil type classified as ML, SILT with Sand according to USCS specifications, and A-7-5(12) according to AASHTO specifications.

Groundwater and Soil Moisture

On April 17, 2015, observed soil moisture conditions were generally moist to very moist. Groundwater was not encountered within our test pit explorations. According to our review of available well logs, groundwater is commonly encountered at depths of approximately 35 feet bgs in the vicinity of the subject site. According to the *Estimated Depth to Groundwater in the Portland, Oregon Area, (United States Geological Survey, Snyder, 2015 website)*, groundwater is expected to be present at an approximate depth of 10 feet below the ground surface. It is anticipated that groundwater conditions will vary depending on the season, local subsurface conditions, changes in site utilization, and other factors. Perched groundwater may be encountered in localized areas. Seeps and springs may exist in areas not explored, and may become evident during site grading. Piezometer installation and long-term monitoring, which is beyond the scope of this investigation, would be needed to provide additional groundwater information.

HISTORICAL AERIAL PHOTOGRAPHY REVIEW

GeoPacific conducted a review of historical aerial photography of the site obtained from the Army Corp. of Engineers, and Google Earth. Photographs were reviewed from 1936, 1944, 1955, 1963, 1972, 1980, 1996, 2001, 2007, and 2010. A brief summary of our observations is provided below.

1936 to 1955

The site was primarily used for agricultural purposes.

1955 to 1960's

The site was mined for sand and gravel resulting in excavation across the site, potentially to depths of 30 to 40 feet below the original ground surface. During this time period several stockpiles were moved around at the site. The mining operations created Clackamette Cove located north of the site.

1963

A concrete batch plant is present at the site and several aggregate piles are present across the site. The batch plant equipment is primarily located at the northern portion of the site. The drainage swale currently located along the western site boundary is not present. The southern portion of the site is quite different than today and consists of aggregate stockpiles and a fill berm

along the southern boundary of the site. The Oregon City Shopping Plaza is present adjacent to the west of the site. Main Street has not yet been constructed along the sites northern boundary, and a haul road is present extending from the Clackamette Cove area into the site at the northwestern property corner.

1972

The concrete batch plant is in operation at the site and the stockpiles have been dramatically shifted as opposed to 1963. The current highest elevation areas in the southern portion of the site which were observed to contain fine-grained fill soils with debris appear, although not quite as extensive as the current topography. Construction of I-205 is underway in the photograph and haul roads from the construction zone are present at the southern site boundary extending into the site across the fill. It is possible that the fine grained fill soils present in the southern portion of the site today were placed during construction of I-205. Additional concrete equipment is present at the site.

1980

The concrete batch plant is in operation at the site and the stockpiles in the southern portion of the site have increased in size, more closely resembling the topography existing today. Several concrete trucks are visible. Main Street has been constructed to its present day location. Construction of I-205 is complete. The northeastern portion of the site appears to contain a conveyor belt and is in the location where extensive layering of random concrete pours was observed during our site investigation. It is likely that the area was used as a disposal location for test batches and reject batches of concrete.

1996

The aerial photography from 1996 was taken during a 100-year flood event in February. The photograph shows the entire site underwater, with some of the concrete batch plant equipment can be seen extending out of the water. It is our understanding that the high water level at the site reached an approximate elevation of 50 feet amsl during the flood event.

2001

The concrete batch plant is still in operation. The southern portion of the site where fine-grained fill soils and remnant crushed aggregate stockpiles were encountered was being used as a parking area. The drive entrances into the batch plant are in the locations we observed during our site investigation. The pond in the northern portion of the site is present.

2007

The concrete batch plant appears to be in operation. The drainage swale along the western margin of the site appears. A roadway appears along the western margin of the site adjacent to the drainage swale. The parking areas in the southern portion of the site have been expanded. The batch plant configuration appears to be relatively unchanged.

2010

The concrete batch plant is gone from the site. The site appears to resemble its current condition.

CONCLUSIONS AND RECOMMENDATIONS

Our site investigation indicates that the proposed construction is geotechnically feasible, provided that the recommendations of this report are incorporated into the design and construction phases of the project. The primary geotechnical concern associated with development at the subject site is the presence of large quantities of highly variable undocumented fill at the site. Removal of some undocumented fill at the site should be conducted to depths necessary to limit potential settlement of engineered fill and structures. Undocumented fill was observed to extend to greater depths than our test pit explorations, and as a result, the subsurface stratum across the site is not thoroughly understood at this time. Several additional subsurface explorations consisting of deep soils borings are recommended for the site in order to gain a better understanding of the extent, and depth of the undocumented fill soils. The installation of settlement plates during site grading and placement of engineered fill will likely be required.

Initial Site Preparation Recommendations

Areas of proposed construction and areas to receive fill should be cleared of vegetation and unsuitable undocumented fill soils. Due to the complexity of the site conditions, and the limits of our preliminary subsurface investigation, at this time the ultimate depth of removal of undocumented fill soils which will be required prior to placement of engineered fill and structures cannot fully be determined. In order to gain a better understanding of the magnitude of the removal of unsuitable fill soils which will ultimately be required at the site, we recommend that an initial phase of site demolition be conducted based upon the information currently available. A period of demolition and bulk removal of undocumented fill soils will allow soil boring drill rigs to more easily penetrate portions of the site which are surfaced with concrete rubble that limited excavation of test pits, and expose subsurface layers which are not currently visible.

During the initial demolition phase, grading operations should either remove areas of undocumented fill which are clearly unsuitable. Figure 3 presents a generalized map of the types of fill materials encountered at the site during our preliminary subsurface investigation. The extent and boundaries of the types of fill soils indicated on the map should be considered approximate.

Portions of the site where fine-grained soils containing debris are present should be excavated to depths necessary to remove the soils. These materials were found to be soft and highly variable. These soils will likely present poor foundational support for structures, roads, and underground utilities, and should be considered susceptible to static settlement. Test pits conducted within these areas extended to a maximum depth of 15 feet bgs and were terminated in undocumented fill soils. Based upon review of well logs from the monitoring wells installed at the site, we anticipate that the fill soils may be present on the order of 20 feet thick or greater. Soils removed from these areas may be suitable for use as engineered fill provided that deleterious materials, debris, and highly organic soils are removed from the fill. The final extent of removal, and suitability for re-use as engineered fill of this soil type should be determined in the field during construction by the geotechnical engineer or designated representative.

As indicated on Figure 3, the site contains areas of apparent remnant sand and gravel stockpiles. The gravels were observed to vary in density and gradation. As indicated on the attached test pit logs, some of the sand and gravel fill soils were observed to be very dense and caused refusal of exploration. Uncertainty exists as to the subsurface conditions below the depths explored. Additional subsurface exploration consisting of soil borings is recommended in the areas proposed for structures. It is possible that some of the sand and gravel deposits may remain in place, particularly in areas where proposed fill depths are greater than 10 feet. In areas where less than 10 feet of fill has been proposed, soils may need to be excavated and the areas re-graded. The final extent of removal of this soil type should be determined in the field during bulk demolition and following additional subsurface exploration. It appeared that this soil type will largely be suitable for re-use as engineered fill.

The north, east, and central portions of the site contain remnant building foundations and extensive layers of randomly poured concrete debris. It is our understanding that a concrete crusher will be utilized during site grading and that the recycled concrete will be used as engineered fill. We recommend that large excavators be utilized to remove the precast concrete debris in as much of the site as is feasible, thereby exposing as much of the underlying soil layers as possible. There may be portions of the site where it is feasible to leave some of the concrete in place, particularly areas where proposed fill depths are greater than 10 feet. The low elevation central portions of the site are surfaced with concrete that consisted of remnant building slabs and apparent drive areas.

Site investigation conducted in the central portion of the site on June 30th, 2015 included utilization of a hydraulic rock chipper to penetrate through the concrete in test pits TP-19 through TP-26. The concrete in much of the central portion of the site was observed to be approximately 6-inches-thick, and did not contain rebar. Re-bar was observed in the remnant concrete building foundations. Underlying the 6-inch concrete slab that surfaces much of the central portion of the site, soils were observed to consist of fill material consisting of dark gray and brown, moist, medium stiff, SILT. The fine-grained fill soils were observed to extend to the maximum depth of exploration at the locations observed. See the attached Figure 2 and test pit logs in the appendix of this report for greater detail of subsurface soil conditions.

Based upon review of preliminary grading plans, it is our understanding that up to 15 feet of fill is planned in the central, low elevation portions of the site. In order to determine whether or not the existing concrete is suitable for engineered fill placement, GeoPacific should conduct additional soil borings in the locations proposed for structures to determine if voids or other unsuitable soil types are present which may be susceptible to settlement. In addition, settlement plates should be installed at the base elevation prior to engineered fill placement, and monitored for settlement for a period determined suitable by the geotechnical engineer.

In general, in areas where structures have been proposed, greater depths of removal of unsuitable fill soils will need to be conducted than in areas proposed for parking and drive aisles. Additional subsurface exploration consisting of soil borings should be conducted in areas proposed for structures. In areas proposed for drive and parking areas, it may be feasible to limit over-excavation.

Inorganic debris and organic materials from clearing should be removed from the site. Organic-rich soils and root zones should then be stripped from construction areas of the site or where engineered fill is to be placed.

The final depth of soil removal will be determined on the basis of further subsurface explorations and site inspections during and after the excavation. Soil borings should be drilled at the location of the proposed structures to determine the total extent of undocumented fill and susceptibility to static settlement under the proposed loading. Stripped topsoil should be removed from the site. Any remaining topsoil should be stockpiled only in designated areas and stripping operations should be observed and documented by the geotechnical engineer or his representative.

Engineered Fill

All grading for the proposed construction should be performed as engineered grading in accordance with the applicable building code at the time of construction with the exceptions and additions noted herein. Areas proposed for fill placement should be prepared as described in the site preparation section. Surface soils should then be scarified and recompacted prior to placement of structural fill. Proper test frequency and earthwork documentation usually requires daily observation and testing during stripping, rough grading, and placement of engineered fill. 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. Field density testing should conform to ASTM D2922 and D3017, or D1556. All engineered fill should be 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. Because testing is performed on an on-call basis, we recommend that the earthwork contractor be held contractually responsible for test scheduling and frequency. Site earthwork will be impacted by soil moisture and shallow groundwater conditions.

Static Settlement and Settlement Monitoring

As described above, the subject site is underlain by variable thicknesses and types of undocumented fill. Some portions of the site have been proposed for up to 17 feet of engineered fill placement. In areas where engineered fill has been proposed at the subject site, particularly the central and southern portions of the site, we anticipate potential static settlement of the existing soils under the weight of the engineered fill and proposed structures. Due to the variability of existing subsurface site conditions it may not be feasible to remove all of the undocumented fill. At this time we do not have sufficient subsurface data to conduct static settlement calculations. We recommend that several soil borings be drilled at the site to determine the extent and soil parameters of the undocumented fill soils present.

Calculations for long-term static settlement should be based upon placement of structural fill and structural building loads, both of which increase the vertical effective stress in subsurface soils and

induce soil settlement. SPT measurements obtained during drilling soil borings will provide the information needed to conduct static settlement calculations. Estimating time rate of settlement is beyond the scope of this preliminary investigation, however it should be understood that embankment fills will likely undergo active settlement during grading and construction activities in many portions of the site. Allowing as much time as possible to pass after grading before installing permanent structures, curbs, sidewalks, and flexible pavement is recommended.

Due to the variation in soil conditions throughout the site and the range of possible loads, a site-specific dynamic and static settlement analysis should be conducted for each individual proposed structure at the subject site.

We recommend the installation of settlement monitoring plates within areas proposed for engineered fill. The settlement plates should be installed prior to any addition of fill material at several locations selected by the geotechnical engineer. The settlement plates shall be constructed of 24-inch, by 24-inch, by 1/2-inch steel sheets with 1-inch threaded coupling centered. 1-inch threaded steel pipe sections should be tightly coupled and extend above proposed finish grade elevation by 2-feet. A 3-inch pvc sleeve shall be placed around the steel pipe to allow free movement of the steel pipe during settlement. Detailed as-built construction measurements shall be documented and submitted to the geotechnical engineer and survey team for proper elevation calculations. Ground elevation and the elevation of the settlement plate riser pipe should be established and recorded prior to placement of the fill material to establish a baseline reading. Settlement plates shall be placed on level, undisturbed ground, embedded at least one foot below existing ground surface. Placement of the settlement plates shall be observed by the geotechnical engineer. Settlement plate piping shall be protected from disturbance (construction traffic, etc.) during construction activities and during the settlement period after fill operations are complete.

The elevation and location of settlement plates and the extensions should be surveyed before, during, and after placement of each extension. Settlement plates should be numbered. Settlement plates should be surveyed immediately at the time of installation. It is essential that the settlement plates be surveyed as soon as they are placed. During initial construction of the fill and any time thereafter when fill is being actively placed, the settlement plates should be read every two days. After the fill placement has been completed the plates may be read weekly. When fill is being placed, the amount of fill (lift heights) should be carefully recorded for use in settlement data interpretation. Any extreme or unusual events should also be recorded. If the plates are disturbed or damaged GeoPacific should be immediately notified. It is preferred that the same surveyors read the settlement plates over the course of the monitoring period.

Excavating Conditions and Utility Trench Backfill

We anticipate that excavation of on-site soils will require heavy equipment in many portions of the site. During our site investigation subsurface exploration with a medium sized, rubber-tired back-hoe was greatly limited due to the presence of concrete fill and dense sand and gravel mixtures. A hydraulic rock chipper was unable to penetrate concrete rubble at the location of test pit TP-26. The fine grained soils encountered at the site will likely present poor foundational support for underground utilities, and should be considered susceptible to static settlement. If underground utilities are proposed to be located within the areas designated as zone 1 on the

attached Figure 3, subgrade stabilization of the utility systems will be a concern and require additional measures.

Groundwater seepage was not encountered in our subsurface explorations. 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 soils classify as Type C Soil and temporary excavation side slope inclinations as steep as 1.5H:1V may be assumed for planning purposes. This cut slope inclination is applicable to excavations above the water table only.

Shallow, perched groundwater may be encountered during the wet weather season and should be anticipated in excavations and utility trenches. 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.

PVC pipe should be installed in accordance with the procedures specified in ASTM D2321 and Oregon City standards. We recommend that structural trench backfill be compacted to at least 95 percent of the maximum dry density obtained by the Standard Proctor (ASTM D698) or equivalent. Initial backfill lift thicknesses 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, at least 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 conditions that would be considered highly susceptible to erosion. In our opinion, the primary concern regarding erosion potential will occur during construction in areas that have been stripped of vegetation. Erosion at the site during construction can be minimized by implementing the project erosion control plan, which should include judicious use of straw waddles, fiber rolls, and silt fences. If used, these erosion control devices should remain in place throughout site preparation and construction.

Erosion and sedimentation of exposed soils can also be minimized by quickly re-vegetating exposed areas of soil, and by staging construction such that large areas of the project site are not denuded and exposed at the same time. Areas of exposed soil requiring immediate and/or temporary protection against exposure should be covered with either mulch or erosion control

netting/blankets. Areas of exposed soil requiring permanent stabilization should be seeded with an approved grass seed mixture, or hydroseeded with an approved seed-mulch-fertilizer mixture.

Wet Weather Earthwork

Soils underlying the site may be 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 may require expensive measures such as cement treatment or imported granular material to compact areas where fill may be proposed 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 5 percent passing the No. 200 sieve. 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
- Geotextile silt fences, straw waddles, and fiber rolls should be strategically located to control erosion.

If cement or lime treatment is used to facilitate wet weather construction, GeoPacific should be contacted to provide additional recommendations and field monitoring.

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 Oregon Structural Specialty Code (OSSC) revisions (current 2014). We recommend Site Class D be used for design per the OSSC, Table 1613.5.2 and as defined in ASCE 7, Chapter 20, Table 20.3-1. Design values determined for the site using the USGS (United States Geological Survey) *2012 Seismic Design Maps Summary Report* are summarized in Table 1.

Table 1 - Recommended Earthquake Ground Motion Parameters (USGS 2015)

Parameter	Value
Location (Lat, Long), degrees	45.3689, -122.5976
Probabilistic Ground Motion Values, 2% Probability of Exceedance in 50 yrs	
Peak Ground Acceleration	0.406 g
Short Period, S_s	0.938 g
1.0 Sec Period, S_1	0.404 g
Soil Factors for Site Class D:	
F_a	1.125
F_v	1.596
$SD_s = 2/3 \times F_a \times S_s$	0.703 g
$SD_1 = 2/3 \times F_v \times S_1$	0.430 g
Seismic Design Category	D

Soil Liquefaction and Dynamic Settlement

Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to earthquake shaking. Soil liquefaction generally occurs where loose, sands and granular soils are located below the water table. Observed on-site soils consist predominantly of dense sands and gravels, and concrete fill soils located above the water table.

The *Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon HazVu: Statewide Geohazards Viewer* indicates that the subject site is located in an area considered to be at risk for very strong ground shaking during an earthquake, and high risk for liquefaction during a seismic event.

According to review of well logs installed in 2009, subsurface soils underlying the concrete rubble consist of sandy SILT, and Gravelly Cobbles. The well logs indicate that groundwater was observed underlying the site at a depth of approximately 35 feet bgs. In our opinion, the soil profile we observed at the site did not appear to be susceptible to a high risk liquefaction. Placement of 15 feet of engineered fill would further reduce the risk of liquefaction. Additional subsurface exploration would provide information which will allow us to identify potentially liquefiable soil layers underlying the site in greater detail.

UNCERTAINTIES AND LIMITATIONS

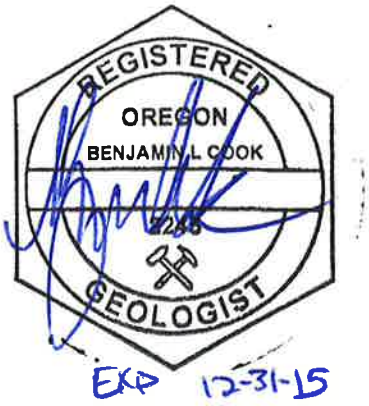
We have prepared this report for the owner and his/her consultants for use in design of this project only. The conclusions and interpretations presented in this report should not be construed as a warranty of the subsurface conditions. Experience has shown that soil and groundwater conditions can vary 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, GeoPacific should be notified for review of the recommendations of this report, and revision of such if necessary.

Within the limitations of scope, schedule and budget, GeoPacific executed these services in accordance with generally accepted professional principles and practices in the fields of geotechnical engineering and engineering geology at the time the report was prepared. No warranty, express 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,

GEOPACIFIC ENGINEERING, INC.



EXPIRES: 06/30/2017

Benjamin L. Cook, R.G.
Senior Geologist

James D. Imbrie, G.E., C.E.G.
Principal Geotechnical Engineer

REFERENCES

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CHECKLIST OF RECOMMENDED GEOTECHNICAL TESTING AND OBSERVATION

Item No.	Procedure	Timing	By Whom	Done
1	Preconstruction meeting	Prior to beginning site work	Contractor, Developer, Civil and Geotechnical Engineers	
2	Fill removal from site or sorting and stockpiling	Prior to mass stripping	Soil Technician/ Geotechnical Engineer	
3	Stripping, aeration, and root-picking operations	During stripping	Soil Technician	
4	Compaction testing of engineered fill (95% of Standard Proctor)	During filling, tested every 2 vertical feet	Soil Technician	
5	Compaction testing of trench backfill (95% of Standard Proctor)	During backfilling, tested every 4 vertical feet for every 200 lineal feet	Soil Technician	
6	Street Subgrade Inspection	Prior to placing base course	Soil Technician	
7	Base course compaction (95% of Modified Proctor)	Prior to paving, tested every 200 lineal feet	Soil Technician	
8	Final Geotechnical Engineer's Report	Completion of project	Geotechnical Engineer	

FIGURES

14835 SW 72nd Avenue
Portland, Oregon 97224

Tel (503) 598-8445
Fax (503) 941-9281

GeoPacific Engineering, Inc.
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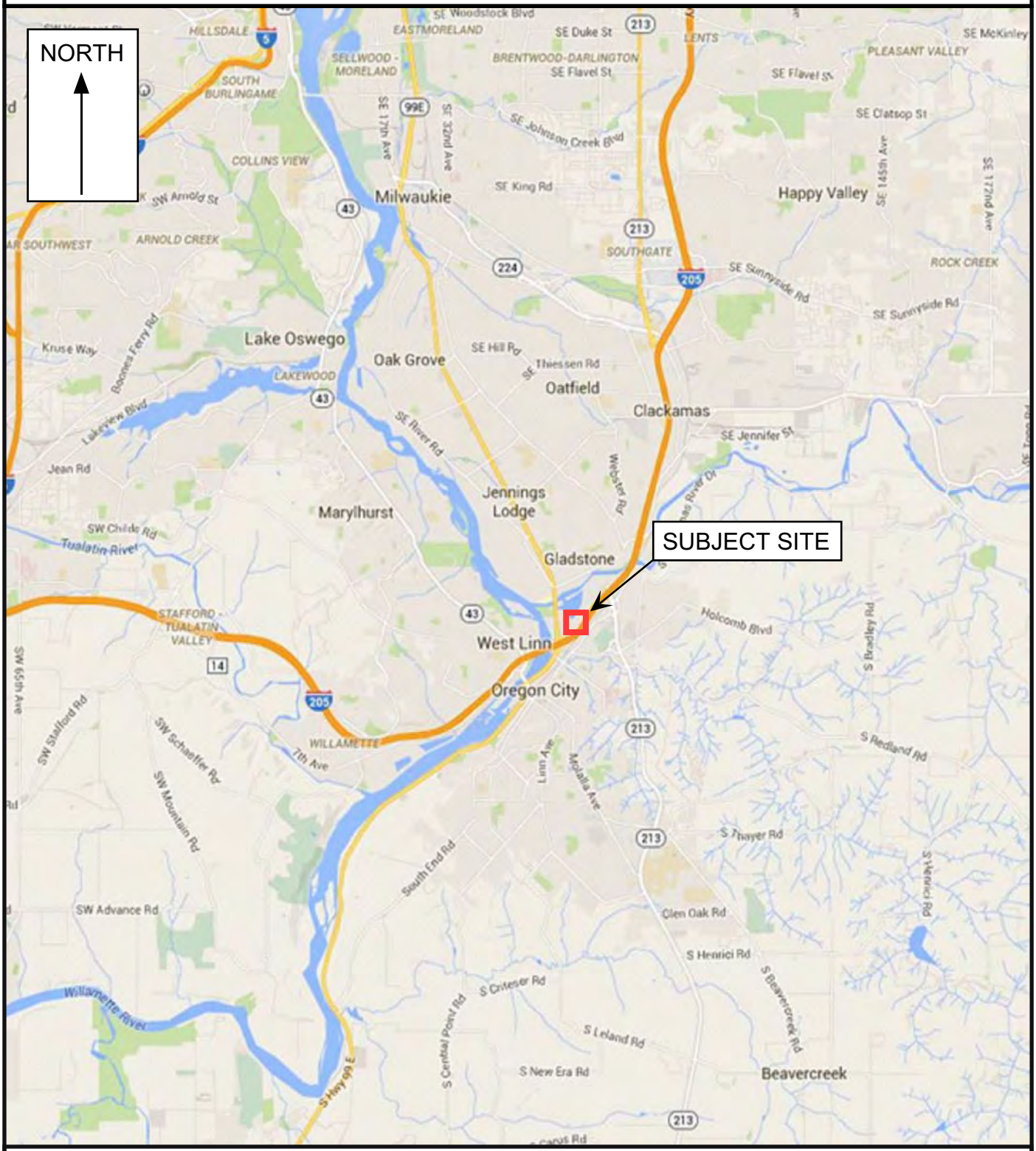
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

SITE VICINITY MAP



Base map: Google Maps, 2015

Date: 5/5/15
Drawn by: BLC

Project: The Cove Garden Apartments Oregon City, Oregon	Project No. 15-3719	FIGURE 1

GeoPacific Engineering, Inc.
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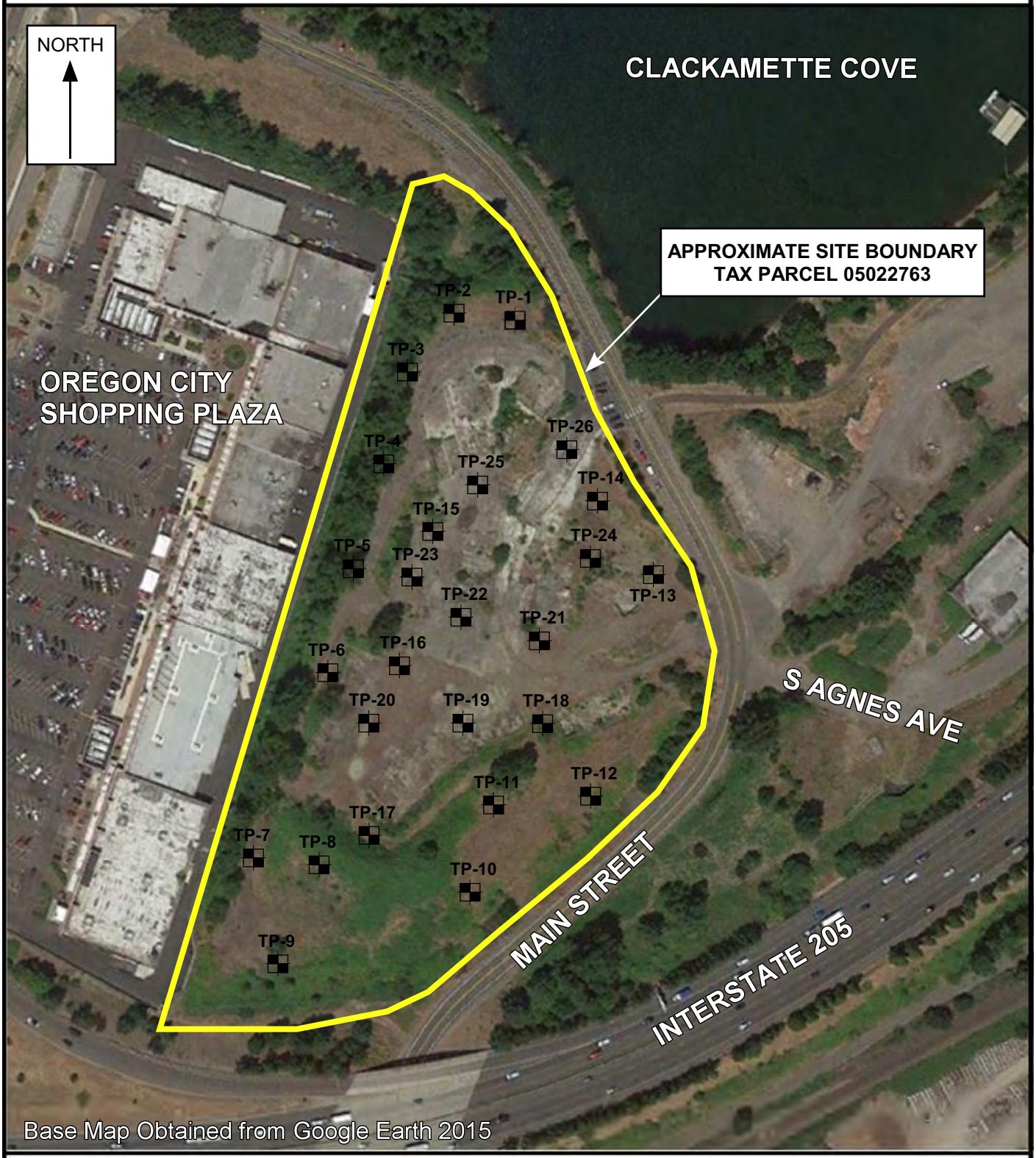
Tel: (503) 598-8445 Fax: (503) 941-9281

SITE AERIAL AND EXPLORATION LOCATIONS



Legend:

TP-1 Test Pit Designation and Approximate Location

0 200'

APPROXIMATE SCALE 1"=200'

Date: 7/8/15
Drawn by: BLC

Project: The Cove Garden Apartments Oregon City, Oregon	Project No. 15-3719	FIGURE 2

GeoPacific Engineering, Inc.
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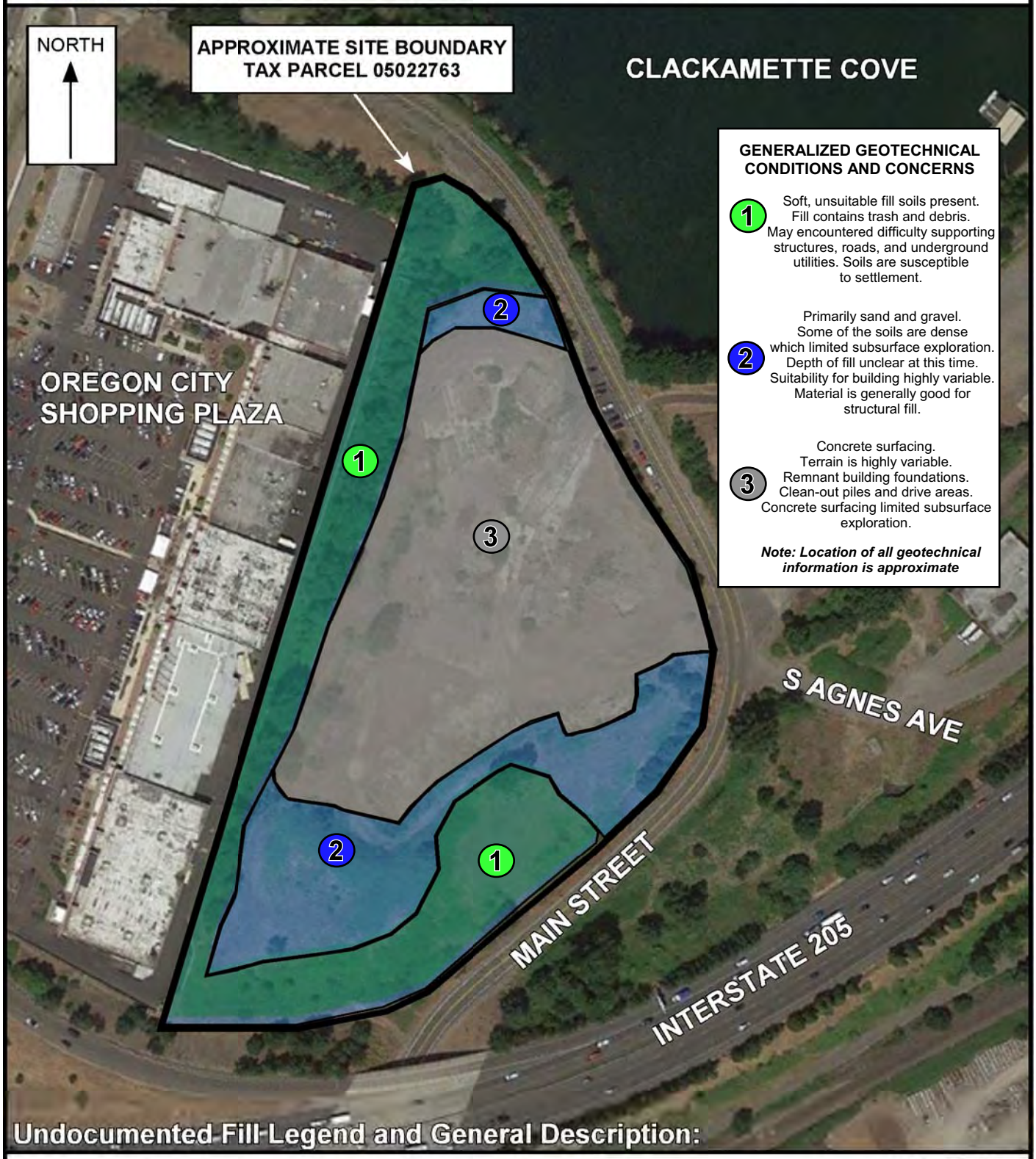
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

SITE AERIAL AND GENERALIZED UNDOCUMENTED FILL MAP



GENERALIZED GEOTECHNICAL CONDITIONS AND CONCERNS

1. Soft, unsuitable fill soils present. Fill contains trash and debris. May encountered difficulty supporting structures, roads, and underground utilities. Soils are susceptible to settlement.

2. Primarily sand and gravel. Some of the soils are dense which limited subsurface exploration. Depth of fill unclear at this time. Suitability for building highly variable. Material is generally good for structural fill.

3. Concrete surfacing. Terrain is highly variable. Remnant building foundations. Clean-out piles and drive areas. Concrete surfacing limited subsurface exploration.

Note: Location of all geotechnical information is approximate

Undocumented Fill Legend and General Description:

- Fine-Grained Soil, Contains Debris
- Granular Fill, Sand and Gravel
- Concrete Surfacing, Concrete Fill

0 200'

APPROXIMATE SCALE 1"=200'

Date: 5/5/15
Drawn by: BLC

Project: The Cove Garden Apartments Oregon City, Oregon	Project No. 15-3719	FIGURE 3

Real-World Geotechnical Solutions
Investigation • Design • Construction Support

EXPLORATION LOGS

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13910 SW Galbreath Drive, Suite 102
Sherwood, Oregon 97140
Tel: (503) 625-4455 Fax: (503) 625-4405

TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-1**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	3.0	100 to 1,000 g				FILL. Brown, Silty SAND with subrounded gravel (SM-GM), moist, dense, containing various sizes of concrete fragments. .
2	3.0					
3	3.0	100 to 1,000 g				
4	4.0					
5		100 to 1,000 g				FILL. Concrete rubble. Various sizes. Refusal caused by a concrete slab at -6 feet bgs.
6						Test Pit Terminated at 6 feet bgs due to refusal on concrete fill. No Groundwater Seepage Observed.
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

100 to 1,000 g — Bag Sample
5 Gal. Bucket — Bucket Sample
Shelby Tube Sample
Seepage
Water Bearing Zone
Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 43 feet

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TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-2**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	3.0	100 to 1,000 g				FILL. Brown, Silty SAND with subrounded gravel (SM-GM), moist, dense, containing various sizes of concrete fragments.
2	3.0					
		100 to 1,000 g				FILL. Concrete rubble. Various sizes. Refusal caused by a concrete slab at -3 feet bgs.
3	4.0					Test Pit Terminated at 3 feet bgs due to refusal on concrete fill. No Groundwater Seepage Observed.
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 47 feet

GeoPacific Engineering, Inc.
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Sherwood, Oregon 97140
Tel: (503) 625-4455 Fax: (503) 625-4405

TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-3**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	3.0	100 to 1,000 g				FILL. Brown, Silty SAND with subrounded gravel (SM-GM), moist, dense, containing various sizes of concrete fragments.
2	3.0					
3	4.0	100 to 1,000 g				
4						FILL. Concrete rubble. Various sizes. Refusal caused by a concrete slab at -4 feet bgs.
5						Test Pit Terminated at 4 feet bgs due to refusal on concrete fill. No Groundwater Seepage Observed.
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 45 feet

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Sherwood, Oregon 97140
Tel: (503) 625-4455 Fax: (503) 625-4405

TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-4**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	1.0	100 to 1,000 g				FILL. Dark brown, Silty SAND with subrounded gravel (SM-GM), moist, loose, containing various sizes of concrete fragments, metal, and plastic.
2	1.0	100 to 1,000 g				
3	1.0					
4	2.0	100 to 1,000 g				FILL. Brown, Silty SAND with subrounded gravel (SM-GM), moist, loose, non-plastic, containing concrete blocks, large roots, metal debris.
5		100 to 1,000 g	14.3	7.5		
6						
7						
8						
9		100 to 1,000 g				FILL. Gray, concrete rubble and 3/4"-0 gravel, moist, dense. Refusal caused by a concrete slab at -11 feet bgs.
10						
11						Test Pit Terminated at 11 feet bgs due to refusal on concrete fill. No Groundwater Seepage Observed.
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 45 feet

GeoPacific Engineering, Inc.
13910 SW Galbreath Drive, Suite 102
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TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-5**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	1.0	100 to 1,000 g				FILL. Dark brown, Silty SAND with subrounded gravel (SM-GM), moist, loose, containing various sizes of concrete fragments, metal, and plastic debris.
2	1.0	100 to 1,000 g				
3	1.0					
4	1.0	100 to 1,000 g				
5						
6		100 to 1,000 g	44.1	22.3		FILL. Brown, Clayey GRAVEL with Sand (GC), very moist, soft, containing roots, concrete fragments, and asphalt fragments. Liquid Limit = 40.9, Plasticity Index = 22.1.
7						
8		100 to 1,000 g				FILL. Gray, silty SAND (SM), moist, loose becoming dense, containing large concrete fragments, 3/4"-0 gravel, 3 foot diameter basalt boulder encountered at -9 feet. Refusal caused by a concrete slab at -11 feet bgs.
9						
10						
11						Test Pit Terminated at 11 feet bgs due to refusal on concrete fill. No Groundwater Seepage Observed.
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 45 feet

GeoPacific Engineering, Inc.
13910 SW Galbreath Drive, Suite 102
Sherwood, Oregon 97140
Tel: (503) 625-4455 Fax: (503) 625-4405

TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-6**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	2.0	100 to 1,000 g				FILL. Gray, well graded SAND with GRAVEL (SM-GM), 1"-0 crushed aggregate, moist to very moist, medium dense.
2	2.5					
3	3.0	100 to 1,000 g				
4	2.5					
5		100 to 1,000 g				
6						
7						
8						
9		100 to 1,000 g				FILL. Gray, well graded SAND with GRAVEL (SM-GM), containing cobble sized rock up to an 8-inch diameter, very moist, dense.
10						
11						FILL. Concrete Slab, Refusal of excavation at - 11 feet bgs.
12						Test Pit Terminated at 11 feet bgs due to refusal on concrete fill. No Groundwater Seepage Observed.
13						
14						
15						
16						
17						

LEGEND

100 to 1,000 g — Bag Sample
5 Gal. Bucket — Bucket Sample
Shelby Tube Sample
Seepage
Water Bearing Zone
Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 45 feet

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TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-7**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	4.0					FILL. Gray, well graded SAND with GRAVEL (GW), 1"-0 crushed aggregate, moist to very moist, dense to very dense. Refusal of excavation at -3 feet bgs.
2	>4.5					
3	>4.5					
4						Test Pit Terminated at 3 feet bgs due to refusal on dense gravel. No Groundwater Seepage Observed.
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 49 feet

GeoPacific Engineering, Inc.
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TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-8**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	4.0					TOPSOIL. Brown, medium stiff, moist, organic SILT (OL-ML), containing blackberry roots to a depth of approximately 8-inches bgs
2	>4.5					FILL. Gray, crushed concrete and concrete rubble, dense to very dense. Caused refusal of excavation at approximately 3-feet bgs.
3	>4.5					
4						Test Pit Terminated at 3 feet bgs due to refusal on concrete fill. No Groundwater Seepage Observed.
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 55 feet

GeoPacific Engineering, Inc.
13910 SW Galbreath Drive, Suite 102
Sherwood, Oregon 97140
Tel: (503) 625-4455 Fax: (503) 625-4405

TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-9**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	1.0					FILL. Dark brown, SILT (ML), very moist, soft, containing concrete fragments, asphalt fragments, bricks, plastic.
2	1.0	100 to 1,000 g				
3	1.0					
4	1.0	100 to 1,000 g				
5						
6						FILL. Light brown to yellowish SILT (ML), very moist, soft, containing concrete fragments, asphalt fragments, bricks, plastic, paper.
7						
8		100 to 1,000 g				
9						
10						
11						FILL. Gray Clayey GRAVEL with Sand (GC), very moist, soft, containing concrete fragments, asphalt fragments, bricks, plastic, paper, fabric. Liquid Limit = 46.7, Plasticity Index = 21.4
12		100 to 1,000 g	47.7	19.8		
13						Test Pit Terminated at 13 feet bgs in undocumented fill. No Groundwater Seepage Observed.
14						
15						
16						
17						

LEGEND

100 to 1,000 g — Bag Sample
5 Gal. Bucket — Bucket Sample
Shelby Tube Sample
Seepage
Water Bearing Zone
Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 53 feet

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Sherwood, Oregon 97140
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TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-10**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	1.0					FILL. Dark brown, SILT (ML), very moist, soft, containing cobble sized rock, concrete and asphalt fragments.
2	1.0	100 to 1,000 g				
3	1.0					
4	1.0	100 to 1,000 g				FILL. Brown, Clayey GRAVEL with Sand (GC), very moist, soft, containing 3"-0 angular rock, and concrete fragments.
5						
6						FILL. Dark gray, Clayey GRAVEL with Sand (GC), very moist, soft, containing up to 8-inch diameter cobble-sized rock, concrete fragments, asphalt fragments, glass, and woody debris including boards.
7						
8						
9						
10						
11						
12						Test Pit Terminated at 12 feet bgs in undocumented fill. No Groundwater Seepage Observed.
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 54 feet

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TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-11**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	2.0					TOPSOIL. Brown, medium stiff, moist, organic SILT (OL-ML), containing blackberry roots to a depth of approximately 6-inches bgs
2	2.5					FILL. Gray, well graded SAND with GRAVEL (GW), 3/4"-0 crushed aggregate, moist, medium dense.
3	1.0					FILL. Brown, Clayey GRAVEL with Sand (GC), very moist, soft, containing 3"-0 angular rock, and concrete fragments.
4	1.0					
5						
6						@ - 6 feet bgs, concrete post with re-bar and 2" to 4" brick fragments
7						
8						soft soil conditions, digs easily
9						
10						@ - 10 feet bgs, woody debris, paint cans, lathe, and painted boards
11						
12						
13						
14						FILL. Brown, organic SILT (OL-ML), medium stiff, moist, soft, containing roots.
15						Test Pit Terminated at 15 feet bgs in undocumented fill. No Groundwater Seepage Observed.
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 52 feet

GeoPacific Engineering, Inc.
13910 SW Galbreath Drive, Suite 102
Sherwood, Oregon 97140
Tel: (503) 625-4455 Fax: (503) 625-4405

TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-12**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	2.0					TOPSOIL. Brown, medium stiff, moist, organic SILT (OL-ML), containing roots to a depth of approximately 6-inches bgs
2	2.5					FILL. Brown, Silty SAND with subrounded gravel (SM-GM), moist, loose, containing various sizes of concrete and asphalt fragments.
3	2.5					
4	3.0					
5						FILL. Basalt boulders encountered. Refusal of excavation at 6-feet bgs.
6						Test Pit Terminated at 6 feet bgs due to refusal on boulders. No Groundwater Seepage Observed.
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample | Bucket Sample | Shelby Tube Sample | Seepage | Water Bearing Zone | Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 52 feet

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Tel: (503) 625-4455 Fax: (503) 625-4405

TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-13**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	4.0					FILL. Gray, well graded SAND with GRAVEL (GW), 3/4"-0 crushed aggregate, moist to very moist, dense to very dense.
2	>4.5					
3	>4.5					FILL. Concrete. Refusal of excavation at -3 feet bgs.
4						Test Pit Terminated at 3 feet bgs due to refusal on concrete. No Groundwater Seepage Observed.
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 38 feet

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Sherwood, Oregon 97140
Tel: (503) 625-4455 Fax: (503) 625-4405

TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-14**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	4.0					FILL. Gray, well graded SAND with GRAVEL (GW), 3/4"-0 crushed aggregate, moist to very moist, dense to very dense. Refusal of excavation at -2 feet bgs.
2	>4.5					Test Pit Terminated at 2 feet bgs due to refusal on dense gravels. No Groundwater Seepage Observed.
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 32 feet

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TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-15**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	4.0					FILL. Gray, well graded SAND with GRAVEL (GW), 3/4"-0 crushed aggregate, moist to very moist, dense to very dense.
2	>4.5					
3	>4.5					FILL. Concrete. Refusal of excavation at -3 feet bgs.
						Test Pit Terminated at 3 feet bgs due to refusal on concrete. No Groundwater Seepage Observed.
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 38 feet

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Sherwood, Oregon 97140
Tel: (503) 625-4455 Fax: (503) 625-4405

TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-16**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	4.0					FILL. Gray, well graded SAND with GRAVEL (GW), 3/4"-0 crushed aggregate, moist to very moist, dense to very dense.
2	>4.5					
3	>4.5					
4						FILL. Concrete. Refusal of excavation at -3 feet bgs.
						Test Pit Terminated at 4 feet bgs due to refusal on concrete. No Groundwater Seepage Observed.
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 36 feet

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TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-17**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	4.0					FILL. Gray, well graded SAND with GRAVEL (GW), 3/4"-0 crushed aggregate, moist to very moist, dense to very dense. Refusal of excavation caused by dense gravels at -5 feet bgs.
2	>4.5					
3						
4	>4.5					
5	>4.5					Test Pit Terminated at 5 feet bgs due to refusal on dense gravels. No Groundwater Seepage Observed. Test pit conducted at base of slope.
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 40 feet

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TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-18**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1	4.0					FILL. Gray, well graded SAND with GRAVEL (GW), 3/4"-0 crushed aggregate, moist to very moist, dense to very dense. Refusal of excavation caused by dense gravels at -5 feet bgs.
2	>4.5					
3						
4	>4.5					
5	>4.5					Test Pit Terminated at 5 feet bgs due to refusal on dense gravels. No Groundwater Seepage Observed. Test pit conducted at base of slope.
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 4/17/15
Logged By: B. Cook
Surface Elevation: 38 feet

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TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-19**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
0						FILL. Concrete fill. Poured slab approximately 6-inches thick. No re-bar observed.
1						FILL. 1.5"-0" aggregate, gray, damp, medium dense to dense, subrounded sand and gravel.
2	2.5					FILL. Sandy CLAY (CL) with Gravel, gray to dark gray, moist, medium stiff, sandy clay containing subrounded gravel to cobble sized rock.
3	2.5					FILL. Elastic SILT (MH), dark gray, moist, medium stiff.
4	2.5	100 to 1,000 g	91.8	29.9		
5						
6						
7						
8						
9						
10						
11						
12						Test Pit Terminated at 12 feet bgs. No Groundwater Seepage Observed.
13						
14						
15						
16						
17						

LEGEND

Date Excavated: 6/30/15
Logged By: B. Cook
Surface Elevation: 36 feet

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TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-20**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1						FILL. Concrete fill. Poured slab approximately 6-inches thick. No re-bar observed.
2						FILL. 1.5"-0" aggregate, gray, damp, medium dense to dense, subrounded sand and gravel.
3						FILL. Sandy CLAY (CL) with Gravel, brown to dark gray, moist, medium stiff, sandy clay containing subrounded gravel to cobble sized rock.
4						FILL. Concrete fill. Poured slab approximately 6-inches thick. No re-bar observed.
5	2.5					FILL. Elastic SILT (MH), dark gray, moist, medium stiff.
6						FILL. Elastic SILT (MH), brown, moist, medium stiff.
7						
8						
9						
10						
11						
12						
13						
14						Test Pit Terminated at 14 feet bgs. No Groundwater Seepage Observed.
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 6/30/15
Logged By: B. Cook
Surface Elevation: 36 feet

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TEST PIT LOG

Project: The Cove Garden Apartments
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Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-21**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
0						FILL. Concrete fill. Poured slab approximately 6-inches thick. No re-bar observed.
1						FILL. 1.5"-0" aggregate, gray, damp, medium dense to dense, subrounded sand and gravel.
2						
3	2.5					FILL. Elastic SILT (MH), dark gray, moist, medium stiff.
4	2.5					FILL. SILT with Sand (ML), brown, moist, medium stiff.
5						
6		100 to 1,000 g	72.0	30.7		
7						
8						
9						
10						
11						
12						
13						Test Pit Terminated at 13 feet bgs. No Groundwater Seepage Observed.
14						
15						
16						
17						

LEGEND

100 to 1,000 g — Bag Sample
5 Gal. Bucket — Bucket Sample
Shelby Tube Sample
Seepage
Water Bearing Zone
Water Level at Abandonment

Date Excavated: 6/30/15
Logged By: B. Cook
Surface Elevation: 38 feet

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TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-22**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
0						FILL. Concrete fill. Poured slab approximately 6-inches thick. No re-bar observed.
1						FILL. 1.5"-0" aggregate, gray, damp, medium dense to dense, subrounded sand and gravel.
2						
3	2.5					FILL. Elastic SILT (MH), dark gray, moist, medium stiff.
4						
5	2.5					FILL. SILT with Sand (ML), brown, moist, medium stiff.
6						
7						
8						
9						
10						
11						
12						
13						Test Pit Terminated at 13 feet bgs. No Groundwater Seepage Observed.
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 6/30/15
Logged By: B. Cook
Surface Elevation: 36 feet

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TEST PIT LOG

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Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-23**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1						FILL. Concrete fill. Poured slab more than 18-inches thick. No re-bar observed. Concrete caused refusal of test pit.
2						Test Pit Terminated at 1.5 feet bgs due to refusal in concrete fill. No Groundwater Seepage Observed.
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 6/30/15
Logged By: B. Cook
Surface Elevation: 36 feet

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TEST PIT LOG

Project: The Cove Garden Apartments
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Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-24**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1						FILL. 1.5"-0" aggregate, gray, damp, dense, subrounded sand and gravel, processed aggregate.
2						
3						FILL. Metal fragments.
4						FILL. Concrete fill. Poured slab approximately 24-inches thick. Contains re-bar, likely represents old building foundation.
5						
6						FILL. 1.5"-0" aggregate, gray, damp, dense, subrounded sand and gravel, processed aggregate.
7						
8						
9						FILL. SILT with Sand (ML), brown, moist, medium stiff.
10						
11						
12						
13						Test Pit Terminated at 13 feet bgs. No Groundwater Seepage Observed.
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 6/30/15
Logged By: B. Cook
Surface Elevation: 30 feet

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TEST PIT LOG

Project: The Cove Garden Apartments
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Project No. 15-3719

Test Pit No. **TP-25**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
1						FILL. Concrete fill. Poured slab approximately 18-inches thick. Contains re-bar, likely represents old building foundation.
2						FILL. 1.5"-0" aggregate, gray, damp, dense, subrounded sand and gravel, processed aggregate.
3						
4						
5						FILL. Elastic SILT (MH), dark gray, moist, medium stiff.
6						FILL. SILT with Sand (ML), brown, moist, medium stiff.
7						
8						
9						Test Pit Terminated at 9 feet bgs. No Groundwater Seepage Observed.
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 6/30/15
Logged By: B. Cook
Surface Elevation: 35 feet

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TEST PIT LOG

Project: The Cove Garden Apartments
Tax Parcel 05022763
Oregon City, Oregon

Project No. 15-3719

Test Pit No. **TP-26**

Depth (ft)	Pocket Penetrometer (tons/ft²)	Sample Type	% Passing No. 200 Sieve	Moisture Content (%)	Water Bearing Zone	Material Description
0						FILL. Asphalt drive. Asphalt is 4-inches thick.
1						FILL. Concrete fill. Poured slab approximately 6-inches thick.
2						FILL. SILT (ML), gray, moist, medium stiff.
3						FILL. 1.5"-0" aggregate, gray, damp, dense, subrounded sand and gravel, processed aggregate.
4						FILL. Concrete fill. Poured slab approximately 6-inches thick.
5						FILL. 1.5"-0" aggregate, gray, damp, dense, subrounded sand and gravel, processed aggregate. Caused refusal of excavation.
6						Test Pit Terminated at 5 feet bgs due to refusal. Utilized a hydraulic rock chipper to penetrate through concrete rubble. No Groundwater Seepage Observed.
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

LEGEND

Bag Sample

Bucket Sample


Shelby Tube Sample


Seepage


Water Bearing Zone


Water Level at Abandonment

Date Excavated: 6/30/15
Logged By: B. Cook
Surface Elevation: 35 feet

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LABORATORY ANALYSIS

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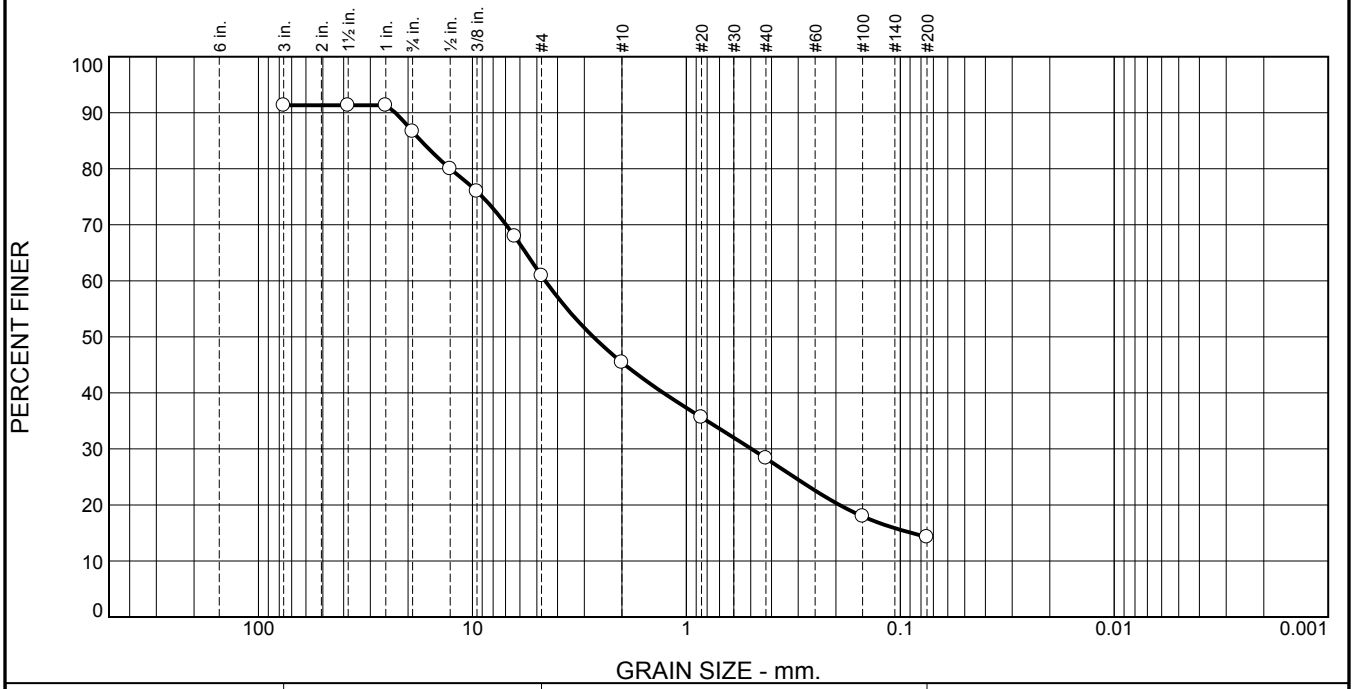
Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
	4.7	25.7	15.5	17.1	14.0	14.3	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3	91.3		
1.5	91.3		
1	91.3		
.75	86.6		
.5	80.0		
.375	76.0		
.25	67.9		
#4	60.9		
#10	45.4		
#20	35.6		
#40	28.3		
#100	18.0		
#200	14.3		

* (no specification provided)

Material Description

Silty Sand with Gravel

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-a

Coefficients

D_{90}= 22.9220 D_{85}= 17.4092 D_{60}= 4.5705
D_{50}= 2.7231 D_{30}= 0.4965 D_{15}= 0.0884
D_{10}= C_u= C_c=

Remarks

Moisture 7.5%
S15-46

Date Received: **Date Tested:** 4.25.2015

Tested By: MTB

Checked By:

Title:

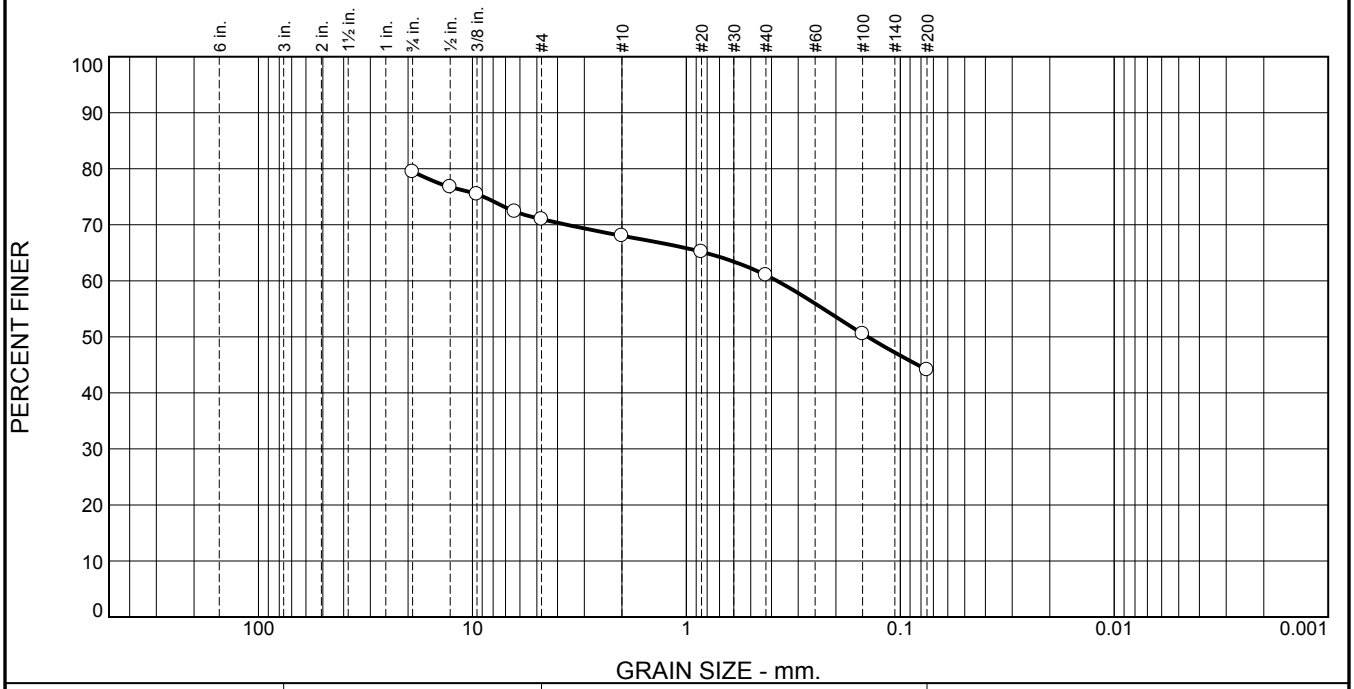
Sample Number: TP-4 **Depth:** 5' **Date Sampled:** 4.17.2015

GEOPACIFIC ENGINEERING, INC.

Client: Grand Peak Properties
Project: The Cove Garden Apts

Project No: 15-3719 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		8.5	3.0	7.0	16.9	44.1	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	79.5		
.5	76.7		
.375	75.5		
.25	72.4		
#4	71.0		
#10	68.0		
#20	65.2		
#40	61.0		
#100	50.5		
#200	44.1		

* (no specification provided)

Material Description

Clayey Gravel with Sand

Atterberg Limits (ASTM D 4318)

PL= 18.8 **LL=** 40.9 **PI=** 22.1

Classification

USCS (D 2487)= GC **AASHTO (M 145)=** A-7-6(5)

Coefficients

D_{90}= D_{85}= D_{60}= 0.3772
D_{50}= 0.1421 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Moisture 22.3%
S15-47

Date Received: **Date Tested:** 4.25.2015

Tested By: MTB

Checked By:

Title:

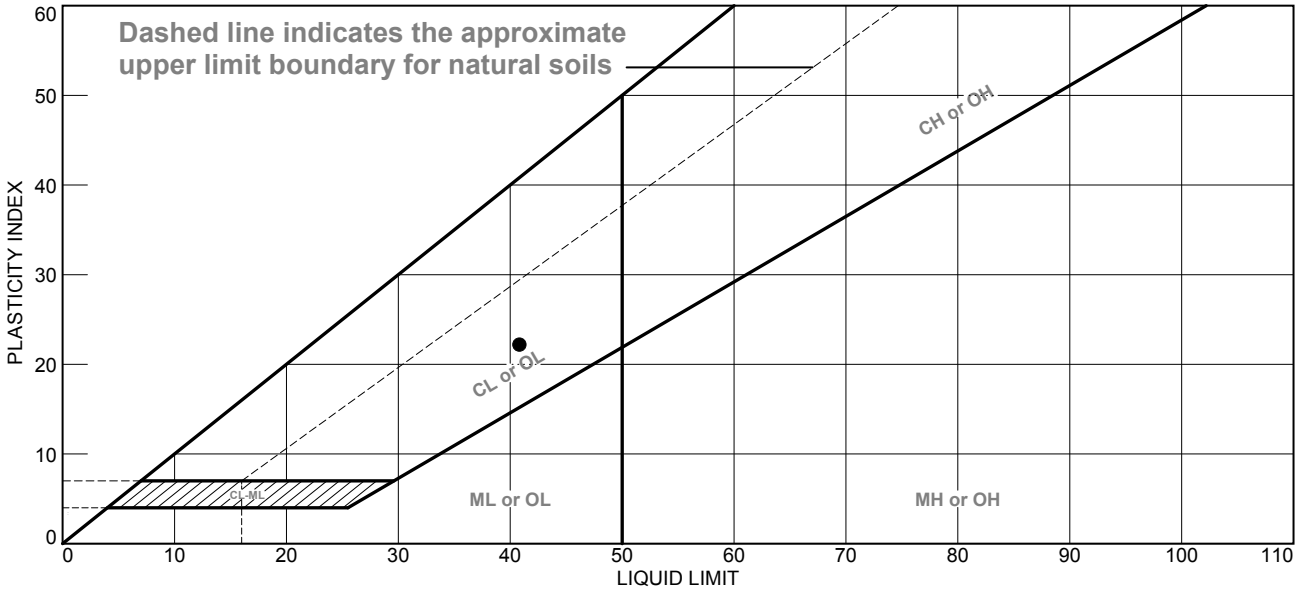
Sample Number: TP-5 5.1 **Depth:** 6' **Date Sampled:** 4.17.2015

GEOPACIFIC ENGINEERING, INC.

Client: Grand Peak Properties
Project: The Cove Garden Apts

Project No: 15-3719 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey Gravel with Sand	40.9	18.8	22.1	61.0	44.1	GC

Project No. 15-3719 **Client:** Grand Peak Properties

Project: The Cove Garden Apts

Sample Number: TP-5 5.1 **Depth:** 6'

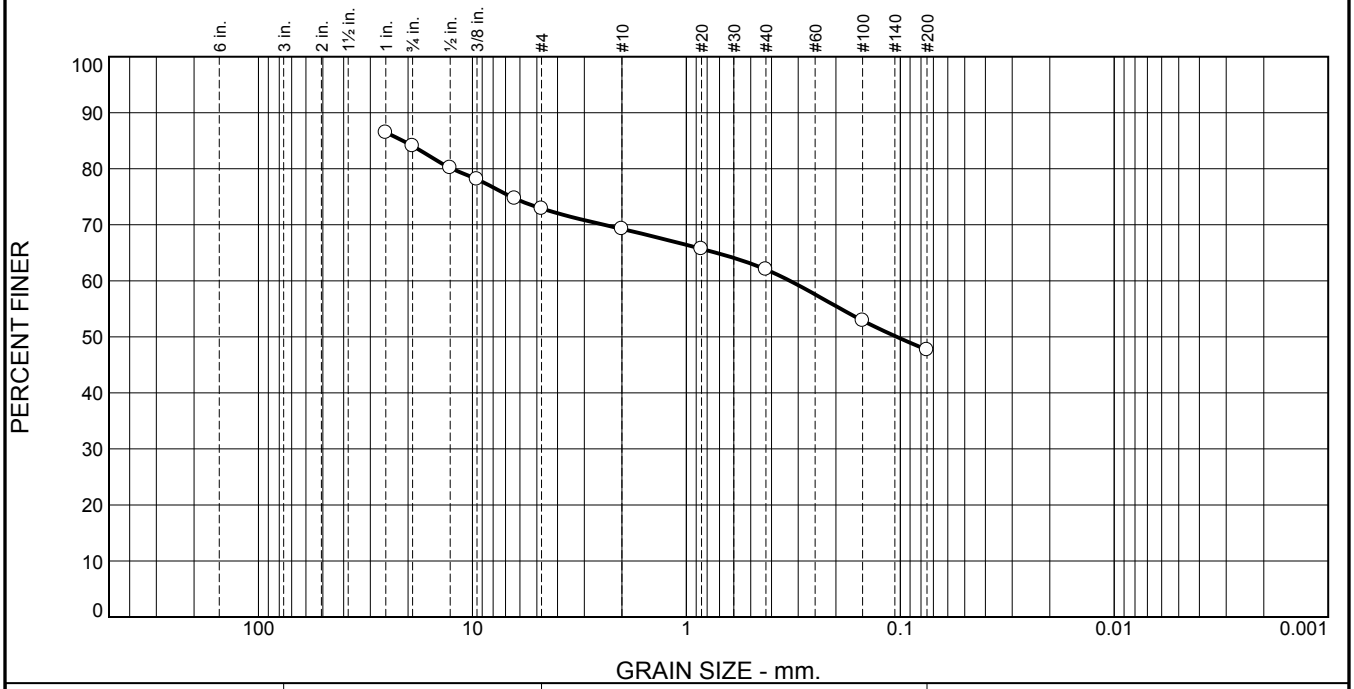
Remarks:
●S15-47

GEOPACIFIC ENGINEERING, INC.

Figure

Tested By: MTB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
		11.2	3.6	7.3	14.3	47.7	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1	86.5		
.75	84.1		
.5	80.2		
.375	78.1		
.25	74.7		
#4	72.9		
#10	69.3		
#20	65.7		
#40	62.0		
#100	52.9		
#200	47.7		

* (no specification provided)

Material Description

Clayey Gravel with Sand

Atterberg Limits (ASTM D 4318)

PL= 25.3 **LL=** 46.7 **PI=** 21.4

Classification

USCS (D 2487)= GC **AASHTO (M 145)=** A-7-6(7)

Coefficients

D_{90}= D_{85}= 21.1614 D_{60}= 0.3279
D_{50}= 0.1039 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Moisture 19.8%
S15-48

Date Received: **Date Tested:** 4.25.2015

Tested By: MTB

Checked By:

Title:

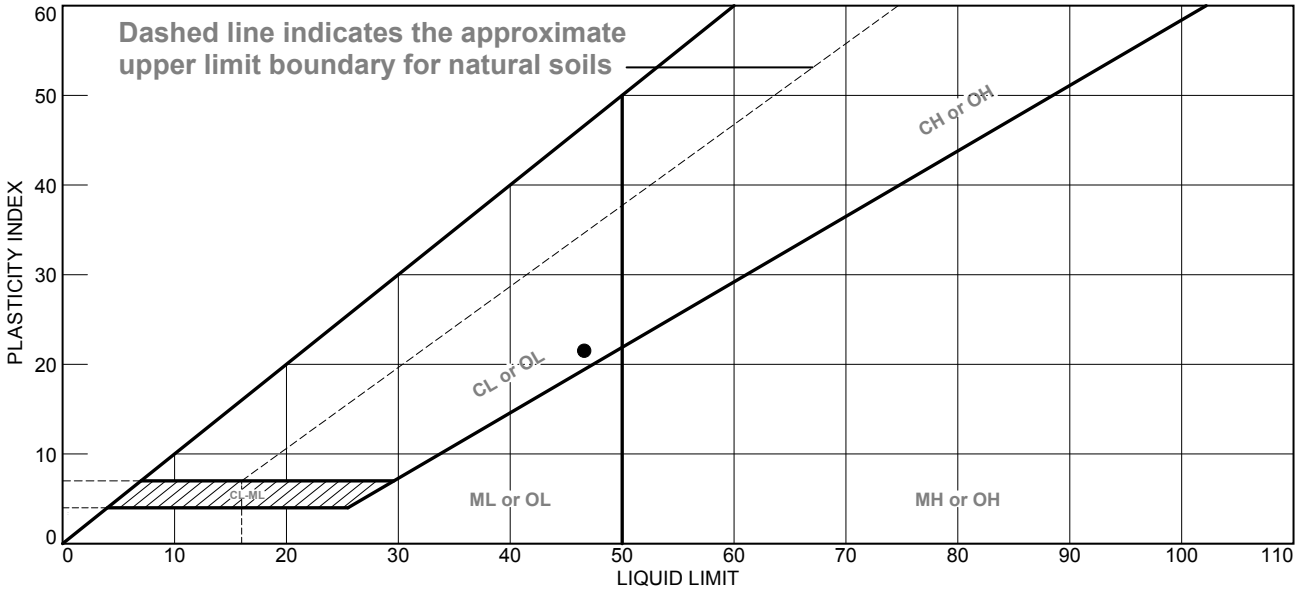
Sample Number: TP-9 **Depth:** 12' **Date Sampled:** 4.17.2015

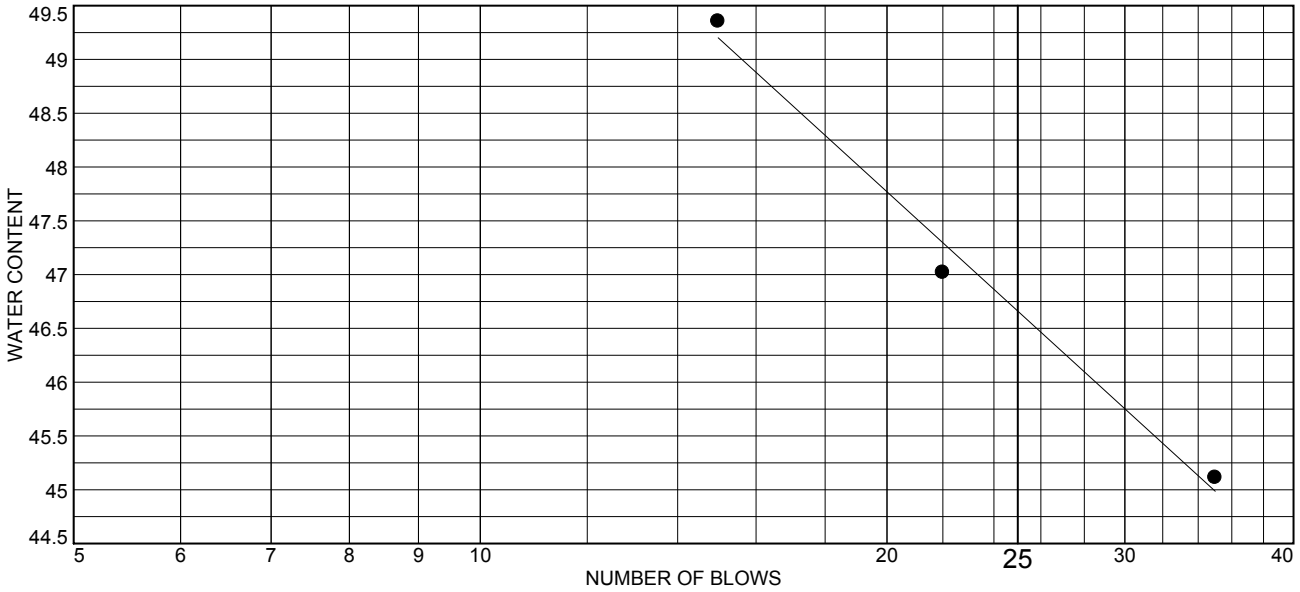
GEOPACIFIC ENGINEERING, INC.

Client: Grand Peak Properties
Project: The Cove Garden Apts

Project No: 15-3719 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey Gravel with Sand	46.7	25.3	21.4	62.0	47.7	GC

Project No. 15-3719 **Client:** Grand Peak Properties

Project: The Cove Garden Apts

Sample Number: TP-9 **Depth:** 12'

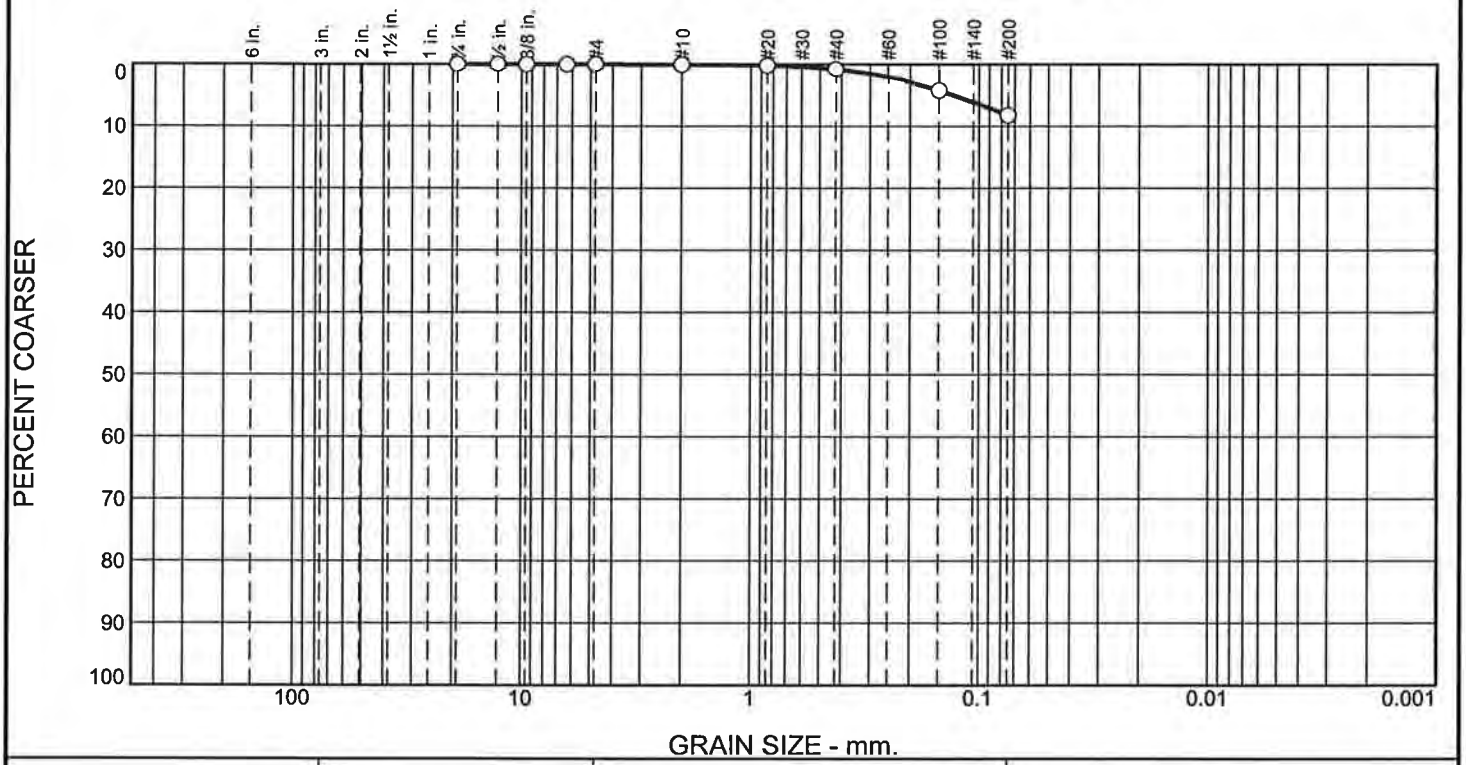
Remarks:
●S15-48

GEOPACIFIC ENGINEERING, INC.

Figure

Tested By: MTB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.7	7.4	91.8	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#10	99.9		
#20	99.8		
#40	99.2		
#100	95.9		
#200	91.8		

* (no specification provided)

Material Description

Elastic Silt

Atterberg Limits (ASTM D 4318)

PL= 35 LL= 65 PI= 30

Classification

USCS (D 2487)= MH AASHTO (M 145)= A-7-5(34)

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Moisture 29.9%
S15-115

Date Received: **Date Tested:** 7.6.2015

Tested By: SJC

Checked By: MTB

Title: Lab Manager

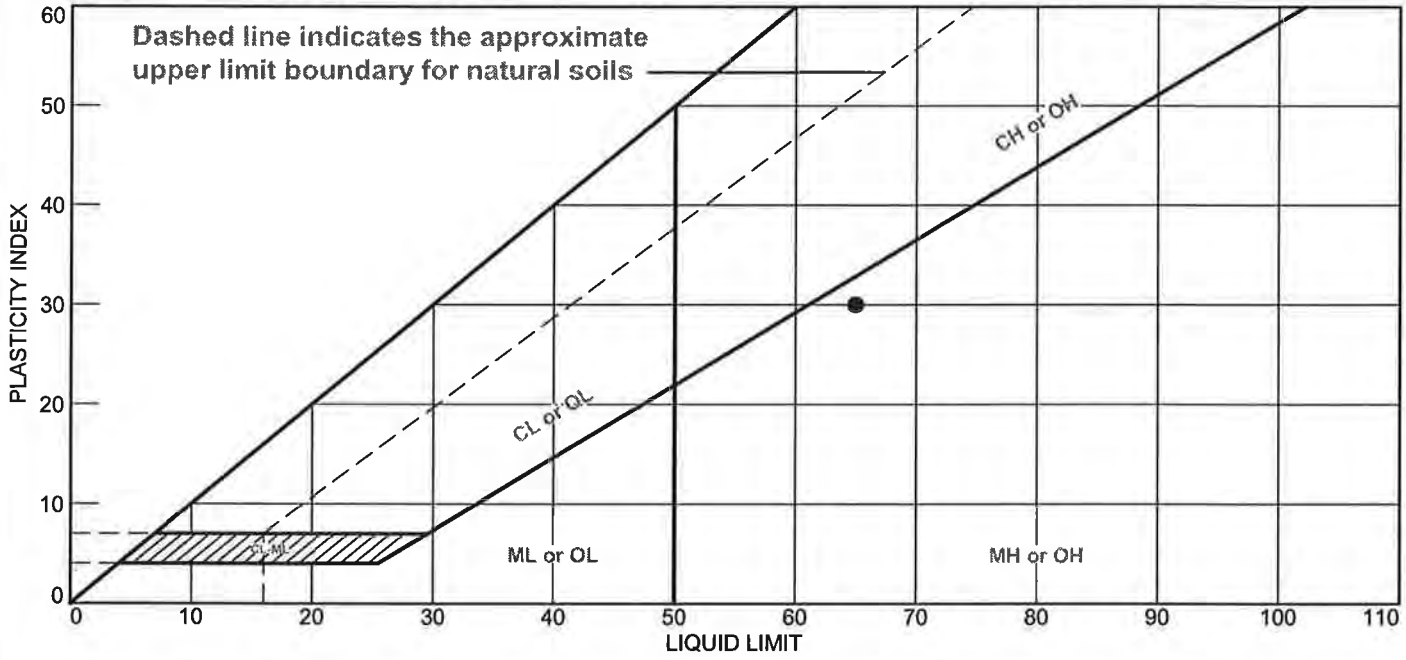
Sample Number: TP-19 19.1 **Depth:** 4' **Date Sampled:** 6.30.2015

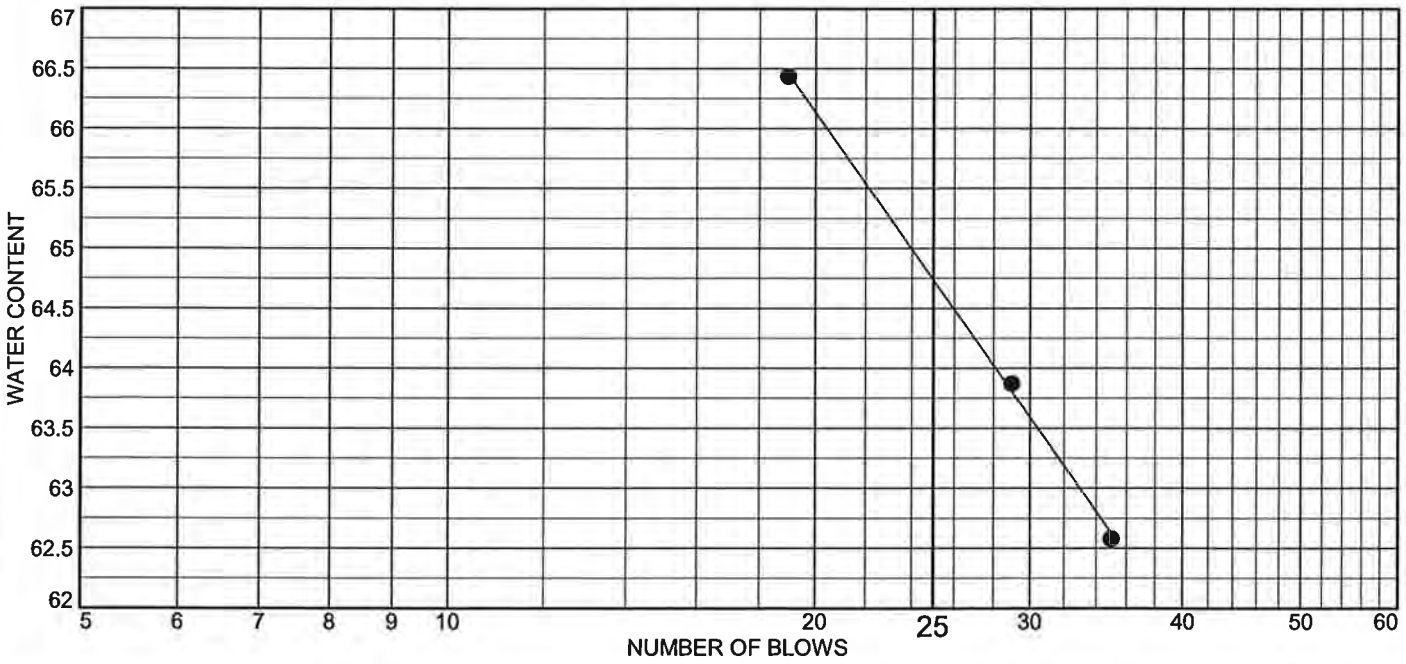
GEOPACIFIC ENGINEERING, INC.

Client: Grand Peak Properties
Project: The Cove Garden Apts

Project No: 15-3719 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Elastic Silt	65	35	30	99.2	91.8	MH

Project No. 15-3719 **Client:** Grand Peak Properties

Project: The Cove Garden Apts

Sample Number: TP-19 19.1 **Depth:** 4'

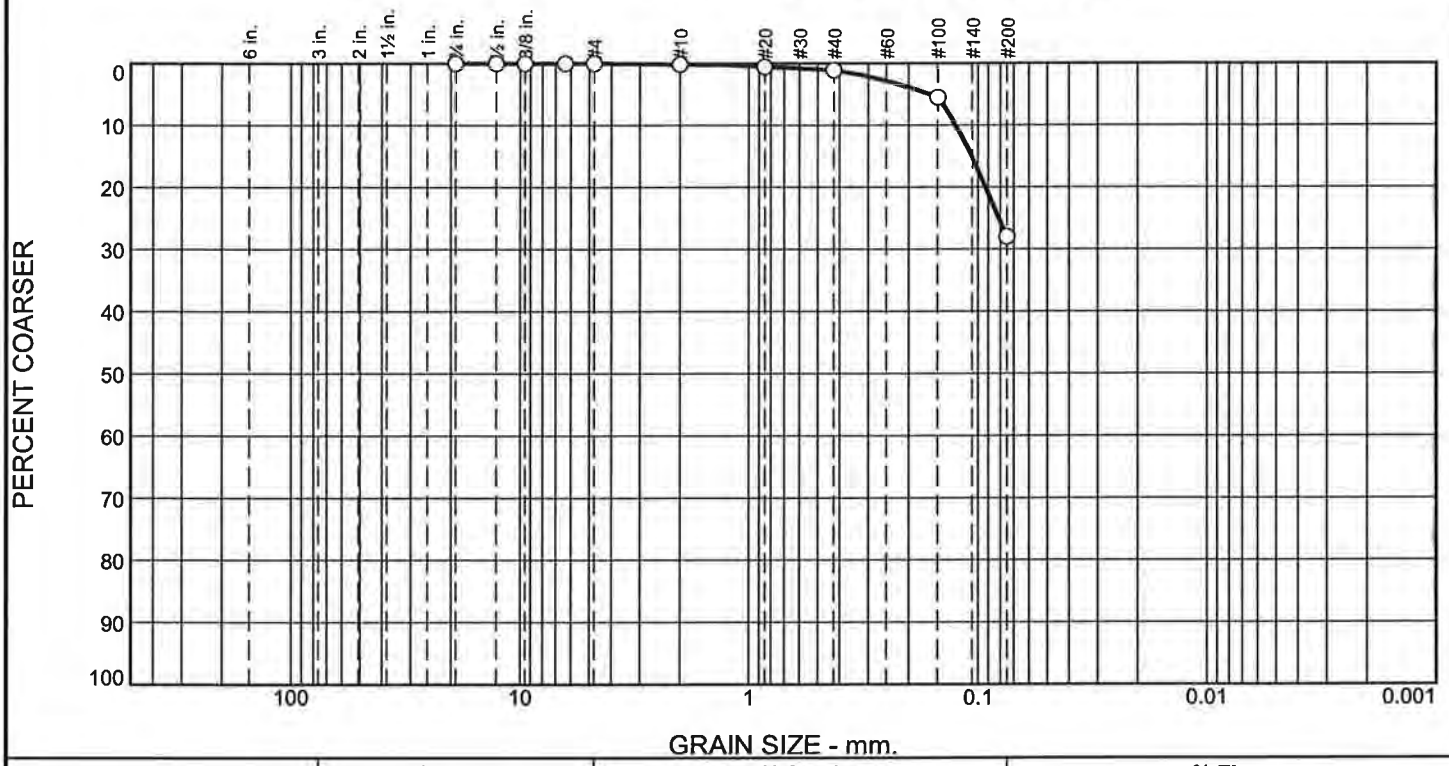
Remarks:
● S15-115

GEOPACIFIC ENGINEERING, INC.

Figure

Tested By: SJC **Checked By:** MTB

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.0	26.9	72.0	

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
.75	100.0		
.5	100.0		
.375	100.0		
.25	100.0		
#4	100.0		
#10	99.9		
#20	99.5		
#40	98.9		
#100	94.5		
#200	72.0		

* (no specification provided)

Material Description

Silt with Sand

Atterberg Limits (ASTM D 4318)

PL= 31 LL= 47 PI= 16

Classification

USCS (D 2487)= ML AASHTO (M 145)= A-7-5(12)

Coefficients

D_{90}= 0.1251 D_{85}= 0.1067 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Moisture 30.7%
S15-114

Date Received: **Date Tested:** 7.6.2015

Tested By: SJC

Checked By: MTB

Title: Lab Manager

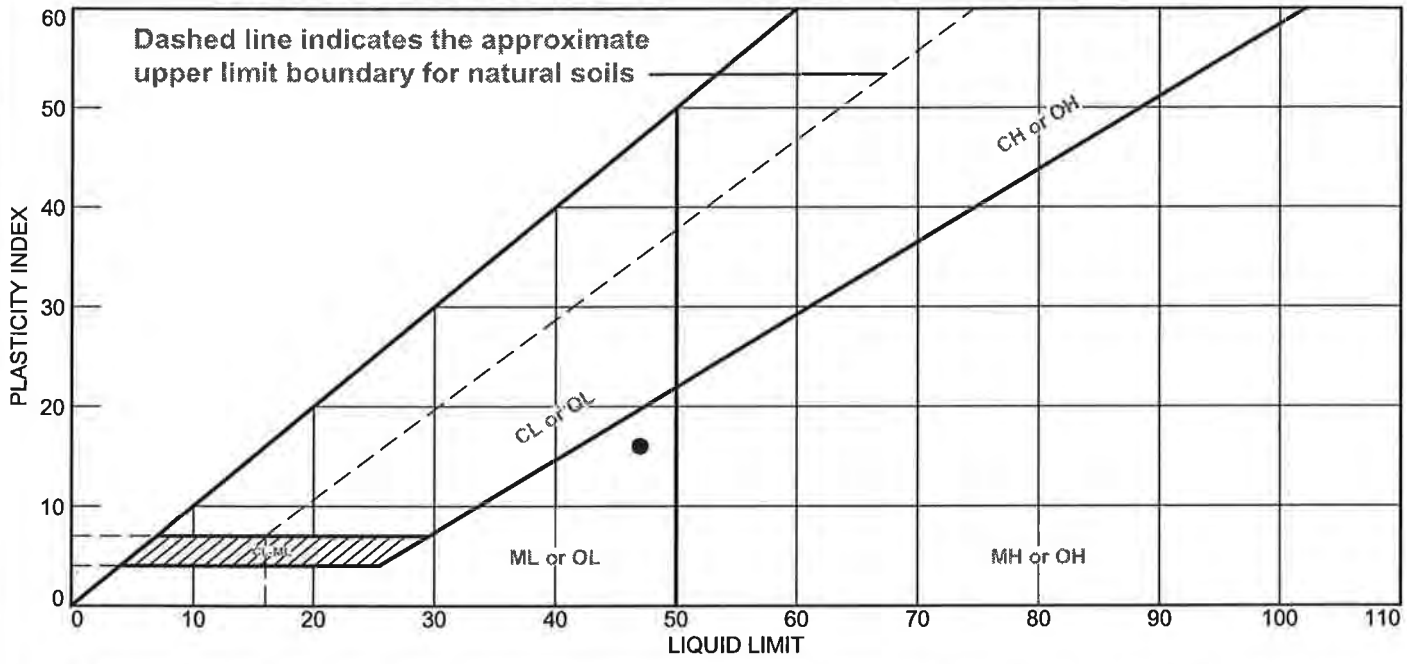
Sample Number: TP-21 21.1 **Depth:** 6' **Date Sampled:** 6.30.2015

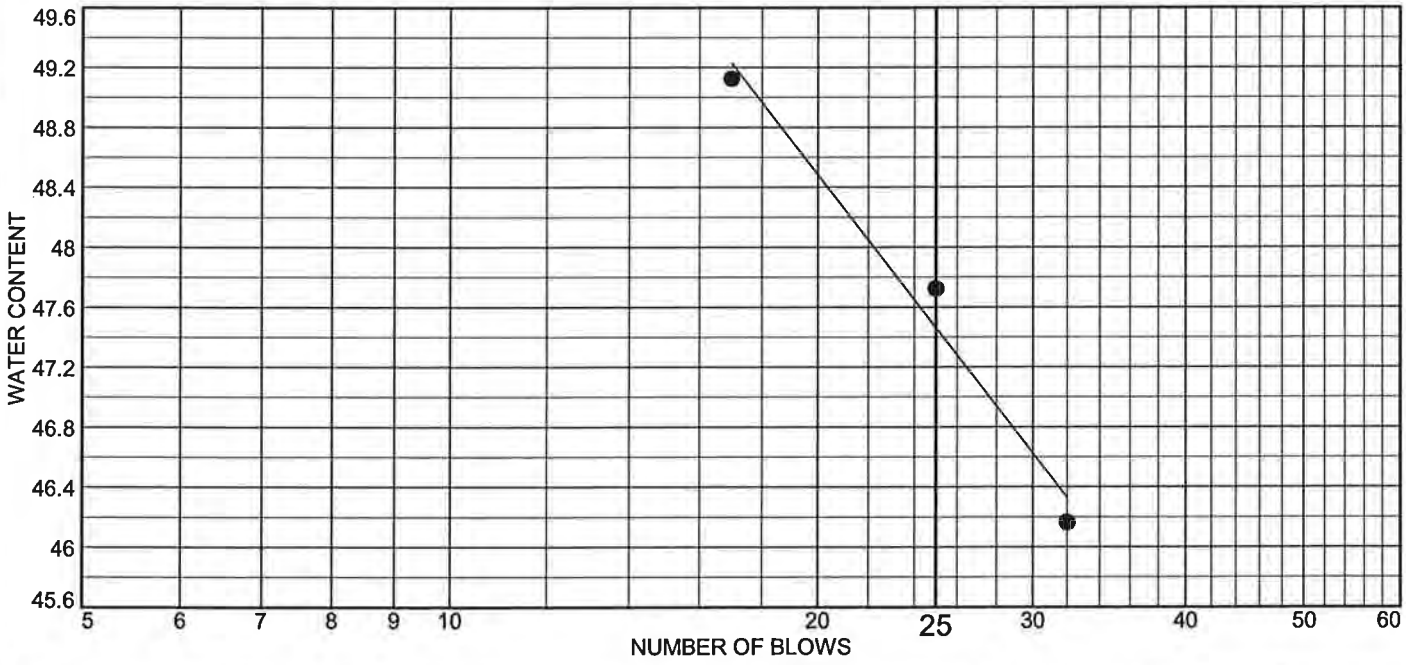
GEOPACIFIC ENGINEERING, INC.

Client: Grand Peak Properties
Project: The Cove Garden Apts

Project No: 15-3719 **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silt with Sand	47	31	16	98.9	72.0	ML

Project No. 15-3719 **Client:** Grand Peak Properties

Project: The Cove Garden Apts

Sample Number: TP-21 21.1 **Depth:** 6'

Remarks:
● S15-114

GEOPACIFIC ENGINEERING, INC.

Figure

Tested By: SJC **Checked By:** MTB

Real-World Geotechnical Solutions
Investigation • Design • Construction Support

SITE RESEARCH

14835 SW 72nd Avenue
Portland, Oregon 97224

Tel (503) 598-8445
Fax (503) 941-9281

CLAC 66529

12-10-2009

STATE OF OREGON
MONITORING WELL REPORT

(as required by ORS 537.765 & OAR 690-240-0395)

WELL LABEL # L 98917

START CARD # 1006424

(1) LAND OWNER

Owner Well I.D. MW-4

First Name _____ Last Name P09084-3141

Company PARKER POND LLC SCOTT PARKER

Address PO BOX AF

City SCAPPOOSE State OR Zip 97056

(2) TYPE OF WORK

☒ New ☐ Deepening ☐ Conversion ☐ Alteration (repair/recondition) ☐ Abandonment

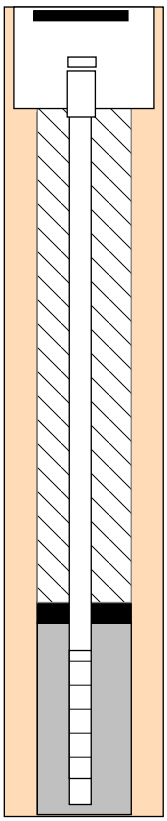
(3) DRILL METHOD

☐ Rotary Air ☐ Rotary Mud ☐ Cable ☒ Hollow Stem Auger ☐ Cable Mud ☐ Reverse Rotary ☐ Other _____

(4) CONSTRUCTION

Piezometer Well ☐

Depth of Completed Well 47 ft. Special Standard ☐



MONUMENT/VAULT Below Ground
From 0 To 1

BORE HOLE
Diameter 11 From 0 To 47

CASING
Dia. 2 From ☐ 0 To 26.5
Gauge SCH 40 Wld ☐ Thrd ☒
Material ◯ Steel ◉ Plastic

LINER
Dia. _____ From ☐ _____ To _____
Gauge _____ Wld ☐ Thrd ☐
Material ◯ Steel ◯ Plastic

SEAL
From 0 To 23.5
Material Bentonite Chips
Amount 21.00 S Grout weight _____

SCREEN
Casing/Liner _____ Material PVC
Diameter 2 From 26.5 To 46.5
Slot Size .010

FILTER
From 23.5 To 47 Material SAND Size of pack 10/20

(5) WELL TESTS

◯ Pump ◯ Bailer ◯ Air ◯ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)

Temperature 56 °F Lab analysis ☐ Yes By _____

Supervising Geologist/Engineer _____

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(6) LOCATION OF WELL (legal description)

County **Clackamas** Twp **2.00** S N/S Range **2.00** E E/W WM
Sec **29** **NE** 1/4 of the **NE** 1/4 Tax Lot **1900**
Tax Map Number _____ Lot _____
Lat ___ ° ___ ' ___ " or **45.36998600** DMS or DD
Long ___ ° ___ ' ___ " or **-122.59924500** DMS or DD

◉ Street address of well ◯ Nearest address

16421 MAIN ST
OREGON CITY, OR

(7) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening			☐	
Completed Well	07-31-2009		☐	34

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 34

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
07-31-2009	34	47			☐	34
					☐	
					☐	
					☐	
					☐	

(8) WELL LOG

Ground Elevation _____

Material	From	To
CONCRETE	0	1
CONCRETE FILL	1	18
SAND SILT	18	31
GRAVELLY COBBLES	31	47

Date Started 07-31-2009 Completed 07-31-2009

(unbonded) Monitor Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon monitoring well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number 10328 Date 12-10-2009

Electronically Submitted
Signed JOEL R WELSH (E-filed)

(bonded) Monitor Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon monitoring well construction standards. This report is true to the best of my knowledge and belief.

License Number 10357 Date 12-10-2009

Electronically Submitted
Signed TERRENCE JACQUES (E-filed)

Contact Info (optional) _____

ORIGINAL - WATER RESOURCES DEPARTMENT

THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK

Form Version: 0.95

Map of well


Agnes Ave
E Portland Fwy
Google
2009
Eye alt 1858 ft
Edison Ave
Main St
Image © 2009 Metro, Portland Oregon
© 2009 Tele Atlas
45°22'09.58" N 122°35'45.33" W elev 14 ft
527 ft
205
Imagery Date: Jul 12, 2007

CLAC 66528

12-10-2009

STATE OF OREGON
MONITORING WELL REPORT

(as required by ORS 537.765 & OAR 690-240-0395)

WELL LABEL # L 98916

START CARD # 1006423

(1) LAND OWNER

Owner Well I.D. MW-3

First Name _____ Last Name P09084-3141

Company PARKER POND LLC SCOTT PARKER

Address PO BOX AF

City SCAPPOOSE State OR Zip 97056

(2) TYPE OF WORK

☒ New ☐ Deepening ☐ Conversion
☐ Alteration (repair/recondition) ☐ Abandonment

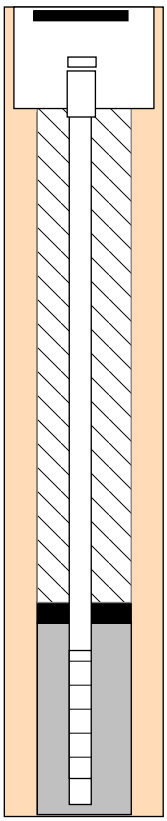
(3) DRILL METHOD

☐ Rotary Air ☐ Rotary Mud ☐ Cable ☒ Hollow Stem Auger ☐ Cable Mud
☐ Reverse Rotary ☐ Other _____

(4) CONSTRUCTION

Piezometer Well ☐

Depth of Completed Well 47 ft. Special Standard ☐



MONUMENT/VAULT Below Ground
From 0 To 1

BORE HOLE
Diameter 11 From 0 To 47

CASING
Dia. 2 From ☐ 0 To 26.5
Gauge SCH 40 Wld ☐ Thrd ☒
Material ◯ Steel ◉ Plastic

LINER
Dia. _____ From ☐ _____ To _____
Gauge _____ Wld ☐ Thrd ☐
Material ◯ Steel ◯ Plastic

SEAL
From 0 To 23.5
Material Bentonite Chips
Amount 21.00 S Grout weight _____

SCREEN
Casing/Liner _____ Material PVC
Diameter 2 From 26.5 To 46.5
Slot Size .010

FILTER
From 23.5 To 47 Material SAND Size of pack 10/20

(5) WELL TESTS

◯ Pump ◯ Bailer ◯ Air ◯ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)

Temperature 56 °F Lab analysis ☐ Yes By _____

Supervising Geologist/Engineer _____

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(6) LOCATION OF WELL (legal description)

County **Clackamas** Twp **2.00** S N/S Range **2.00** E E/W WM
Sec **29** **NE** 1/4 of the **NE** 1/4 Tax Lot **1900**
Tax Map Number _____ Lot _____
Lat ___ ° ___ ' ___ " or **45.36998600** DMS or DD
Long ___ ° ___ ' ___ " or **-122.59924500** DMS or DD

◉ Street address of well ◯ Nearest address

16421 MAIN ST
OREGON CITY, OR

(7) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening			☐	
Completed Well	07-31-2009		☐	34

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 34

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
07-31-2009	34	47			☐	34
					☐	
					☐	
					☐	
					☐	

(8) WELL LOG

Ground Elevation _____

Material	From	To
CONCRETE	0	1
CONCRETE FILL	1	18
SAND SILT	18	31
GRAVELLY COBBLES	31	47

Date Started 07-31-2009 Completed 07-31-2009

(unbonded) Monitor Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon monitoring well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number 10328 Date 12-10-2009

Electronically Submitted
Signed JOEL R WELSH (E-filed)

(bonded) Monitor Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon monitoring well construction standards. This report is true to the best of my knowledge and belief.

License Number 10357 Date 12-10-2009

Electronically Submitted
Signed TERRENCE JACQUES (E-filed)

Contact Info (optional) _____

Map of well


Agnes Ave
I-205 Portland Fwy
Google
2009
Eye alt 1858 ft
Edison Ave
Main St
MW-4
MW-3
MW-2
MW-1
Image © 2009 Metro, Portland Oregon
© 2009 Tele Atlas
45°22'09.58" N 122°35'45.33" W elev 14 ft
527 ft
205
Imagery Date: Jul 12, 2007

CLAC 66526

12-10-2009

STATE OF OREGON
MONITORING WELL REPORT

(as required by ORS 537.765 & OAR 690-240-0395)

WELL LABEL # L 98914

START CARD # 1006421

(1) LAND OWNER

Owner Well I.D. MW-1

First Name _____ Last Name P09084-3141

Company PARKER POND LLC SCOTT PARKER

Address PO BOX AF

City SCAPPOOSE State OR Zip 97056

(2) TYPE OF WORK

☒ New ☐ Deepening ☐ Conversion
☐ Alteration (repair/recondition) ☐ Abandonment

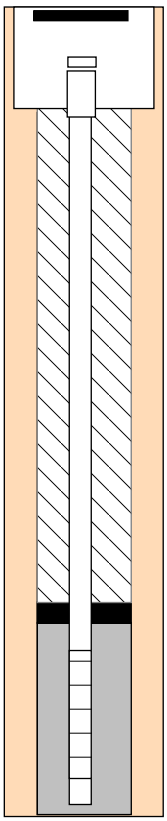
(3) DRILL METHOD

☐ Rotary Air ☐ Rotary Mud ☐ Cable ☒ Hollow Stem Auger ☐ Cable Mud
☐ Reverse Rotary ☐ Other _____

(4) CONSTRUCTION

Piezometer Well ☐

Depth of Completed Well 50 ft. Special Standard ☐



MONUMENT/VAULT Below Ground
From 0 To 1

BORE HOLE
Diameter 11 From 0 To 50

CASING
Dia. 2 From ☐ 0 To 29.5
Gauge SCH 40 Wld ☐ Thrd ☒
Material ◯ Steel ◉ Plastic

LINER
Dia. _____ From ☐ _____ To _____
Gauge _____ Wld ☐ Thrd ☐
Material ◯ Steel ◯ Plastic

SEAL
From 0 To 27.5
Material Bentonite Chips
Amount 24.00 S Grout weight _____

SCREEN
Casing/Liner _____ Material PVC
Diameter 2 From 29.5 To 49.5
Slot Size .010

FILTER
From 27.5 To 50 Material SAND Size of pack 10/20

(5) WELL TESTS

◯ Pump ◯ Bailer ◯ Air ◯ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)

Temperature 56 °F Lab analysis ☐ Yes By _____

Supervising Geologist/Engineer _____

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(6) LOCATION OF WELL (legal description)

County **Clackamas** Twp **2.00** S N/S Range **2.00** E E/W WM
Sec **29** **NE** 1/4 of the **NE** 1/4 Tax Lot **1900**
Tax Map Number _____ Lot _____
Lat ___ ° ___ ' ___ " or **45.36998600** DMS or DD
Long ___ ° ___ ' ___ " or **-122.59924500** DMS or DD

◉ Street address of well ◯ Nearest address

16421 MAIN ST
OREGON CITY, OR

(7) STATIC WATER LEVEL

	Date	SWL(psi)	+ SWL(ft)
Existing Well / Predeepening			☐
Completed Well	07-29-2009		☐ 34

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 34

SWL Date	From	To	Est Flow	SWL(psi)	+ SWL(ft)
07-29-2009	34	50			☐ 34
					☐
					☐
					☐
					☐

(8) WELL LOG

Ground Elevation _____

Material	From	To
CONCRETE	0	1
CONCRETE FILL	1	18
SAND SILT	18	31
GRAVELLY COBBLES	31	50

Date Started 07-29-2009 Completed 07-29-2009

(unbonded) Monitor Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon monitoring well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number 10328 Date 12-10-2009

Electronically Submitted
Signed JOEL R WELSH (E-filed)

(bonded) Monitor Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon monitoring well construction standards. This report is true to the best of my knowledge and belief.

License Number 10357 Date 12-10-2009

Electronically Submitted
Signed TERRENCE JACQUES (E-filed)

Contact Info (optional) _____

ORIGINAL - WATER RESOURCES DEPARTMENT

THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK

Form Version: 0.95

Map of well


Agnes Ave
I-205 Portland Fwy
Google
2009
Eye alt 1858 ft
Edison Ave
Main St
Image © 2009 Metro, Portland Oregon
© 2009 Tele Atlas
45°22'09.58" N 122°35'45.33" W elev 14 ft
527 ft
205
Imagery Date: Jul 12, 2007

CLAC 66527

12-10-2009

STATE OF OREGON
MONITORING WELL REPORT

(as required by ORS 537.765 & OAR 690-240-0395)

WELL LABEL # L 98915

START CARD # 1006422

(1) LAND OWNER

Owner Well I.D. MW-2

First Name _____ Last Name P09084-3141

Company PARKER POND LLC SCOTT PARKER

Address PO BOX AF

City SCAPPOOSE State OR Zip 97056

(2) TYPE OF WORK

☒ New ☐ Deepening ☐ Conversion ☐ Alteration (repair/recondition) ☐ Abandonment

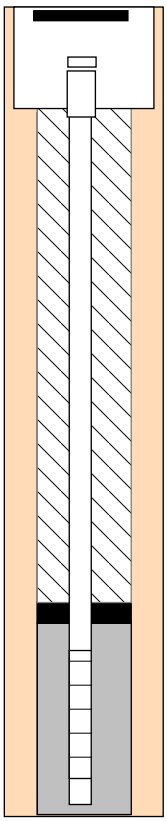
(3) DRILL METHOD

☐ Rotary Air ☐ Rotary Mud ☐ Cable ☒ Hollow Stem Auger ☐ Cable Mud ☐ Reverse Rotary ☐ Other _____

(4) CONSTRUCTION

Piezometer Well ☐

Depth of Completed Well 50 ft. Special Standard ☐



MONUMENT/VAULT Below Ground
From 0 To 1

BORE HOLE
Diameter 11 From 0 To 50

CASING
Dia. 2 From ☐ 0 To 29.5
Gauge SCH 40 Wld ☐ Thrd ☒
Material ◯ Steel ◉ Plastic

LINER
Dia. _____ From ☐ _____ To _____
Gauge _____ Wld ☐ Thrd ☐
Material ◯ Steel ◯ Plastic

SEAL
From 0 To 27.5
Material Bentonite Chips
Amount 24.00 S Grout weight _____

SCREEN
Casing/Liner _____ Material PVC
Diameter 2 From 29.5 To 49.5
Slot Size .010

FILTER
From 27.5 To 50 Material SAND Size of pack 10/20

(5) WELL TESTS

◯ Pump ◯ Bailer ◯ Air ◯ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)

Temperature 56 °F Lab analysis ☐ Yes By _____

Supervising Geologist/Engineer _____

Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(6) LOCATION OF WELL (legal description)

County **Clackamas** Twp **2.00** S N/S Range **2.00** E E/W WM
Sec **29** **NE** 1/4 of the **NE** 1/4 Tax Lot **1900**
Tax Map Number _____ Lot _____
Lat ___ ° ___ ' ___ " or **45.36998600** DMS or DD
Long ___ ° ___ ' ___ " or **-122.59924500** DMS or DD

◉ Street address of well ◯ Nearest address

16421 MAIN ST
OREGON CITY, OR

(7) STATIC WATER LEVEL

	Date	SWL(psi)	+ SWL(ft)
Existing Well / Predeepening			☐
Completed Well	07-30-2009		☐ 34

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 34

SWL Date	From	To	Est Flow	SWL(psi)	+ SWL(ft)
07-30-2009	34	50			☐ 34
					☐
					☐
					☐
					☐

(8) WELL LOG

Ground Elevation _____

Material	From	To
CONCRETE	0	1
CONCRETE FILL	1	18
SAND SILT	18	31
GRAVELLY COBBLES	31	50

Date Started 07-30-2009 Completed 07-30-2009

(unbonded) Monitor Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon monitoring well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number 10328 Date 12-10-2009

Electronically Submitted
Signed JOEL R WELSH (E-filed)

(bonded) Monitor Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon monitoring well construction standards. This report is true to the best of my knowledge and belief.

License Number 10357 Date 12-10-2009

Electronically Submitted
Signed TERRENCE JACQUES (E-filed)

Contact Info (optional) _____

ORIGINAL - WATER RESOURCES DEPARTMENT

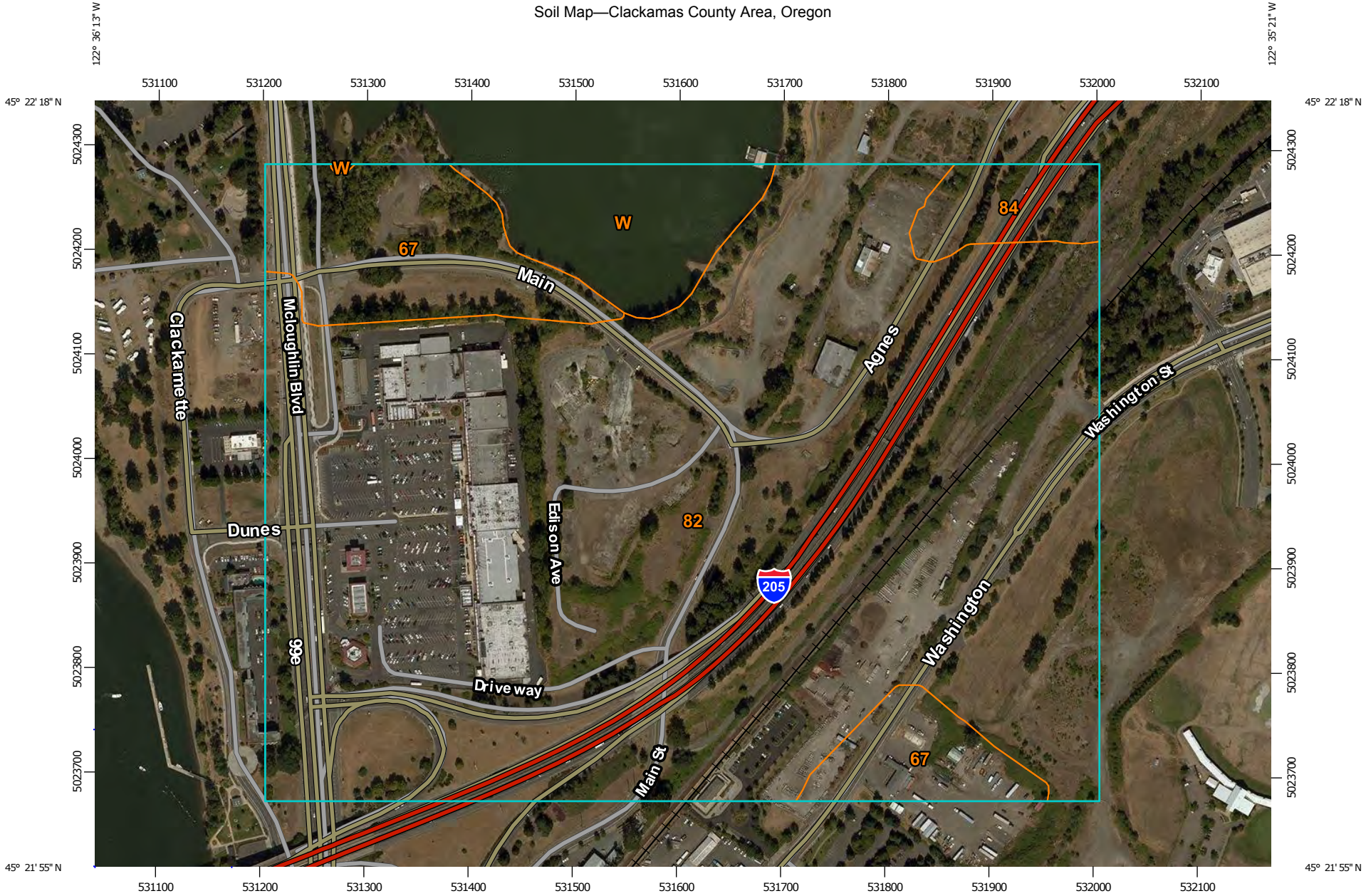
THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK

Form Version: 0.95

Map of well


Agnes Ave
I Portland Fwy
Google
2009
Eye alt 1858 ft
Edison Ave
Main St
Image © 2009 Metro, Portland Oregon
© 2009 Tele Atlas
45°22'09.58" N 122°35'45.33" W elev 14 ft
527 ft
205
Imagery Date: Jul 12, 2007

Soil Map—Clackamas County Area, Oregon



Map Scale: 1:5,160 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Clackamas County Area, Oregon
Survey Area Data: Version 9, Sep 19, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 26, 2014—Sep 5, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Clackamas County Area, Oregon (OR610)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
67	Newberg fine sandy loam	13.0	10.7%
82	Urban land	97.9	80.8%
84	Wapato silty clay loam	3.3	2.7%
W	Water	6.9	5.7%
Totals for Area of Interest		**121.1**	**100.0%**

USGS Design Maps Summary Report

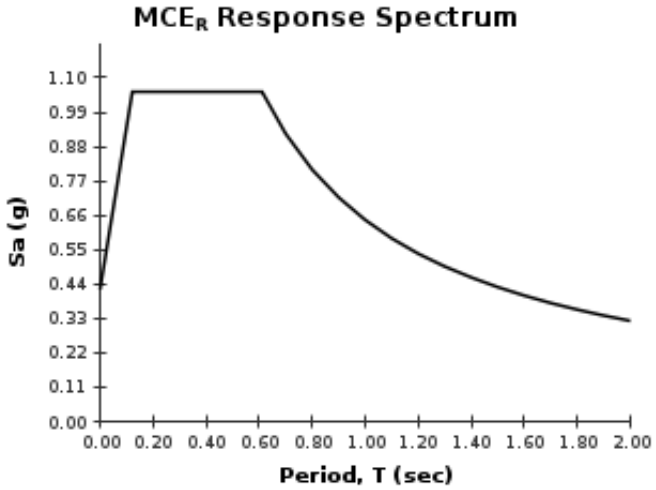
User–Specified Input

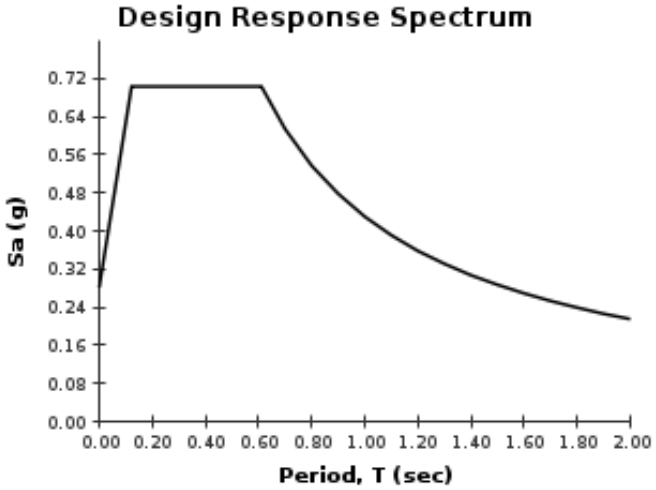
Report Title	15-3719, The Cove Garden Apartments Tue May 5, 2015 20:37:08 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	45.36899°N, 122.5976°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

S_S =	0.938 g	S_{MS} =	1.055 g	S_{DS} =	0.703 g
S_1 =	0.404 g	S_{M1} =	0.645 g	S_{D1} =	0.430 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

Design Maps Detailed Report

ASCE 7-10 Standard (45.36899°N, 122.5976°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1]	S_S = 0.938 g
From Figure 22-2 [2]	S_1 = 0.404 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\overline{v}_S$	$\overline{N}$ or $\overline{N}_{ch}$	$\overline{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content w ≥ 40%, and • Undrained shear strength $\overline{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = D and S_S = 0.938 g, F_a = 1.125

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.404 g, F_v = 1.596

Equation (11.4–1):	$S_{MS} = F_a S_S = 1.125 \times 0.938 = 1.055$ g
Equation (11.4–2):	$S_{M1} = F_v S_1 = 1.596 \times 0.404 = 0.645$ g

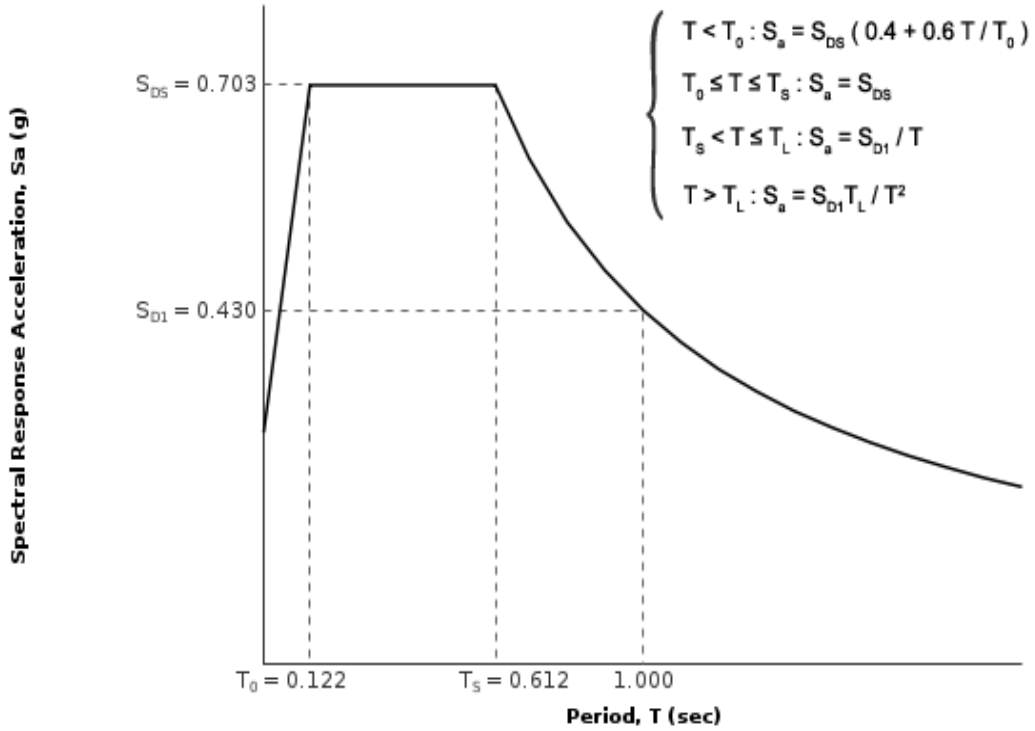
Section 11.4.4 — Design Spectral Acceleration Parameters

Equation (11.4–3):	$S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 1.055 = 0.703$ g
Equation (11.4–4):	$S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.645 = 0.430$ g

Section 11.4.5 — Design Response Spectrum

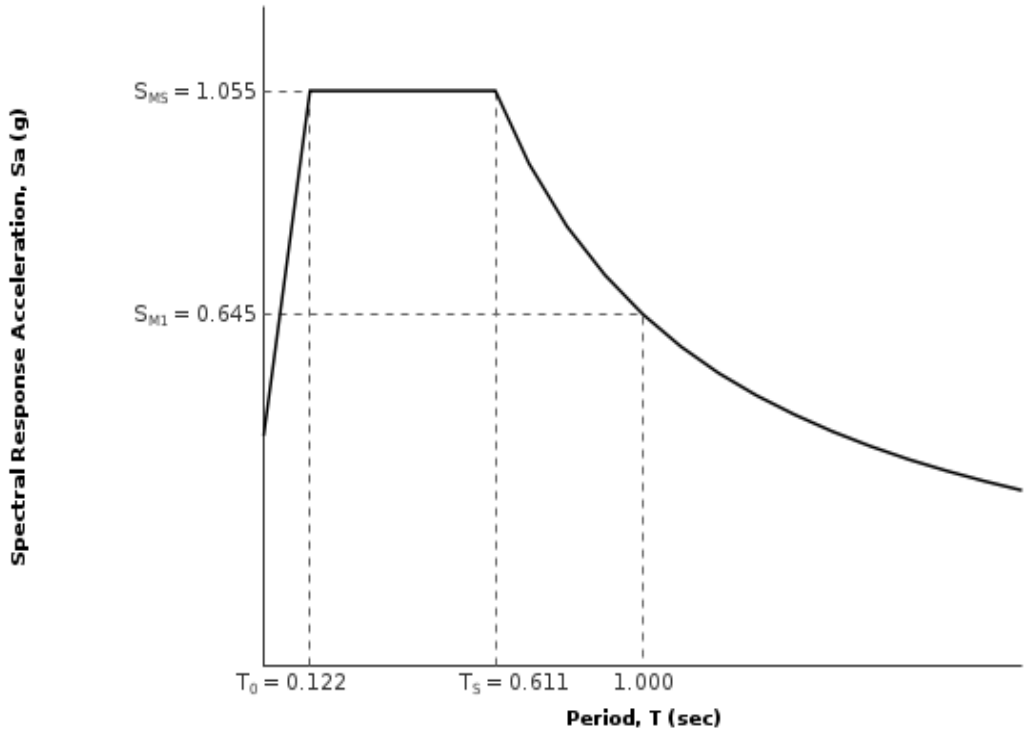
From Figure 22-12 [3]	$T_L = 16$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.406

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.094 \times 0.406 = 0.444$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.406 g, F_{PGA} = 1.094

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 0.906

From Figure 22-18 [6] C_{R1} = 0.875

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.703 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.430 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is E for buildings in Risk Categories I, II, and III, and F for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. Figure 22-1: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. Figure 22-2: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. Figure 22-12: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. Figure 22-7: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. Figure 22-17: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. Figure 22-18: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

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PHOTOGRAPHIC LOG

14835 SW 72nd Avenue
Portland, Oregon 97224

Tel (503) 598-8445
Fax (503) 941-9281

THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

Aerial Photo, Facing Southeast

Aerial Photo, Facing North

THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

Aerial Photo, Facing Northeast

Aerial Photo, North End of Site, Facing Southeast

THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

Aerial Photo, Showing Pond and Concrete Debris, North End of Site

Aerial Photo, Showing Old Building Foundations and Concrete Fill

THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

Aerial Photo, Facing West, Showing Concrete Fill

Aerial Photo, Facing West, Showing Concrete Fill

THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

Test Pit TP-2

Facing Northwest

East Side of Site, Facing South

THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

Facing North, Test Pit TP-3, Excavating Fill and Garbage

Facing South, Test Pit TP-3, Excavating Fill and Garbage

THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

Facing South, Test Pit TP-6

Facing West, Test Pit TP-9

THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

Facing South, Test Pit TP-10

Test Pit TP-10

THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

Facing East, Test Pit TP-11

Test Pit TP-11, Depth = 3 Feet

THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

East Side of Site, Facing South, Pond with Concrete Debris

Northeast Portion of Site, Facing East, Showing Layering of Concrete Pours

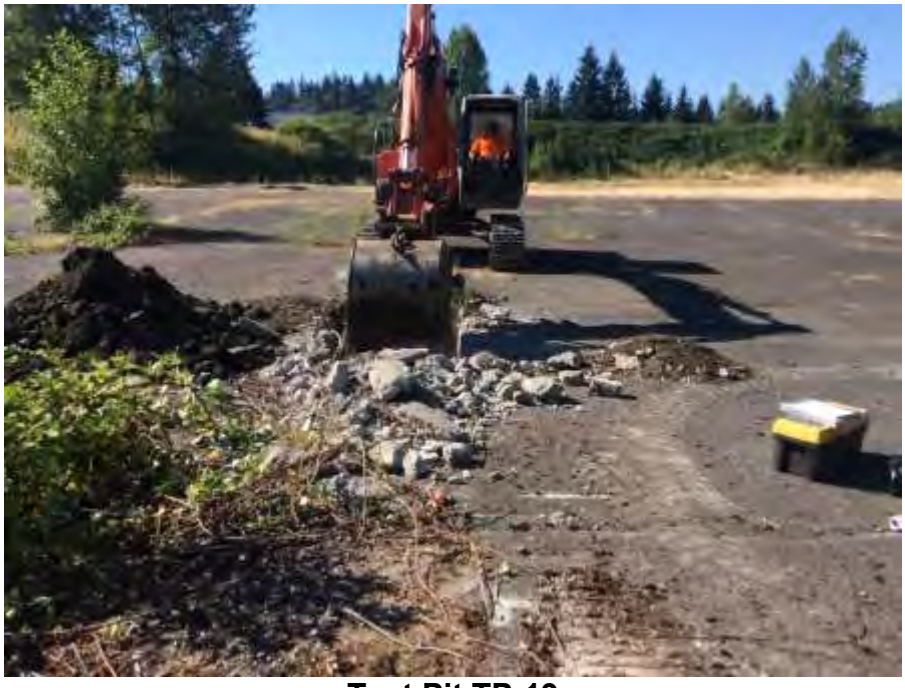
THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

North End of Site, Old Building Foundation

Test Pit TP-17

THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

Hydraulic Rock Chipper Used to Penetrate Concrete Fill



Test Pit TP-19

THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

Test Pit TP-24

Test Pit TP-24

THE COVE GARDEN APARTMENTS
PHOTOGRAPHIC LOG

Test Pit TP-26

Test Pit TP-26

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HISTORICAL AERIAL PHOTOGRAPHY

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Tel (503) 598-8445
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THE COVE GARDEN APARTMENTS
HISTORICAL AERIAL PHOTOGRAPHY

1936, North at Right

THE COVE GARDEN APARTMENTS
HISTORICAL AERIAL PHOTOGRAPHY

1944, North at Right

THE COVE GARDEN APARTMENTS
HISTORICAL AERIAL PHOTOGRAPHY

1955, North at Right

THE COVE GARDEN APARTMENTS
HISTORICAL AERIAL PHOTOGRAPHY

1963, North at Right

THE COVE GARDEN APARTMENTS
HISTORICAL AERIAL PHOTOGRAPHY

1972, North at Right

THE COVE GARDEN APARTMENTS
HISTORICAL AERIAL PHOTOGRAPHY

1980, North at Right

THE COVE GARDEN APARTMENTS
HISTORICAL AERIAL PHOTOGRAPHY

1996, North at Right, During 100-Year Flood Event

THE COVE GARDEN APARTMENTS
HISTORICAL AERIAL PHOTOGRAPHY

2001, North at Top

THE COVE GARDEN APARTMENTS
HISTORICAL AERIAL PHOTOGRAPHY

2007, North at Top

THE COVE GARDEN APARTMENTS
HISTORICAL AERIAL PHOTOGRAPHY

2010, North at Top

Appendix D

Tree Condition Report

Tree Condition Assessment
The Cove
Oregon City, Oregon

Prepared for:

Randy Tyler
Pacific Propertry Search, LLC
340 Oswego Pointe Drive
Suite 105
Lake Oswego, Oregon 97034
Telephone: 503-697-5000
FAX: 503-697-1630

and

WRG Design, Inc.
5415 S.W. Westgate Drive
Suite 100
Portland, Oregon 97221
Telephone: 503-419-2500
FAX: 503-419-2600

♦

Prepared by:

Robert Mazany, ASCA, RCA #133
Robert Mazany and Associates
P.O. Box 1305
Beaverton, Oregon 97075
Phone/FAX: 503-533-1064

MEMORANDUM

TO: Randy Tyler
Pacific Property Search, LLC

FROM: Robert Mazany, ASCA
Registered Consulting Arborist #133

DATE: August 21, 2007

RE: The Cove – Oregon City

We have completed our final site and plan review for a condition assessment of trees designated to be retained and peripheral vegetation areas to be preserved. We have also inspected and tagged trees in close proximity to preserve trees that we feel may be retained. These trees and areas are noted on the Tree Preservation Plans prepared by WRG Design, Inc. The tree numbers in the field note narrative are those on the Clackamette Cove Tree Survey and accompanying Tree Survey Plans provided to Robert Mazany and Associates by WRG Design, Inc. The trees were not numbered by the survey crew in the field. We have attached number tags, to correspond to those on the Tree Survey, and green flagging on all trees inspected. Trees in the preservation areas classified as high risk trees have been identified with number tags and blue flagging. The trees inspected have also been highlighted on a copy of the Tree Survey Plans for location reference. It is our opinion, with a reasonable degree of certainty, the trees identified are as located on the plan. The areas where there may be some discrepancies are identified to be re-surveyed and the location more definitively documented on the Tree Survey Plans. This updates our preliminary report of August 1, 2007 and includes additional trees inspected.

Please feel free to contact me if you have any questions or when I may be of further assistance.

Attachments:

- Field Note Narrative
- Numbered Plan
- Tree and Plant Preservation/Protection Specifications

cc: WRG Design, Inc.

Field Note Narrative
The Cove – Oregon City
Pacific Property Search, LLC

This narrative has been prepared to document the condition of trees to be retained and a risk assessment of trees in areas noted for preservation. The trees inspected have been marked in the field with number tags and green flagging for retained trees and blue flagging for high risk trees. General observations and recommendations are included as part and parcel of this narrative. All diameter measurements have been taken at 4.5 (dbh) feet above the ground unless noted otherwise. There are 98 trees noted to be preserved that have been inspected for this narrative. There are also 9 high risk trees in the peripheral preservation areas.

General Observations

1. The majority of the trees on site are black cottonwood (Populus trichocarpa). This is a mixed age stand from seedling through mature. These trees have dominated the area following various stages of site disturbance over many years. The understory is a cover of invasive noxious vegetation including Scotch broom, ivy and blackberry. This is to be removed during the riparian area restoration.

2. There is evidence throughout the area of branch and crown failure typical of this relatively weak structure specie, predominantly in the more mature trees.

3. The density in many areas has resulted in trees with taller than normal crowns further exacerbating the potential for failure.

4. Many of the trees along the water edge have been undermined with the support root structure growing into the steep banks in an attempt to prevent failure. Any disturbance, i.e., slope grading to achieve a manageable grade, above these trees will increase their failure potential.

Tree No.	Specie	Diameter	Condition/Comment
5091	Black cottonwood	23.0"	Poor. This tree is heavily weight loaded over the adjacent paved trail with serious decay suspected in a deformed area at 20 feet. Due to the high risk/failure potential, removal is recommended.
5092	Black cottonwood	24.0"	Poor. There is extensive decay in the base and trunk extending to 40 feet. The high hazard/failure potential dictates removal.
5093	Black cottonwood	29.0"/30.0"	Fair. It has had one major stem failure in the crown leaving it with a high risk/failure potential. Consider removal or crown reduction.
5094	Pacific willow	10.0"/9.0"/13.0"	Poor. In decline with a partial uprooting and pronounced lean over the path. Removal recommended.
5096	Black cottonwood	20.5"	Poor. Has large deadwood and a major stem failure in the crown. Removal recommended due to its proximity to the path.

Tree No.	Specie	Diameter	Condition/Comment
5097	Black cottonwood	15.5"	Fair. Heavy ivy on trunk.
5098	Black cottonwood	23.0"	Fair. Heavy ivy on trunk.
5099	Douglas fir	12.5"	Fair. Understory to adjacent trees.
5100	Black cottonwood	17.5"	Fair.
5112	Douglas fir	8.0"	Fair. Understory to adjacent trees.
5113	Black cottonwood	12.0"	Poor. Dead snag. Retain as wildlife tree.
5114	Douglas fir	8.0"	Fair. Understory to adjacent trees.
5115	Black cottonwood	17.5"	Poor. Dead snag. Retain as wildlife tree.
5116	Black cottonwood	22.5"	Fair.
5117	Oregon maple	18.0"	Fair.
5119	Black cottonwood	12.0"	Fair.
5120	Black cottonwood	18.0"	Poor. Top broken at 40 feet. May be retained as wildlife tree.
5123	Douglas fir	17.0"	Fair.
5125	Black cottonwood	32.5"	Fair.
5126	Black cottonwood	31.0"/25.0"/14.0"	Fair. Triple stem at ground.
5127	Oregon maple	12.5"	Fair.
5128	Douglas fir	17.0"	Fair.
5160	Oregon maple	10.0"/11.0"/8.0"	Fair.
5161	Oregon maple	12.0"	Fair.
5162	Oregon maple	7.5"	Fair.

NOTE: 5160-61 and 62 are in close proximity to 5163 and may be considered to be retained.

5163	Oregon maple	8.0"	Fair.

Tree No.	Specie	Diameter	Condition/Comment
5182	Black cottonwood	35.0"/31.0"	Fair. Double stem at 3 feet.
5184	Black cottonwood	13.0"/13.0"	Fair. Double stem at ground.
5185	Black cottonwood	11.0"	Dead. High hazard tree. Remove.
5186	Douglas fir	11.5"	Fair.
5187	Black cottonwood	13.5"/11.5"	Fair. Double stem at ground.
5188	Oregon maple	17.0"	Fair. Heavy ivy.
5189	Oregon maple	7.5"	Fair.
5190	Douglas fir	11.0"	Fair.
5191	Black cottonwood	19.0"	Fair.
5192	Black cottonwood	14.5"	Poor. Dead. High hazard tree. Remove.
5193	Black cottonwood	23.5"	Fair.
5194	Black cottonwood	8.5"	Fair.
5195	Black cottonwood	13.5"/14.5"	Fair.
5196	Black cottonwood	7.0"	Fair.
5197	Oregon maple	13.5"/11.5"	Fair.

5194-95-96-97 share a common root zone and have heavy ivy.

5263	Oregon maple	15.5"	Fair.
5267	Black cottonwood	23.5"/23.0"/ 21.0"/25.5"	Fair. Multi-stem at ground.
5268	Black cottonwood	7.5"	Poor. Dead top. Understory to 5269.
5269	Black cottonwood	21.0"	Fair.
5270	Black cottonwood	21.0"/23.0"	Dead. Double stem. May be pruned and retained as wildlife tree.
5307	Black cottonwood	12.0"	Fair.

Tree No.	Specie	Diameter	Condition/Comment
5308	Black cottonwood	17.0"	Fair.
5309	Black cottonwood	14.0"	Fair.
5310	Black cottonwood	10.0"	Fair.
5311	Black cottonwood	7.5"	Fair.
5312	Black cottonwood	12.5"	Fair.
5313	Black cottonwood	12.0"	Fair.
5375	Black cottonwood	12.5"/14.5"	Fair. Double stem at ground.
5386	Black cottonwood	13.5"	Fair.
5387	Black cottonwood	8.5"	Fair.
5388	Black cottonwood	6.5"	Fair.
5389	Black cottonwood	6.5"/7.5"	Fair. Double stem at ground.
5390	Black cottonwood	11.5"	Fair.
5941	Black cottonwood	14.0"	Fair.
5944	Black cottonwood	8.5"	Fair. Pistol butt trunk with exposed roots. Some failure potential.
5945	Black cottonwood	18.5"	Poor. Roots washed and exposed by erosion. High failure potential. Removal recommended.
5946	Black cottonwood	10.0"	Poor. Roots washed and exposed by erosion. High failure potential. Removal recommended.
5947	Black cottonwood	18.5"	Poor. Roots washed and exposed by erosion. High failure potential. Removal recommended.
5948	Black cottonwood	10.0"	Poor. Pistol butt trunk with serious areas of missing bark. Removal recommended.
5953	Black cottonwood	12.5"	Fair.
5954	Black cottonwood	9.5"/9.0"/6.0"	Fair. 6 inch stem broken at 8 feet.

Tree No.	Specie	Diameter	Condition/Comment
5955	Black cottonwood	10.0"/10.0" 9.0"/12.5"	Poor. Weak stem unions in 10 inch and 12.5" stem have high failure potential. Removal recommended.
5956	Black cottonwood	10.5"	Fair. Has 30 degree lean toward water with some failure potential.
5963	Oregon maple	10.5"	Fair. 25 feet tall with good canopy structure.
5970	Black cottonwood	28.0"	Fair.
5980	Black cottonwood	11.5"	Fair. Pistol butt trunk with some minor root exposure.
5981	Black cottonwood	41.0"	Fair. Some large roots exposed but appears to be well anchored into the bank.
6075	Black cottonwood	19.0"	Poor. Exposed roots from water action. High risk/ failure tree. Removal recommended.
6078	Black cottonwood	23.0"/21.0"	80% dead. High hazard tree. Removal recommended.
6119	Black cottonwood	24.5"	Fair. Verify location.
6120	Black cottonwood	15.0"	Fair. Verify location.
6122	Black cottonwood	17.5"	Fair. Verify location.
6134	Black cottonwood	7.0"	Poor. Dead. Verify location.
6138	Black cottonwood	9.0"	Poor. 40% dead. Verify location.
6146	Black cottonwood	16.0"	Fair. Pronounced lean to south.
6198	Black cottonwood	18.0"/17.0"	Fair. Double stem at ground.
6199	Black cottonwood	15.5"	Fair.
6200	Black cottonwood	16.0"/15.5"	Fair.
6203	Black cottonwood	20.0"	Fair.
6211	Black cottonwood	13.5"	Fair.

Tree No.	Specie	Diameter	Condition/Comment
6212	Black cottonwood	16.5"	Fair.
6216	Black cottonwood	---	Not located. Verify location.
6217	Black cottonwood	14.5"/13.5"	Fair.
6218	Black cottonwood	---	Not located. Verify location.
6221	Black cottonwood	---	Not located. Verify location.
6236	Black cottonwood	16.5"	Fair.
6945	Black cottonwood	7.5"/9.0"	Fair.
6952	Black cottonwood	7.0"	Fair.
6955	Black cottonwood	7.0"	Fair.
6957	Black cottonwood	6.0"/6.0"	Fair. One foot apart.
6962	Black cottonwood	6.5"	Fair.
6963	Black cottonwood	7.0"/6.5"	Fair. Three feet apart. Tag on each stem.
6964	Black cottonwood	7.5"	Fair.
6965	Alder	11.0"	Fair.
6966	Black cottonwood	6.5"/7.5"	Fair. Lean to east from adjacent trees.
6968	Black cottonwood	7.5"	Fair.
7008	Black cottonwood	13.0"	Fair.
7011	Black cottonwood	7.5"	Fair. Heavy ivy into crown.
7441	Black cottonwood	9.0"	Fair.
7442	Black cottonwood	9.5"	Fair.
7451	Black cottonwood	8.0"	Fair.
7452	Black cottonwood	17.5"	Poor. Triple stem at 4 feet with weak stem unions giving this tree a high risk/failure rating. Removal recommended.

Recommendations

1. Retain trees in larger stands to minimize the potential for failure of individual trees. This will also protect the fir to be retained from failure.

2. Due to the proximity of the proposed development on the cement property to the east, all but a few selective and groupings of trees should be removed. This can be accomplished during the clearing of noxious and undesirable vegetation. This will allow for inter planting in this area with a more aesthetically and functionally acceptable landscape and still leave some more mature vegetation for the present.

3. Few, if any, trees along the slope at the waters edge can be retained to achieve the necessary cut and fill balance and develop a more stable and manageable 3:1 slope. Many of the more viable trees in the condominium and office/restaurant site can be retained and protected.

4. Additional recommendations may be submitted based on future site and plan reviews as the project progresses.

In summary it is my professional opinion very few of the existing trees are sufficiently aesthetically or functionally viable as individual trees to be retained. The potential for branch or crown failure in a developed area as is evident on site, could at some point cause serious property damage or personal injury. The cottonwood is considered a weed specie in some areas where soil disturbance has created an ideal area for sprouting such as alder and lodge pole pine in fire ravaged areas. A re-vegetation with more suitable riparian and other native specie will create a more pleasing and viable landscape for many years.

Tree & Plant
Preservation/Protection

PART 1 – GENERAL

1.01 DESCRIPTION:

A. General requirements: Preservation, protection, and trimming of existing trees and shrubs, and other vegetation indicated to remain.

B. Definitions:

1. Registered Consulting Arborist (RCA): A Consulting Arborist registered with the American Society of Consulting Arborists (ASCA).

2. Project Consulting Arborist (PCA): A Registered Consulting Arborist engaged to be a member of the project team.

3. Certified Arborist: Certified by the International Society of Arboriculture (ISA).

1.02 PROJECT CONDITIONS:

A. Make every effort to protect all trees, shrubs, ground cover and other vegetation existing on the Project site with the exception of that indicated to be removed.

B. Meet local jurisdiction requirements for protection of existing trees and vegetation.

C. Provide temporary fencing, barricades and guards as required to protect trees and other plants which are to remain from all damage. Erect prior to commencement of clearing and demolition work and remove only after all work potentially injurious to trees and other plants is complete. Fence shall be placed as far from trees as is practical, but in no instance closer than one foot behind required construction limits.

Fence should be semi-permanent six-foot chain link fence on steel posts placed no further than ten feet apart, kept taut and in place throughout the duration of construction or as authorized by the PCA.. Four foot visibility plastic fence may be used, if acceptable to the local jurisdiction, on steel posts six feet apart.

D. Protect all trees from stockpiling, material storage, vehicle parking and driving within the tree drip line or tree protection fence area.

E. Protect all plant growth including root systems of trees and plants from:

1. Dumping of refuse.
2. Chemically injurious materials and liquids.
3. Noxious materials in solution caused by run-off and spillage during mixing and placement of construction materials, and drainage from stored materials.
4. Continual puddling of running water.

F. Restrict vehicular and foot traffic to prevent compaction of soil over root systems.

PART 2 – PRODUCTS

2.01 – MATERIALS:

A. As indicated and required elsewhere in the Specification Section, and as may be recommended by the PCA.

PART 3 – EXECUTION

3.01 – GENERAL:

A. Protect root systems of existing trees, shrubs and ground covers from damage due to noxious materials in solution caused by run-off and spillage during mixing and placement of construction materials, and drainage from stored materials.

B. Protect root systems from flooding, erosion, excessive wetting and drying resulting from de-watering and other operations.

C. Protect all existing plant material to remain against unnecessary cutting, breaking and skinning of roots and branches, skinning or bruising of bark.

D. Do not allow fires under and adjacent to trees or other plants which are to remain.

E. The PCA should direct removal of branches from trees and large shrubs, which are to remain, if required to clear new construction and where indicated; and to direct tree root pruning and relocation work.

F. Where directed by the PCA, extend pruning operations to restore natural shape of entire tree.

G. Cut branches and roots with sharp pruning instruments. Do not break, chop or mutilate.

H. Water trees and other vegetation, which are to remain, as necessary to maintain their health during the course of the work. Maintain a water schedule and document.

3.02 – EXCAVATION AROUND TREES:

A. Excavate within root zone of trees only where indicated and acceptable to the PCA.

B. Excavate around tree roots within tree root zone only under the direction of the PCA.

C. Where trenching for utilities is required within root zones, tunnel under and around roots by hand digging. Do not cut main lateral support roots. Cut smaller roots that interfere with installation of new work; use sharp pruning tools.

D. Where excavating for new construction is required within root zones of trees, hand excavate to minimize damage to root systems. Use narrow tine spading forks and comb soil to expose roots. Relocate roots in backfill areas whenever possible. If large, main lateral roots are encountered, expose beyond excavation limits as required to bend and relocate without breaking.

E. If encountered immediately adjacent to location of new construction and relocation is not practical, cut roots approximately 6 inches back from new construction.

F. Do not allow exposed roots to dry out before permanent backfill is placed; provide temporary earth cover, pack with wet peat moss or 4 layers of wet untreated burlap and temporarily support and protect from damage until permanently relocated and covered with backfill. Water puddle backfill to eliminate voids and air pockets.

G. All pruning shall be performed to ANSI A-300 pruning standards by Oregon state registered tree care firms employing Certified Arborists. Other therapeutic care work shall be performed to Tree Care Industry Standards.

3.03 – GRADING AND FILLING AROUND TREES:

A. Maintain existing grade within root zones of trees unless otherwise indicated or acceptable to the PCA.

B. Lowering Grades: Where existing grade is above new finish grade shown around trees, under direction of PCA, carefully hand excavate within root zones to new grade. Cut roots exposed by excavation to approximately 3 inches below elevation of new finish grade.

C. Raising Grades: Permitted only as acceptable to the PCA.

3.04 – REPAIR AND REMOVAL OF TREES:

A. The PCA should direct tree repair work. Engage a Certified Arborist, acceptable to the PCA, to perform tree repair work. Repair trees damaged by construction operations in a manner acceptable to the PCA. Make repairs promptly after damage occurs to prevent progressive deterioration of damaged trees.

B. Remove dead and damaged trees that are determined by the PCA to be incapable of restoration to normal growth pattern.

3.05 – REPAIR AND REPLACEMENT OF SHRUBS:

A. Repair shrubs, and other vegetation damaged by construction operations in a manner acceptable to the PCA. Make repairs promptly after damage occurs to prevent progressive deterioration of damaged plants.

B. Remove and replace dead and damaged plants that are determined by the PCA incapable of restoration to normal growth pattern.

1. Provide new shrubs of same size and specie as those replaced or as otherwise acceptable to the PCA and Landscape Architect.

2. Plant and maintain as acceptable to the PCA and Landscape Architect.

3.06 – HARDSCAPE INSTALLATION WITHIN THE PROTECTION ZONES:

A. Electrical conduit and irrigation main lines should be run under walkways, within stone or concrete subbase, and should not cut into native soil within the Tree Protection Zone (within the drip line). Drip irrigation shall be installed within the Tree Protection Zone. Lateral electrical lines to individual lights, should be installed as close to the soil surface as possible with short runs from the main conduit.

B. Electrical fixtures, housing, and irrigation valves must be installed with care to avoid cutting roots. Digging must be minimal with excess dirt removed from the tree preservation area. Do not cut roots greater than 1" in diameter without the approval of the PCA. Roots greater than 1" in diameter exposed during excavation should be cut squarely at the edge of the excavation with a sharp saw or appropriate pruning tool.

C. Install walkways as close to grade as possible to minimize excavation into the soil where large roots and areas of high root density exist. Backfill with loose dirt to the minimum depth necessary to achieve a natural look. Mulch if appropriate, as directed by the PCA.

3.07 – COMPENSATION TO OWNER FOR TREES:

A. Contractor shall pay the Owner the value of existing trees to remain that died or were damaged and required removal because of the Contractor's failure to provide adequate protection and maintenance.

B. Value of existing trees will be determined by the PCA in accordance with the evaluation formula set forth in "The Council of Tree and Landscape Evaluation Guide for Plant Appraisal," ninth edition, 2000.

C. Any wound or damage to a preserved tree constitutes partial injury. These include, but are not limited to:

Any cambian tissue damage.
Unauthorized cutting, breaking or removing tree branches.
Unauthorized cutting or damaging protected root zones.
Soil compaction.
Toxic run-off into tree preservation area.

D. Partial injury will be calculated by percentage of the total value of the damaged tree.

E. The loss value penalty will include cost to the Owner for loss appraisal by the PCA plus the cost for necessary damage repair.

PART 4 – PRE-CONSTRUCTION TREE CARE

4.01 – PRUNING AND STRUCTURAL SUPPORT:

A. All trees designated to be retained within the project limits shall be pruned to ANSI A-300 Pruning standards with selective low limb removal, as directed and approved by the PCA, where required for construction clearance.

B. Structural support (cabling) may be required on specific trees as identified by the PCA to Tree Care Industry Standards.

C. All therapeutic care recommended should be directed, inspected, and approved by the PCA.

PART 5 – POST-CONSTRUCTION TREE CARE

5.01 – FERTILIZATION/AERATION:

A. Aeration as determined by the PCA may be required in areas where construction compaction has occurred.

B. Deep root liquid injection fertilizing of all trees retained within the project limits may be required following the completion of construction toTree Care Industry Standards. The timing of this fertilizing will be determined by the PCA.

Prepared by:

Robert Mazany, ASCA
Registered Consulting Arborist #133
Robert Mazany and Associates
PO Box 1305
Beaverton, OR 97075
(503) 533-1064