City of
West Linn

Planning & Development • 22500 Salamo Rd #1000 • West Linn, Oregon 97068
Telephone 503.656.4211 • Fax 503.656.4106 • westlinnoregon.gov

DEVELOPMENT REVIEW APPLICATION

For Office Use Only

STAFF CONTACT	PROJECT NO(S). WAP-20-01 / WRG-20-01 / MIS-20-01 / LLA-20-01	
NON-REFUNDABLE FEE(S) $ 3,850.00	REFUNDABLE DEPOSIT(S) $ 2,750.00	TOTAL $ 6,600.00

Type of Review (Please check all that apply):

☐ Annexation (ANX)
☐ Appeal and Review (AP) *
☐ Conditional Use (CUP)
☐ Design Review (DR)
☐ Easement Vacation
☐ Extraterritorial Ext. of Utilities
☐ Final Plat or Plan (FP)
☒ Flood Management Area
☐ Hillside Protection & Erosion Control
☐ Historic Review
☐ Legislative Plan or Change
☒ Lot Line Adjustment (LLA) */**
☐ Minor Partition (MIP) (Preliminary Plat or Plan)
☐ Non-Conforming Lots, Uses & Structures
☐ Planned Unit Development (PUD)
☐ Pre-Application Conference (PA) */**
☐ Street Vacation
☐ Subdivision (SUB)
☐ Temporary Uses *
☐ Time Extension *
☐ Variance (VAR)
☐ Water Resource Area Protection/Single Lot (WAP)
☒ Water Resource Area Protection/Wetland (WAP)
☒ Willamette & Tualatin River Greenway (WRG)
☐ Zone Change

Home Occupation, Pre-Application, Sidewalk Use, Sign Review Permit, and Temporary Sign Permit applications require different or additional application forms, available on the City website or at City Hall.

Site Location/Address:
Clackamas County Assessor's Map No. 31E02AC, Tax Lots 800 and 802

Assessor's Map No.: 31E02AC
Tax Lot(s): 800 and 802
Total Land Area: +- 72,087 SF

Brief Description of Proposal:
Lot Line Adjustment (LLA) between TL 800 and 802, and HCA, FMA, WRG and WRA for TL 802.

Applicant Name: (please print) Roy Marvin
Address: 615 NW Territorial Road
City State Zip: Canby, OR 97013
Phone: *Please contact Consultant
Email: *Please contact Consultant

Owner Name (required): (please print) Malibar Group LLC, Retirement Plan fbo Roy Marvin
Address: 615 NW Territorial Road
City State Zip: Canby, OR 97013
Phone: *Please contact Consultant
Email: *Please contact Consultant

Consultant Name: (please print) Zach Pelz, AICP, AKS Engineering & Forestry, LLC
Address: 3700 River Road N, Suite 1
City State Zip: Keizer, OR 97303
Phone: (503) 400-6028
Email: PelzZ@aks-eng.com

1. All application fees are non-refundable (excluding deposit). **Any overruns to deposit will result in additional billing.**
2. The owner/applicant or their representative should be present at all public hearings.
3. A denial or approval may be reversed on appeal. No permit will be in effect until the appeal period has expired.
4. **Three (3) complete hard-copy sets (single sided) of application materials must be submitted with this application. One (1) complete set of digital application materials must also be submitted on CD in PDF format. If large sets of plans are required in application please submit only two sets.**

* No CD required / ** Only one hard-copy set needed

RECEIVED
JAN 07 2020
PLANNING & BUILDING
CITY OF WEST LINN
TIME

The undersigned property owner(s) hereby authorizes the filing of this application, and authorizes on site review by authorized staff. I hereby agree to comply with all code requirements applicable to my application. Acceptance of this application does not infer a complete submittal. All amendments to the Community Development Code and to other regulations adopted after the application is approved shall be enforced where applicable. Approved applications and subsequent development is not vested under the provisions in place at the time of the initial application.

Applicant's signature — Date 12-10-19

Owner's signature ***(required)*** — Date 12-10-19

Submittal Transmittal

AKS Engineering & Forestry, LLC | 3700 River Rd N, Suite 1 Keizer OR 97303 United States

FROM:

Linda Johnson
AKS Engineering & Forestry, LLC
3700 River Rd N, Suite 1
Keizer OR 97303
United Statesjohnsonl@aks-eng.com
503-400-6028 x428

TO:

Jennifer Arnold
City of West Linn
22500 Salamo Road
West Linn, OR 97068
jarnold@westlinnoregon.gov
503-723-2542

PROJECT:	1220 9th Street - West Linn 5926	DATE SENT:	1/6/2020
SUBJECT:	Consolidated LUA 'TL 802'	ID:	00042
PURPOSE:	For Review and Comment	VIA:	Delivered by AKS Engineering

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REMARKS: Sub 1 Consolidated LUA 'TL 802'

Good Afternoon,

Enclosed for your review is a Consolidated Land Use Application for TL 802. Together with are 3 copies of the application, two checks in the amounts of $6,000 and $600 totaling $6,600, a flash drive with a PDF of all submittal items and the full-sized preliminary plans, the original signed application and one set of full sized 34 X 22 plans.
If you have any questions please let us know,

Kindly,

Linda K. Johnson

AKS ENGINEERING & FORESTRY, LLC
WE'VE MOVED! PLEASE NOTE OUR NEW ADDRESS BELOW.
3700 River Road N, Suite 1 | Keizer, OR 97303
P: 503.400.6028 Ext. 428 | F: 503.400.7722 | www.aks-eng.com JohnsonL@aks-eng.com
Offices in: Bend, OR | Keizer, OR | Tualatin, OR | Vancouver, WA

Consolidated Land Use Applications for a Property Line Adjustment and Natural Resource Overlay Permits for Lots 800 and 802

Date: January 2020

Submitted to: City of West Linn
22500 Salamo Road
West Linn, OR 97068

Applicant: Malibar Group, LLC
615 NW Territorial Road
Canby, OR 97013

AKS Job Number: 5926

AKS ENGINEERING & FORESTRY
3700 River Road N, Suite 1
Keizer, OR 97303
(503) 400-6028

Table of Contents

Tables

Exhibits

Consolidated Land Use Applications for a Property Line Adjustment and Natural Resource Overlay Permits for Lots 800 and 802

Submitted to:	City of West Linn Planning Department 22500 Salamo Road West Linn, OR 97068
Applicant:	Malibar Group, LLC Attn: Roy Marvin 615 NW Territorial Road Canby, OR 97013
Property Owners:	Malibar Group, LLC Retirement Plan FBO Roy Marvin 615 NW Territorial Road Canby, OR 97013
Applicant's Consultant:	AKS Engineering & Forestry, LLC 3700 River Road N, Suite 1 Keizer, OR 97303 Contact: Zach Pelz, AICP Email: PelzZ@aks-eng.com Phone: (503) 400-6028
Site Location:	No site address, West Linn, OR 97068
Clackamas County Assessor's Map:	Clackamas County Assessor's Map 3 1E 02AC, Tax Lots 800 and 802
Site Size:	±1.09 acres (Lot 800) and ±0.48 acres (Lot 802)
Land Use Districts:	R-10 (Single Family Residential Detached)

I. Executive Summary

AKS Engineering & Forestry, LLC is pleased to submit this application on behalf of Roy Marvin (Applicant) to gain approval for a consolidated package of land use applications, including a property line adjustment (PLA), Water Resource Area (WRA) permit, Flood Management Area (FMA) permit, and Willamette River Greenway (WRG) permit for Tax Lots 800 and 802 of Clackamas County Assessor's Map 3 1E 02AC. While the PLA affects both Lots 800 and 802, the requested WRA, FMA, and WRG permits affect only Lot 802. The PLA is designed to minimize impacts to the mapped WRAs Habitat Conservation Areas (HCAs), WRGs, and FMAs that lie in the vicinity of the subject property. Where a high degree of regulation constrains a property, the West Linn Community Development Code (CDC) provides hardship provisions that accommodate reasonable land use. The subject property satisfies applicable provisions of the city hardship standards, and this application demonstrates a thoughtful balance between natural resource protection and development expectations.

Concurrent with these applications is a request for the vacation of a 20-foot-wide public utility easement (PUE) along the north line of Lot 802. This vacation would allow the buildable envelope to be moved further away from the wetland boundary and minimize impacts to the WRAs during future development. Responses in this narrative are contingent on approval of the requested PUE vacation.

This application includes the City application forms, written materials, and preliminary plans necessary for staff to review and determine compliance with the applicable approval criteria. The evidence is substantial and supports the City's approval of the application.

II. Site Description/Setting

Tax Lot 802 is located north of Volpp Street between 9th and 10th streets in West Linn's Willamette Neighborhood and is zoned Single-Family Residential Detached (R-10). The site is unimproved but has access to public water, sanitary sewer, gas, power, and communications along 9th Street.

The subject property is completely encompassed within the Federal Emergency Management Agency (FEMA) 100-year floodplain and is further constrained by the WRG, WRA, and HCA protection overlay zones. A larger wetland is located across Tax Lots 800, 802, and 803 and extends offsite to the northeast.

III. Applicable Review Criteria

CITY OF WEST LINN COMMUNITY DEVELOPMENT CODE

Chapter 11 – SINGLE-FAMILY RESIDENTIAL DETACHED, R-10

11.030 Permitted Uses

The following are uses permitted outright in this zoning district:

1. **Single-family detached residential unit.**

…

Response: While a request to construct a home on Lot 802 is not included with this application, the Applicant desires to construct a single-family home once this request is approved. The City of West Linn will confirm that the proposed structure conforms to all applicable criteria at the time of building permit submittal. This criterion can be met.

11.070 **Dimensional Requirements, Uses Permitted Outright And Uses Permitted Under Prescribed Conditions**

Except as may be otherwise provided by the provisions of this code, the following are the requirements for uses within this zone:

1. **The minimum lot size shall be 10,000 square feet for a single-family detached unit.**

Response: Exhibit A shows that the adjusted sizes of Tax Lots 800 and 802 are larger than the minimum 10,000 square feet required in the R-10 zone. This criterion is met.

2. **The minimum front lot line length or the minimum lot width at the front lot line shall be 35 feet.**

Response: Exhibit A shows the front lot line length is +- 100 feet for Tax Lot 802 and ±228 feet for Tax Lot 800. This criterion is met.

3. **The average minimum lot width shall be 50 feet.**

Response: Exhibit A shows that Lot 802 is ±154 feet wide and Lot 800 is ±227 feet wide. This criterion is met.

4. **Repealed by Ord. 1622.**
5. **Except as specified in CDC 25.070(C)(1) through (4) for the Willamette Historic District, the minimum yard dimensions or minimum building setback area from the lot line shall be:**
   a. **For the front yard, 20 feet; except for steeply sloped lots where the provisions of CDC 41.010 shall apply.**

Response: Exhibit A shows the front building setback area for Tax Lots 800 and 802. This application includes a request, as permissible under the hardship provisions of CDC 32.110, for a reduction in the front setback on Lot 802 to 12 feet. See responses under CDC 32 regarding this request. The criteria are met.

   b. **For an interior side yard, seven and one-half feet.**

Response: Exhibit A shows the interior side setback on Tax Lots 800 and 802 as 7.5 feet. This criterion is met.

   c. **For a side yard abutting a street, 15 feet.**

Response: The subject property does not have a side yard abutting a street. This criterion does not apply.

   d. **For a rear yard, 20 feet.**

Response: Exhibit A shows the rear yard setback is 20 feet. The rear yard of Lot 800 is established by the 15-foot wetland setback. This criterion is met.

6. **The maximum building height shall be 35 feet, except for steeply sloped lots in which case the provisions of Chapter 41 CDC shall apply.**

Response: This application does not include a request to construct new homes on the subject lots. The City will ensure that the building height requirements are met at the time of building permit submittal. The criteria do not apply.

7. **The maximum lot coverage shall be 35 percent.**

Response: The lot coverage provisions of this section are superseded by the maximum disturbance area and related requirements under the WRA hardship (Chapter 32) and FMA standards (Chapter 27). Please see responses to those criteria later in this narrative. This criterion does not apply.

8. **The minimum width of an accessway to a lot which does not abut a street or a flag lot shall be 15 feet.**

Response: Exhibit A shows a shared accessway to Tax Lots 800 and 802 along the north boundary of these lots. The accessway measures 20 feet in width. To the extent it applies, this criterion is met.

9. **The maximum floor area ratio shall be 0.45. Type I and II lands shall not be counted toward lot area when determining allowable floor area ratio, except that a minimum floor area ratio of 0.30 shall be allowed regardless of the classification of lands within the property. That 30 percent shall be based upon the entire property including Type I and II lands. Existing residences in excess of this standard may be replaced to their prior dimensions when damaged without the requirement that the homeowner obtain a non-conforming structures permit under Chapter 66 CDC.**
10. **The sidewall provisions of Chapter 43 CDC shall apply.**

Response: The subject property is comprised entirely of Type II Lands with a floor area ratio (FAR) calculated at the minimum of 0.30, for an adjusted lot size of 4,380 square feet, based on a total lot area of 14,600 square feet. The criteria are met.

11.090 Other Applicable Development Standards

A. The following standards apply to all development including permitted uses:

1. **Chapter 34 CDC, Accessory Structures, Accessory Dwelling Units, and Accessory Uses.**
2. **Chapter 35 CDC, Temporary Structures and Uses.**
3. **Chapter 38 CDC, Additional Yard Area Required; Exceptions to Yard Requirements; Storage in Yards; Projections into Yards.**
4. **Chapter 41 CDC, Building Height, Structures on Steep Lots, Exceptions.**
5. **Chapter 42 CDC, Clear Vision Areas.**
6. **Chapter 44 CDC, Fences.**

Response: This application does not include a request for building structures or a building permit. The City will ensure the development meets the referenced standards during the building permit submittal. The above criteria do not apply to this application.

7. **Chapter 46 CDC, Off-Street Parking, Loading and Reservoir Areas.**
8. **Chapter 48 CDC, Access, Egress and Circulation.**

Response: Responses to the applicable criteria from CDC 46 and 48 are included below.

Chapter 27 – FLOOD MANAGEMENT AREAS

27.020 Applicability

A flood management area permit is required for all development in the Flood Management Area Overlay Zone. The standards that apply to flood management areas apply in addition to State or federal restrictions governing floodplains or flood hazard areas.

Response: Exhibit A shows that the subject property is located entirely within the Flood Management Area Overlay Zone (FMA). It also illustrates that the adjustment of the property line has been configured to accommodate a buildable footprint to comply with the requirements for construction within the FMA. The Applicant is aware of the requirements for development in this overlay zone and has included the FMA permit application in this submittal. This criterion is met.

27.030 Exemptions

This chapter does not apply to work necessary to protect, repair, or maintain existing public or private structures, utility facilities, roadways, driveways, accessory uses, and exterior improvements, or replace small public structures, utility facilities, or roadways in response to emergencies. Within 30 days after the work has been completed, the party responsible for the work shall initiate a flood management permit designed to analyze any changes effectuated during the emergency and mitigate adverse impacts.

Response: The Applicant is aware of exemptions relating to work performed in response to emergencies. This exemption does not apply.

27.050 Application

Applications for a flood management area permit must include the following:

A. A pre-application conference as a prerequisite to the filing of the application.

Response: A pre-application conference to discuss the subject application was held June 20, 2019 at West Linn City Hall. The Pre-Application Summary from the City is attached hereto as Exhibit H. This criterion has been met.

B. An application initiated by the property owner, or the owner's authorized agent, and accompanied by the appropriate fee.

Response: A signed application form and associated fees are included with this application. This criterion is met.

C. An application submittal that includes the completed application form, one copy of written responses addressing CDC 27.060, 27.070, 27.080 (if applicable), and 27.090 (if applicable), one copy of all maps and plans at the original scale, one copy of all maps and plans reduced to a paper size not greater than 11 inches by 17 inches, and a copy in a digital format acceptable to the City.

Response: An application form signed by the property owner is included as Exhibit B, together with written responses addressing applicable approval criteria and accompanying maps and exhibits, as required. The criterion is met.

D. A map of the property indicating the nature of the proposed alteration and its relationship to property zones, structures, trees, and any other pertinent features.

Response: Exhibit A includes a map of the property indicating the proposed alteration and its relationship to property zones, structures, trees, and other pertinent features. The criterion is met.

E. Information regarding the elevation of the site prior to development, the base flood elevation data for subdivisions (if applicable), and a description of water course alterations, if proposed.

Response: Exhibit A shows the elevations of the subject property prior to development. This criterion is met.

F. A topographic map of the site at contour intervals of five feet or less showing a delineation of the flood management area, which includes, but is not limited to, areas shown on the Flood Management Area map. The City Engineer or Building Official, as applicable, may, at his/her discretion, require the map to be prepared by a registered land surveyor to ensure accuracy. A written narrative explaining the reason why the owner wishes to alter the floodplain shall accompany the site plan map.

Response: Exhibit A includes a survey prepared by AKS Engineering & Forestry, LLC (a licensed professional land surveyor) which shows the boundary of the flood management area. As supported by this narrative and the accompanying exhibits, required submittal elements are included with this application. This criterion is met.

G. The elevation in relation to mean sea level, of the lowest floor (including basement) of all structures.

H. The elevation in relation to mean sea level to which any structure has been flood-proofed (non-residential only).

Response: Exhibit A contains the required elevations as listed above. These criteria are met.

27.060 Approval Criteria

The Planning Director shall make written findings with respect to the following criteria when approving, approving with conditions, or denying an application for development in flood management areas:

A. Development, excavation, and fill shall be performed in a manner to maintain or increase flood storage and conveyance capacity and not increase design flood elevations.

Response: Exhibit A illustrates that flood storage capacity on the subject property will be maintained following new home construction on Lot 802. This criterion is met.

B. No net fill increase in any floodplain is allowed. All fill placed in a floodplain shall be balanced with an equal amount of soil material removal. Excavation areas shall not exceed fill areas by more than 50 percent of the square footage. Any excavation below the ordinary high water line shall not count toward compensating for fill.

Response: Exhibit A shows that the application balances cut and fill within the floodplain. This criterion can be met.

C. Excavation to balance a fill shall be located on the same lot or parcel as the fill unless it is not reasonable or practicable to do so. In such cases, the excavation shall be located in the same drainage basin and as close as possible to the fill site, so long as the proposed excavation and fill will not increase flood impacts for surrounding properties as determined through hydrologic and hydraulic analysis.

Response: As shown in Exhibit A, cut and fill will be balanced between Tax Lots 802 and 803, which are located in the same drainage basin. This criterion is met.

D. Minimum finished floor elevations must be at least one foot above the design flood height or highest flood of record, whichever is higher, for new habitable structures in the flood area.

Response: The base flood elevation on the subject property is 75.1 feet. As shown on Exhibit A, the finished floor of all new habitable space will be a minimum of 1 foot above the base flood elevation. This criterion is met.

E. Temporary fills permitted during construction shall be removed.

Response: Exhibit A shows that temporary fills are not anticipated. This criterion can be met.

F. Prohibit encroachments, including fill, new construction, substantial improvements, and other development in floodways unless certification by a professional civil engineer licensed to practice in the State of Oregon is provided demonstrating that encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge.

Response: Exhibit A shows that the site is not located in or near, nor will it encroach into, the floodway. This criterion does not apply.

G. All proposed improvements to the floodplain or floodway which might impact the flood-carrying capacity of the river shall be designed by a professional civil engineer licensed to practice in the State of Oregon.

Response: Exhibit A shows that all proposed improvements within the floodplain have been designed by a professional civil engineer licensed to practice in the State of Oregon. This criterion is met.

H. New culverts, stream crossings, and transportation projects shall be designed as balanced cut and fill projects or designed not to significantly raise the design flood elevation. Such projects shall be designed to minimize the area of fill in flood management areas and to minimize erosive velocities. Stream crossings shall be as close to perpendicular to the stream as practicable. Bridges shall be used instead of culverts wherever practicable.

Response: This application includes half-street improvements along Lot 802 and 9th Street frontage. These improvements have been designed to minimize impacts to the floodplain and nearby wetlands. This criterion is met.

I. Excavation and fill required for the construction of detention facilities or structures, and other facilities, such as levees, specifically shall be designed to reduce or mitigate flood impacts and improve water quality. Levees shall not be used to create vacant buildable land.

Response: Exhibit A illustrates a new raingarden on Tax Lot 802. Associated excavations and fills have been balanced across the site. This criterion can be met.

J. The applicant shall provide evidence that all necessary permits have been obtained from those federal, State, or local governmental agencies from which prior approval is required.

Response: A pre-construction FEMA Flood Elevation Certificate is included in Exhibit D. A completed elevation certificate will be furnished to the City following the completion of new home construction on Lot 802. This criterion is met.

27.070 Construction Materials and Methods

A. All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage using methods and practices that minimize flood damage.

B. Electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities shall be designed and/or otherwise elevated or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

C. New and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system.

D. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters.

E. On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

F. **All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.**

Response: The majority of new public and private utilities will be placed underground and will be resistant to flood impacts. New HVAC and other above-grade equipment will be located at least 1 foot above the base floor elevation. The criteria can be met.

27.080 Residential Construction

A. **New construction and substantial improvement of any residential structure shall have the lowest floor, including basement, elevated to at least one foot above the base flood elevation.**

Response: As shown in Exhibit A, the BFE is 75.1 feet. The Preliminary Grading Plan in Exhibit A further illustrates that the first floor of a new home on Lot 802 will be set at or above an elevation of 76.2 feet. The criteria are met.

B. **Fully enclosed areas below the lowest floor that are subject to flooding are prohibited, or shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must be certified by either a professional civil engineer or an architect licensed to practice in the State of Oregon, and must meet or exceed the following minimum criteria:**

1. **A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided.**
2. **The bottom of all openings shall be no higher than one foot above grade.**
3. **Openings may be equipped with screens, louvers, or other coverings or devices; provided, that they permit the automatic entry or exit of floodwaters.**
4. **Fully enclosed areas below the base flood elevation shall only be used for parking, access, and limited storage.**
5. **Service equipment (e.g., furnaces, water heaters, washer/dryers, etc.) is not permitted below the base flood elevation.**
6. **All walls, floors, and ceiling materials located below the base flood elevation must be unfinished and constructed of materials resistant to flood damage.**

Response: At time of building permit submittal, the City will ensure flood elevation design complies with these and other applicable building requirements.

C. **Crawlspaces. Crawlspaces are a commonly used method of elevating buildings in special flood hazard areas (SFHAs) to or above the base flood elevation (BFE), and are allowed subject to the following requirements:**

1. **The building is subject to the Flood-Resistant Construction provisions of the Oregon Residential Specialty Code.**
2. **They shall be designed by a professional engineer or architect licensed to practice in the State of Oregon to meet the standards contained in the most current Federal Emergency Management Agency's (FEMA) Technical Bulletin.**
3. **The building must be designed and adequately anchored to resist flotation, collapse, and lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.**
4. **Flood vent openings shall be provided on at least two sides that equalize hydrostatic pressures by allowing for the automatic entry and exit of floodwaters. The total area of the flood vent openings must be no less than one square inch for each square foot of enclosed area. The bottom of each flood vent opening can be no more than one foot above the lowest adjacent exterior grade. For guidance on flood openings, see FEMA Technical Bulletin 1-93, Openings in Foundation Walls.**

5. **Portions of the building below the BFE must be constructed with materials resistant to flood damage. This includes not only the foundation walls (studs and sheathing), but also any joists, insulation, or other materials that extend below the BFE. For more detailed guidance on flood-resistant materials see FEMA Technical Bulletin 2-93, Flood-Resistant Materials Requirements.**
6. **Utility systems within the crawlspace must be elevated above BFE or designed so that floodwaters cannot enter or accumulate within the system components during flood conditions. Ductwork, in particular, must either be placed above the BFE or sealed from floodwaters. For further guidance on the placement of building utility systems in crawlspaces, see FEMA 348, Protecting Building Utilities From Flood Damage. Flood-resistant materials and utilities, access, and ventilation openings in crawlspaces are further addressed in this bulletin.**
7. **The interior grade of a crawlspace below the BFE must not be more than two feet below the lowest adjacent exterior grade (LAG).**
8. **The height of the below-grade crawlspace, measured from the interior grade of the crawlspace to the top of the crawlspace foundation wall, must not exceed four feet at any point. This limitation will also prevent these crawlspaces from being converted into habitable spaces.**
9. **There must be an adequate drainage system that removes floodwaters from the interior area of the crawlspace. Possible options include natural drainage through porous, well-drained soils and drainage systems such as low-point drains, perforated pipes, drainage tiles, or gravel or crushed stone drainage by gravity.**
10. **The velocity of floodwaters at the site should not exceed five feet per second for any crawlspace. For velocities in excess of five feet per second, other foundation types should be used.**
11. **For more detailed information refer to FEMA Technical Bulletin 11-01 or the most current edition.**
12. **The use of below-grade crawlspaces to elevate the building to one foot above the BFE may cause an increase in flood insurance premiums, which are beyond the control of the City.**

D. A poured slab placed over fill can be used to elevate the lowest floor of a structure above the base flood elevation. However, when a building site is filled, it is still in the floodplain and no basements are permitted.

E. Placing a structure on piers, piles, and posts is allowed provided supporting members are designed to resist hydrostatic and hydrodynamic forces.

Response: This application does not include a request to construct any buildings on the subject property at this time. The City will confirm that the building plans conform to the applicable requirements stated herein at the time of the building permit submittal. This criterion can be met.

Chapter 28 – WILLAMETTE AND TUALATIN RIVER PROTECTION

28.030 Applicability

A. The Willamette and Tualatin River Protection Area is an overlay zone. The zone boundaries are identified on the City's zoning map, and include:

1. **All land within the City of West Linn's Willamette River Greenway Area.**
2. **All land within 200 feet of the ordinary low water mark of the Tualatin River, and all land within the 100-year floodplain of the Tualatin River.**

3. **In addition to the Willamette Greenway and Tualatin River Protection Area boundaries, this chapter also relies on the HCA Map to delineate where development should or should not occur. Specifically, the intent is to keep out of, or minimize disturbance of, the habitat conservation areas (HCAs). Therefore, if all, or any part, of a lot or parcel is in the Willamette Greenway and Tualatin River Protection Area boundaries, and there are HCAs on the lot or parcel, a Willamette and Tualatin River Protection Area permit shall be required unless the development proposal is exempt per CDC 28.040.**

Response: The Applicant is aware of the overlay zones and the intent to keep out of, or minimize disturbance of, the habitat conservation areas (HCAs). The subject property is located within the Willamette River Greenway Area (WRG) and the HCA overlay zones; therefore, the relative permit applications are included in this submittal.

B. **At the confluence of a stream or creek with either the Tualatin or Willamette River, the standards of this chapter shall apply only to those portions of the lot or parcel fronting the river. Meanwhile, development in those portions of the property facing or adjacent to the stream or creek shall meet the transition, setbacks and other provisions of Chapter 32 CDC, Water Resource Area Protection.**

Response: The subject property does not front the Tualatin or Willamette River, but the proposed development is located within the WRA. The Applicant's responses to CDC 32 are found in the relevant chapter below.

C. **All uses permitted under the provisions of the underlying base zone and within the Willamette and Tualatin River Protection Area zone are allowed in the manner prescribed by the base zone subject to applying for and obtaining a permit issued under the provisions of this chapter unless specifically exempted per CDC 28.040.**

Response: The Applicant understands the provisions of the applicable R-10 zone in the context of the WRG overlay and has included the appropriate permit application with this submittal.

D. **The construction of a structure in the HCA or the expansion of a structure into the HCA when the new intrusion is closer to the protected water feature than the pre-existing structure.**

Response: This application seeds approval to construct a new home in the HCA. The applicable criteria of this section are responded to below.

28.040 Exemptions/Uses Permitted Outright

The following development activities do not require a permit under the provisions of this chapter. (Other permits may still be required.)

A. **Customary dredging and channel maintenance conducted under permit from the State of Oregon.**

B. **Seasonal increases in gravel operations under permit from the State of Oregon and/or the United States Army Corps of Engineers.**

C. **Scenic easements and their maintenance.**

D. **Replacement-in-kind or minor modification by public utilities for pump stations, public bathrooms, utilities, existing utility lines, wires, fixtures, equipment, circuits, appliances, and conductors and similar facilities.**

E. **Flood emergency procedures and the maintenance and repair of existing flood control facilities.**

F. **Signs, markers, announcements, etc., placed by a public agency to serve the public.**

G. **Maintenance or repair of existing residential houses, structures and docks, provided the work does not involve expansion of building square footage or building footprint.**

H. Storage of equipment or material associated with uses permitted, providing that the storage complies with applicable provisions of this chapter.

I. A change of use of a building or other structure which does not substantially alter or affect the land or water upon which it is situated.

J. Landscaping with native or existing vegetative materials only (excluding nuisance or prohibited plants on the Metro Native Plant List).

K. Routine repair and maintenance of legally established structures, utilities, roads, and manmade water control facilities such as constructed ponds or lakes, wastewater facilities, and stormwater treatment facilities that do not alter the location or footprint of the structure, utility, or road.

L. Reasonable emergency procedures necessary for the safety or protection of property.

M. Minor modifications. A modification shall be considered "minor" when it results in a change in the approved design that is equal to or less than a 10 percent increase in the length, width or height of the facility. A change of location by under 20 feet laterally for any part of the structure, ramp, dock, etc., also constitutes a minor modification.

N. The action of any City officer or employee of any public utility to remove or alleviate from immediate danger to life or property, to restore existing utility service or to reopen a public thoroughfare to traffic; provided, that after the emergency has passed, adverse impacts are mitigated in accordance with CDC 32.070.

O. Routine maintenance activities such as removing dead or dying vegetation that constitutes a hazard to life or property, pollutants, trash, eroded material, etc.

P. Wetland, riparian and upland enhancement or restoration projects done with approval of City staff and regulatory agency personnel (e.g., ODFW, DSL).

Q. Temporary and minor clearing not to exceed 200 square feet for the purpose of site investigations and pits for preparing soil profiles; provided, that such areas are restored to their original condition when the investigation is complete. For wetlands, such clearing shall not occur within the actual wetland itself, but only within the adjacent wetland transition area. While such temporary and minor clearing is exempt from the provisions of this chapter, it is subject to all other City codes, including provisions for erosion control and tree removal.

R. Removal of plants identified as nuisance or prohibited plants on the Metro Native Plant List and the planting or propagation of plants identified as native plants on the Metro Native Plant List. Handheld tools must be used to remove nuisance or prohibited plants, and after such removal all open soil areas greater than 25 square feet must be replanted.

S. In cases where the required development standards of this chapter are applied and met with no encroachment into HCAs, and also meeting subsections T and U of this section, where applicable, then no permit under the provisions of this chapter will be required. For example, if the proposed development or action will be located in the "Habitat and Impact Areas Not Designated as HCAs" and keeps out of the habitat conservation areas, a Willamette or Tualatin River Protection Area permit shall not be required. Floodplain management area or other permits may still be required.

T. The construction, remodeling or additions of home and accessory structures that take place completely within the "Habitat and Impact Areas Not Designated as HCAs" shall be exempt from a Willamette or Tualatin River Protection Area permit. Where the "Habitat and Impact Areas Not Designated as HCAs" goes to the edge of a clearly defined top of bank, the applicant's home and accessory structures shall be set back at least 15 feet from top of bank. At-grade patios and deck areas within 30 inches of grade may extend to within five feet from top of bank. No overhang or cantilevering of structures is permitted over HCA or over setback area. If these terms are met then no permit will be required under this chapter.

U. Maintenance, alteration, expansion, repair and replacement of existing structures are exempt, provided impermeable surfaces do not exceed 5,000 square feet and that it complies with the provisions of Chapters 27 and 28 CDC. The following standards shall also apply:

1. Rebuilding of existing residential and non-residential structures within the same foundation lines as the original structure(s) including, but not limited to, those damaged or destroyed by fire or other natural hazards; or
2. The alteration, expansion, repair and replacement of a house or structure per the standards of CDC 28.110(E) not to exceed 5,000 square feet of impermeable surface per that section; or
3. The alteration, expansion, repair and replacement of a house or structure vertically where the applicant is adding additional floors or expanding above the footprint of the existing structure regardless of whether the structure's footprint is in an HCA or not.

V. Maintenance of existing gardens, pastures, lawns, and landscape perimeters, irrigation systems within existing gardens, lawns, and landscape perimeters. New irrigation systems are not permitted where none existed before. The City encourages restoration of areas within the drainageway transition to native vegetation.

W. Low impact public or private outdoor recreation facilities including, but not limited to, multi-use water-permeable paths and trails to a maximum width of four feet, picnic areas, interpretive displays, benches. Gazebos or similar structures must be out of the HCA areas to be exempt. No more than 500 square feet of new lot coverage allowed under this provision.

X. Interior remodeling.

Y. Installation of new and/or replacement water-permeable driveways, paths and patios and two-track driveways outside of HCAs. Surface area cannot exceed amount allowed by lot coverage standards of underlying zone.

Z. Accessory structures under 15 feet tall and 500 square feet located on the opposite side of the house or principal structure from the resource area requires only a building permit.

AA. Lands that are designated as an HCA only due to a forested canopy shall be exempted since trees are already protected in the municipal code and Chapters 55 and 85 CDC. Development of lands that are designated as HCA due to other variables such as wetlands, flood areas and steep slopes shall still be regulated by the provisions of this chapter and not exempted.

BB. Construction of a public pathway by dedication or easement accepted by the City.

CC. A new dock subject to the approval criteria of this chapter.

DD. Public docks, gangways, and other water related accessory facilities.

<u>Response:</u> This application does not include a request for any of the exemptions listed above. These criteria do not apply.

28.050 Prohibited Uses

The following are prohibited:

1. Residential floating structures, also known as floating homes or houseboats.
2. Permanent ski jumps.
3. More than one dock with or without a boat house per riverfront lot of record, except City-owned tax lots 100, 200, 300, 400, and 500 of Assessor's Map 21 East 24.
4. The location of any dock under any water condition that prevents what would otherwise be historic, safe, uninterrupted water passage.
5. Any new lawn area or garden area consisting primarily of non-native vegetation within HCA lands. A lawn area in the "Allowed Development" area is permitted.

6. **Planting of any species identified as nuisance or prohibited plants on the Metro Native Plant List.**

7. **Non-permitted storage of hazardous materials as defined by the Oregon Department of Environmental Quality and dumping of any materials of any kind.**

8. **Excessive trimming or removal of existing native vegetation within the HCA unless it is to reestablish native vegetation in place of non-native or invasive vegetation.**

Response: This application does not include, nor does the Applicant anticipate, any of the above-listed prohibited uses on site. The criteria do not apply.

28.060 Administration and Approval Process

An application for a protection area permit shall be processed pursuant to the provisions of Chapter 99 CDC, Procedures for Decision-Making: Quasi-Judicial.

Response: The Applicant understands that the application decision will be processed per the applicable provisions of CDC Chapter 99. The criterion will be met.

28.070 Planning Director Verification of Metro Habitat Protection Map Boundaries

A. **The HCA Map is the basis for identifying and designating the habitat conservation areas in the City. A copy of the latest, updated HCA Map is on file at the City and is adopted by reference for use with this chapter.**

It is inevitable, given the large area that Metro's HCA Map covers, that there may be some errors. In cases where, for example, three properties share the same contours and the same natural features but the map shows the middle lot with an HCA designation on it, it is reasonable to question the accuracy of that HCA designation. Using tree overstory as the sole basis for HCA designation will also allow a change in designation since trees are already protected in the municipal code and Chapters 55 and 85 CDC.

B. **The Planning Director shall verify the appropriate HCA or non-HCA designation by site visits or consultations with Metro or by other means. Determination is based on whether the Metro criteria are met or whether the Metro designation was based solely on tree overstory in which case a redesignation is appropriate. In cases where the determination is that the map is incorrect, the Planning Director will make a written finding of this as well as the site conditions that led to that conclusion.**

C. **Class B public notice, per Chapter 99 CDC, shall be required prior to issuance of the redesignation decision if it involves redesignation of the HCA boundary to allow the construction of, or addition to, a house.**

D. **This determination and findings shall become part of the City record and part of the record for any associated land use application. The Planning Director shall also include in the record the revised map boundary. The Planning Director's determination and map revisions shall also be sent to Metro so that their map may be corrected as necessary.**

E. **The Planning Director determination is appealable to the City Council per Chapter 99 CDC.**

F. **Lands that are designated as an HCA only due to a forested overstory are exempt under CDC 28.040, Exemptions, since trees are already protected in the municipal code and Chapters 55 and 85 CDC. Similar exemptions apply to lands that exhibit no constraints.**

Response: The Applicant understands that the HCA Map is the basis for identifying and designating HCAs in the City and errors on the Map are a possibility. The Applicant is also aware of the Planning Director's process for determination and verification of the HCA Map Boundaries. This application relies on the HCA boundaries as adopted in the City and HCA lands inventory.

28.090 Submittal Requirements

A. An application for a protection area permit shall be initiated by the property owner or the owner's authorized agent. Evidence shall be provided to demonstrate that the applicant has the legal right to use the land above the OLW. The property owner's signature is required on the application form.

Response: An application form signed by the property owner is included in the exhibits attached hereto as Exhibit B. Property owner verification is provided as Exhibit C. These criteria are met.

B. A prerequisite to the filing of an application is a pre-application conference at which time the Planning Director shall explain the provisions of this chapter and provide appropriate forms as set forth in CDC 99.030(B).

Response: The Applicant met with City staff for a pre-application conference on June 20, 2019. This criterion is met.

C. An application for a protection area permit shall include the completed application and:

1. **Narrative which addresses the approval criteria of CDC 28.110.**
2. **A site plan, with HCA boundaries shown and by low, moderate, high type shown (CDC 28.120).**
3. **A grading plan if applicable (CDC 28.130).**
4. **Architectural drawings if applicable (CDC 28.140).**
5. **A landscape plan if applicable (CDC 28.150).**
6. **A mitigation plan if applicable (CDC 28.160).**
7. **A storm detention and treatment plan and narrative statement pursuant to CDC 92.010(E).**

One original application form must be submitted. One copy at the original scale and one copy reduced to 11 inches by 17 inches or smaller of all drawings and plans must be submitted. One copy of all other items, including the narrative, must be submitted. The applicant shall also submit one copy of the complete application in a digital format acceptable to the city. When the application submittal is determined to be complete, additional copies may be required as determined by the Planning Director.

Response: As supported by this narrative and the accompanying exhibits, required submittal elements are included with this application. These criteria are met.

D. The applicant shall pay the requisite fees.

Response: Requisite fees are included with this submittal. This criterion is met.

E. The applicant shall be responsible for, and shall apply for, all applicable State and/or federal permits.

Response: The Applicant understands it is his responsibility to apply for all applicable state and/or federal permits, if any are required. This criterion can be met.

F. The applicant shall include a map, approved or acknowledged by DSL, of the preference rights and authorized areas if a water surface structure is proposed.

Response: This application does not include a request for a water surface structure. This criterion does not apply.

28.100 Additional Submittal Information Required, Waiver of Submittal Requirements

A. The Planning Director may require additional information as a part of the application subject to the provisions of CDC 99.035(A).

B. The Planning Director may waive any submittal requirement for the application subject to the provisions of CDC 99.035(B) and (C).

Response: The Planning Director has not requested any additional information as part of this application. The application does not seek a waiver to any of the submittal requirements of this chapter. The criteria do not apply.

28.110 Approval Criteria

No application for development on property within the protection area shall be approved unless the decision-making authority finds that the following standards have been met or can be met by conditions of approval. The development shall comply with the following criteria as applicable:

A. Development: All sites.

1. Sites shall first be reviewed using the HCA Map to determine if the site is buildable or what portion of the site is buildable. HCAs shall be verified by the Planning Director per CDC 28.070 and site visit. Also, "tree canopy only" HCAs shall not constitute a development limitation and may be exempted per CDC 28.070(A). The municipal code protection for trees and Chapters 55 and 85 CDC tree protection shall still apply.

2. HCAs shall be avoided to the greatest degree possible and development activity shall instead be directed to the areas designated "Habitat and Impact Areas Not Designated as HCAs," consistent with subsection (A)(3) of this section.

3. If the subject property contains no lands designated "Habitat and Impact Areas Not Designated as HCAs" and development within HCA land is the only option it shall be directed towards the low HCA areas first, then medium HCA areas and then to high HCA as the last choice. The goal is to, at best, avoid or, at least, minimize disturbance of the HCAs. (Water-dependent uses are exempt from this provision.)

Response: The subject property does not contain any lands designated as "Habitat and Impact Areas Not Designated as HCAs." Exhibit F shows that although the property is covered with a moderate HCA designation, the buildable envelope is configured further away from the WRA to minimize impacts to the HCA. This criterion can be met.

4. All development, including exempted activities of CDC 28.040, shall have approved erosion control measures per Clackamas County Erosion Prevention and Sediment Control Planning and Design Manual, rev. 2008, in place prior to site disturbance and be subject to the requirements of CDC 32.070 and 32.080 as deemed applicable by the Planning Director.

Response: Exhibit A shows that the site design is configured to accommodate new home construction with the least impact to the HCA. The City will ensure that all applicable erosion control measures are in place prior to site construction. The criterion is met.

B. Single-family or attached residential. Development of single-family homes or attached housing shall be permitted on the following HCA designations and in the following order of preference with "a" being the most appropriate and "d" being the least appropriate:

Response: The Applicant is aware that there is a discrepancy between the adopted HCA Map and the text of this section; normally, that the adopted map includes only two classifications of HCA land, "HCAs" and "Allowed Development" areas. The current Metro Map, which has not been adopted into this ordinance, does include the four classifications (a-d) discussed in this section. Nonetheless, the entire subject property is located within West Linn's HCA (and Metro's Type C HCA) and there are no portions of the lot to relocate new home construction that would minimize impacts to the HCA.

1. **Development of land classifications in "b," "c" and "d" shall not be permitted if at least a 5,000-square-foot area of buildable land ("a") exists for home construction, and associated impermeable surfaces (driveways, patios, etc.).**

Response: Exhibit F illustrates that the entire subject property is classified as "c" which is designated as "Moderate HCA" for this R-10 zone and does not have at least 5,000 square feet of buildable land classified as "a." This criterion is met.

2. **If 5,000 square feet of buildable land ("a") are not available for home construction, and associated impermeable surfaces (driveways, patios, etc.) then combinations of land classifications ("a," "b" and "c") totaling a maximum of 5,000 square feet shall be used to avoid intrusion into high HCA lands. Development shall emphasize area "a" prior to extending construction into area "b," then "c" lands.**

Response: The Applicant is aware that there is a discrepancy between the adopted HCA Map and the text of this section; normally, that the adopted map includes only two classifications of HCA land, "HCAs" and "Allowed Development" areas. The current Metro Map, which has not been adopted into this ordinance, does include the four classifications (a-d) discussed in this section. Nonetheless, the entire subject property is located within West Linn's HCA (and Metro's Type C HCA) and there are no portions of the lot to relocate new home construction that would minimize impacts to the HCA.

3. **The underlying zone FAR shall also apply as well as allowable lot coverage.**

Response: As previously discussed, a minimum FAR at 4,380 square feet is allowed on Lot 802. Maximum lot coverage is 5,000 square feet. This criterion is met.

4. **Development may occur on legal lots and non-conforming lots of record located completely within the HCA areas or that have the majority of the lot in the HCA to the extent that the applicant has less than 5,000 square feet of non-HCA land.**

   Development shall disturb the minimum necessary area to allow the proposed use or activity, shall direct development to any available non-HCA lands and in any situation shall create no more than 5,000 square feet of impervious surface. (Driveways, paths, patios, etc., that are constructed of approved water-permeable materials will not count in calculating the 5,000-square-foot lot coverage.) The underlying zone FAR and allowable lot coverage shall also apply and may result in less than 5,000 square feet of lot coverage.

Response: The subject property is a legal lot of record with less than 5,000 square feet of non-HCA land. As illustrated in Exhibit F, new development minimizes disturbance to HCAs and will result in less than 5,000 square-feet of new impervious area. The criterion is met.

> **When only HCA land is available then the structure shall be placed as far away from the water resource area or river as possible. To facilitate this, the front setback of the structure or that side which is furthest away from the water resource or river may be reduced to a five-foot setback from the front property line without a variance. Any attached garage must provide a 20-foot by 20-foot parking pad or driveway so as to provide off-street parking exclusive of the garage. The setbacks of subsection C of this section shall still apply.**

Response: The subject property only has HCA land available for future development. As provided above, the Applicant is requesting approval for a reduced front setback (20 feet to 12 feet) to further minimize impacts to natural resources. Exhibit A shows the proposed setback reduction with the building footprint in compliance with this requirement. This criterion can be met.

5. **Driveways, paths, patios, etc., that are constructed of approved water-permeable materials will be exempt from the lot coverage calculations of subsections (B)(1) through (4) of this section and the underlying zone.**

Response: The Applicant is aware that approved water-permeable material is exempt from lot coverage calculations. This criterion can be met.

6. **Table showing development allowed by land classification:**

Table 1: Development Allowed by Land Classification

Classification	Development Allowed
Non-HCA ("a")	Yes
Low-Medium HCA ("b" and "c")	Yes, if less than 5,000 sq. ft. of non-HCA land available. Avoid "d."
High HCA ("d")	Yes, but only if less than 5,000 sq. ft. of "a," "b" and "c" land available.
Non-conforming Structures (structures on HCA land)	Yes: vertically, laterally and/or away from river. Avoid "d" where possible.

(The underlying zone FAR and allowable lot coverage shall also apply.)

C. **Setbacks from top of bank.**

1. **Development of single-family homes or attached housing on lands designated as "Habitat and Impact Areas Not Designated as HCAs" shall require a structural setback of 15 feet from any top of bank that represents the edge of the land designated as "Habitat and Impact Areas Not Designated as HCAs."**

Response: The subject property does not have any land designated as "Habitat and Impact Areas Not Designated as HCAs." This criterion does not apply.

2. **At-grade water-permeable patios or decks within 30 inches of grade may encroach into that setback but must keep five feet from top of bank and cannot cantilever over the top of bank or into the five-foot setback area.**

Response: The Applicant is aware of this standard regarding encroachments for at-grade, water-permeable patios or decks within 30 inches of grade. This criterion can be met.

3. **For properties that lack a distinct top of bank the applicant shall identify the boundary of the area designated as "Habitat and Impact Areas Not Designated as HCAs" which is closest to the river. A structural setback of 15 feet is required from that boundary line. That 15-foot measurement extends from the boundary line away from the river. At-grade water-permeable patios or decks within 30 inches of grade may encroach into that setback 10 feet but must keep five feet from the boundary and cannot cantilever into the five-foot setback area. For vacant lots of record that comprise no lands with "Habitat and Impact Areas Not Designated as HCAs" designation or insufficient lands with those designations so that the above setbacks cannot be met, the house**

shall be set back as far from river as possible to accommodate house as part of the allowed 5,000 square feet of impermeable surfaces.

Response: The subject property is a vacant lot of record and does not comprise any lands classified as "Habitat and Impact Areas Not Designated as HCAs." The accompanying exhibits demonstrate that a future home will be set back as far from the river as possible while adhering to other applicable rules. This criterion is met.

…

E. Hardship provisions and non-conforming structures.

1. For the purpose of this chapter, non-conforming structures are existing structures whose building footprint is completely or partially on HCA lands. Any additions, alterations, replacement, or rehabilitation of existing non-conforming non-water-related structures (including decks), roadways, driveways, accessory uses and accessory structures shall avoid encroachment upon the HCAs, especially high HCAs, except that:

a. A 10-foot lateral extension of an existing building footprint is allowed if the lateral extension does not encroach any further into the HCA or closer to the river or water resource area than the portion of the existing footprint immediately adjacent.

b. An addition to the existing structure on the side of the structure opposite to the river or water resource area shall be allowed. There will be no square footage limitation in this direction except as described in subsection (E)(1)(c) of this section.

c. The same allowance for the use of, and construction of, 5,000 square feet of total impervious surface for sites in HCAs per subsections (B)(2) through (4) of this section shall apply to lots in this section.

d. Vertical additions are permitted including the construction of additional floors.

e. The provisions of Chapter 66 CDC, Non-conforming Structures, shall not apply.

Response: This application does not include a hardship request involving any "non-conforming structures." These criteria do not apply.

F. Access and property rights.

1. Private lands within the protection area shall be recognized and respected.

2. Where a legal public access to the river or elsewhere in the protection area exists, that legal public right shall be recognized and respected.

Response: The Applicant recognizes the protection areas and will respect them accordingly. The site does not abut the river or provide opportunities for public access to the river.

3. To construct a water-dependent structure such as a dock, ramp, or gangway shall require that all pre-existing legal public access or similar legal rights in the protection area be recognized and respected. Where pre-existing legal public access, such as below the OLW, is to be obstructed by, for example, a ramp, the applicant shall provide a reasonable alternate route around, over or under the obstruction. The alternate route shall be as direct as possible. The proposed route, to include appropriate height clearances under ramps/docks and specifications for safe passage over or around ramps and docks, shall be reviewed and approved by the Planning Director for adequacy.

4. **Any public or private water-dependent use or facility shall be within established DSL-authorized areas.**

5. **Legal access to, and along, the riverfront in single-family residential zoned areas shall be encouraged and pursued especially when there are reasonable expectations that a continuous trail system can be facilitated. The City recognizes the potential need for compensation where nexus and proportionality tests are not met. Fee simple ownership by the City shall be preferred. The trail should be dimensioned and designed appropriate to the terrain it traverses and the user group(s) it can reasonably expect to attract. The City shall be responsible for signing the trail and delineating the boundary between private and public lands or access easements.**

Response: This application does not include a request to construct a water-dependent structure, facility, or trail. These criteria do not apply.

I. Docks and other water-dependent structures.

1. **Once the preference rights area is established by DSL, the property owner identifies where the water-dependent use will be located within the authorized portion of the preference rights area. The water-dependent use should be centered or in the middle of the preference rights/authorized area or meet the side yard setbacks of the underlying zone.**

   Private and public non-commercial docks are permitted where dredging is required so long as all applicable federal and State permits are obtained. Dredging is encouraged if deposits silt up under an existing dock. Dredging is seen as preferable to the construction of longer docks/ramps.

2. **Both joint and single use docks shall not extend into the water any further than necessary to provide four feet between the ship's keel or fixed propeller/rudder and the bottom of the water at any time during the water's lowest point.**

3. **In no case except as provided in this section shall a private ramp and private dock extend more than 100 feet from OLW towards the center of the river or slough. In the case of L-shaped docks, the 100 feet shall be measured from the OLW to the furthest part of the private dock closest to the center of the river.**

4. **Docks on sloughs and similar channels shall not extend more than 30 percent of the distance between two land masses at OHW, such as between the mainland and an island or peninsula, measured in a lineal manner at right angle to the dominant shoreline. In no way shall a dock impede existing public usage or block navigation of a channel.**

5. **Boat storage associated with a rail launch facility shall be located above the OHW, either vertically raised above the ordinary high water line or set back behind the OHW. Such boat storage structure will be natural wood colors or similar earth tones. Private railed launch facilities are permitted for individual boat owners. The onshore setback of the storage structure is equal distance on both sides as extended perpendicular to the thread of the stream, or seven and one-half feet, whichever is the greater setback.**

6. **The width of each deck section shall be no more than 12 feet wide.**

7. **For only single-user and joint-user docks, pilings shall not exceed a maximum height of eight feet above the 100-year flood elevation.**

8. **A single user non-commercial dock shall not exceed 400 square feet in deck area. The boat slip is not included in the calculation of this square footage limitation.**

9. **Private non-commercial boat houses are allowed but only if they are within 50 feet of OLW and/or in locations sufficiently screened from view so that they do not have a significant visual impact on views from adjacent and nearby homes. Building and roof colors shall be brown, gray, beige, natural or similar earth tones. Non-commercial boat houses shall not exceed 12 feet in height measured from the boat house deck level to the roof peak. The size of the boat house shall be sized to accommodate one boat only and shall not exceed a footprint greater than 500 square feet. Boatlifts are permitted within the boat house. The above provisions also apply to open-walled boat shelters with or without boatlifts.**

J. **Joint docks.**

1. **Joint use boat docks may be permitted by the reviewing authority where the applicants are riverfront property owners, ideally owners of adjacent lots of record.**
2. **Co-owners of the joint dock use shall be prohibited from having their own non-joint dock.**
3. **A joint use agreement shall be prepared which will be included in the application for review by the reviewing authority and subsequently recorded. A copy of the recorded document with the County Recorder's stamp shall be submitted to the City.**
4. **A condition of approval for any joint use permit shall be that the dock must be used to serve the same lots of record for which the dock permit was issued. Joint use cannot be transferred to, or used by, any party other than the original applicants or the future owners of those properties.**
5. **Joint docks may go on the common property line between the two landowners who are sharing the dock. Unless agreed to by the adjoining owner, joint docks not being shared with the adjacent property owner must be at least 15 feet from the preference rights area side lines or centered in the middle of the preference rights area.**

Response: This application does not include a request to build any joint docks. These criteria do not apply.

L. **Roads, driveways, utilities, or passive use recreation facilities. Roads, driveways, utilities, public paths, or passive use recreation facilities may be built in those portions of HCAs that include wetlands, riparian areas, and water resource areas when no other practical alternative exists but shall use water-permeable materials unless City engineering standards do not allow that. Construction to the minimum dimensional standards for roads is required. Full mitigation and revegetation is required, with the applicant to submit a mitigation plan pursuant to CDC 32.070 and a revegetation plan pursuant to CDC 32.080. The maximum disturbance width for utility corridors is as follows:**

1. **For utility facility connections to utility facilities, no greater than 10 feet wide.**
2. **For upgrade of existing utility facilities, no greater than 15 feet wide.**
3. **For new underground utility facilities, no greater than 25 feet wide, and disturbance of no more than 200 linear feet of water quality resource area, or 20 percent of the total linear feet of water quality resource area, whichever is greater.**

Response: Exhibit A illustrates the design for public improvements to roads, driveways and utilities within the HCA at the minimum dimensional standards for construction. The required mitigation and revegetation plan under CDC 32.080 are attached as Exhibit F to this application. The criteria are met.

M. **Structures. All buildings and structures in HCAs and riparian areas, including all exterior mechanical equipment, should be screened, colored, or surfaced so as to blend with the riparian environment. Surfaces shall be non-polished/reflective or at least expected to lose their luster within a year. In addition to the specific standards and criteria applicable to water-dependent uses (docks), all other provisions of this chapter shall apply to water dependent uses, and any structure shall be no larger than necessary to accommodate the use.**

Response: Building-specific information is not available at this time. At time of the building permit submittal, the City will confirm that building plans are consistent with the applicable requirements stated herein. These criteria can be met.

N. **Water-permeable materials for hardscapes. The use of water-permeable materials for parking lots, driveways, patios, and paths as well as flow-through planters, box filters, bioswales and drought tolerant plants are strongly encouraged in all "a" and "b" land classifications and shall be required in all "c" and "d" land classifications. The only exception in the "c" and "d" classifications would be where it is demonstrated that water-permeable driveways/hardscapes could not structurally support the axle weight of vehicles or equipment/storage load using those areas. Flow through planters, box filters, bioswales, drought tolerant plants and other measures of treating and/or detaining runoff would still be required in these areas.**

Response: The City has not adopted the land classification scheme described above. Additionally, several construction and building-related details are unknown at this time. While this application demonstrates that a new home on Lot 802 will satisfy the applicable lot coverage, maximum disturbance area, and maximum impervious area standards, the City's building department will need to confirm that building plans satisfy other applicable standards.

O. **Signs and graphics. No sign or graphic display inconsistent with the purposes of the protection area shall have a display surface oriented toward or visible from the Willamette or Tualatin River. A limited number of signs may be allowed to direct public access along legal routes in the protection area.**

Response: This application does not include a request for any signs or graphic displays on the subject property. This criterion does not apply.

P. **Lighting. Lighting shall not be focused or oriented onto the surface of the river except as required by the Coast Guard. Lighting elsewhere in the protection area shall be the minimum necessary and shall not create off-site glare or be omni-directional. Screens and covers will be required.**

Response: The Applicant is aware that the lighting placement on the subject property must be focused or oriented away from the protection area. The minimum necessary lighting will be directed so as not to create off-site glare or be omni-directional. This criterion can be met.

Q. **Parking. Parking and unenclosed storage areas located within or adjacent to the protection area boundary shall be screened from the river in accordance with Chapter 46 CDC, Off-Street Parking, Loading and Reservoir Areas. The use of water-permeable material to construct the parking lot is either encouraged or required depending on HCA classification per CDC 28.110(N)(4).**

Response: The Applicant is aware of the requirements for parking and unenclosed storage areas and as responded with the standards of CDC Chapters 46 and 28, respectively. This criterion can be met.

R. **Views. Significant views of the Willamette and Tualatin Rivers shall be protected as much as possible as seen from the following public viewpoints: Mary S. Young Park, Willamette Park, Cedar Oak Park, Burnside Park, Maddox Park, Cedar Island, the Oregon City Bridge, Willamette Park, and Fields Bridge Park.**

Where options exist in the placement of ramps and docks, the applicant shall select the least visually intrusive location as seen from a public viewpoint. However, if no options exist, then the ramp, pilings and dock shall be allowed at the originally proposed location.

Response: The subject site is not located between the above-listed viewpoints and the Willamette River. The criterion does not apply.

S. **Aggregate deposits. Extraction of aggregate deposits or dredging shall be conducted in a manner designed to minimize adverse effects on water quality, fish and wildlife, vegetation, bank stabilization, stream flow, visual quality, noise and safety, and to promote necessary reclamation.**

Response: This application does not seek approval for extraction of aggregate deposits. This criterion does not apply.

T. **Changing the landscape/grading.**

1. **Existing predominant topographical features of the bank line and escarpment shall be preserved and maintained except for disturbance necessary for the construction or establishment of a water related or water dependent use. Measures necessary to reduce potential bank and escarpment erosion, landslides, or flood hazard conditions shall also be taken.**

   Any construction to stabilize or protect the bank with rip rap, gabions, etc., shall only be allowed where there is clear evidence of erosion or similar hazard and shall be the minimum needed to stop that erosion or to avoid a specific and identifiable hazard. A geotechnical engineer's stamped report shall accompany the application with evidence to support the proposal.

Response: This application does not impact the bank line. The criterion does not apply.

2. **The applicant shall establish to the satisfaction of the approval authority that steps have been taken to minimize the impact of the proposal on the riparian environment (areas between the top of the bank and the low water mark of the river including lower terrace, beach and river edge).**

Response: Although the subject property is located in the WRG, the site is approximately 850 feet north of the Willamette River and is not in the associated riparian corridor. As such, the application will not result in impacts to the riparian environment. The criterion does not apply.

3. **The applicant shall demonstrate that stabilization measures shall not cause subsequent erosion or deposits on upstream or downstream properties.**

4. **Prior to any grading or development, that portion of the HCA that includes wetlands, creeks, riparian areas and water resource area shall be protected with an anchored chain link fence (or approved equivalent) at its perimeter and shall remain undisturbed except as specifically allowed by an approved Willamette and Tualatin River Protection and/or water resource area (WRA) permit. Such fencing shall be maintained until construction is complete. That portion of the HCA that includes wetlands, creeks, riparian areas and water resource area shall be identified with City-approved permanent markers at all boundary direction changes and at 30- to 50-foot intervals that clearly delineate the extent of the protected area.**

5. Full erosion control measures shall be in place and approved by the City Engineer prior to any grading, development or site clearing.

Response: As shown in Exhibit A, an erosion and sediment control fence will delineate the boundary of disturbance areas onsite. This fencing will be maintained throughout the duration of site construction.

U. Protect riparian and adjacent vegetation. Vegetative ground cover and trees upon the site shall be preserved, conserved, and maintained according to the following provisions:

1. Riparian vegetation below OHW removed during development shall be replaced with indigenous vegetation, which shall be compatible with and enhance the riparian environment and approved by the approval authority as part of the application.
2. Vegetative improvements to areas within the protection area may be required if the site is found to be in an unhealthy or disturbed state by the City Arborist or his or her designated expert. "Unhealthy or disturbed" includes those sites that have a combination of native trees, shrubs, and groundcover on less than 80 percent of the water resource area and less than 50 percent tree canopy coverage in the primary and secondary habitat conservation area to be preserved. "Vegetative improvements" will be documented by submitting a revegetation plan meeting CDC 28.160 criteria that will result in the primary and secondary habitat conservation area to be preserved having a combination of native trees, shrubs, and groundcover on more than 80 percent of its area, and more than 50 percent tree canopy coverage in its area. The vegetative improvements shall be guaranteed for survival for a minimum of two years. Once approved, the applicant is responsible for implementing the plan prior to final inspection.
3. Tree cutting shall be prohibited in the protection area except that:
    a. Diseased trees or trees in danger of falling may be removed with the City Arborist's approval; and
    b. Tree cutting may be permitted in conjunction with those uses listed in CDC 28.030 with City Arborist approval; to the extent necessary to accommodate the listed uses;
    c. Selective cutting in accordance with the Oregon Forest Practices Act, if applicable, shall be permitted with City Arborist approval within the area between the OHW and the greenway boundary provided the natural scenic qualities of the greenway are maintained.

Response: As shown in Exhibit A, scheduled tree removal is necessary to accommodate a new home on Lot 802 that minimizes WRA and associated impacts. No tree removal below the OHW is anticipated.

28.120 Site Plan

A. All site plans and maps shall include the name, address and telephone number of the applicant, a lineal scale of the plot plan, a north arrow and a vicinity map.

B. The applicant shall submit a site plan drawn to an appropriate scale (in order of preference: one inch equals 10 feet to one inch equals 30 feet), which contains the following information:

1. Assessor's Map number and tax lot number.
2. The lot or parcel boundaries, dimensions and gross area.
3. The applicant's property and the surrounding property to a distance sufficient to determine the relationship between the applicant's property and proposed development to the adjacent property and development.

4. The location, dimensions, and names of all existing and platted streets and other public ways and easements on adjacent property and on the site.

5. The location, dimensions and setback distances of all:

    a. Existing structures, improvements, utility facilities and drainageways on site and on adjoining properties;

    b. Proposed structures or changes to existing structures, improvements, utility facilities and drainageways on the site.

6. All developments shall define and map existing public access rights on, and adjacent to, the subject property.

7. A slope contour map at minimum two-foot intervals showing slope classifications of zero to 25 percent and greater than 25 percent.

8. If a wetland on the West Linn Local Wetland Inventory is identified on the property and the proposed activity is expected to encroach within 25 feet of the wetland, a delineation of the precise boundaries of that wetland prepared by a wetland biologist.

9. The location of the ordinary high water mark and the ordinary low water mark on the property and on abutting properties.

10. The delineation of areas designated "Habitat and Impact Areas Not Designated as HCAs" and HCA areas by low, medium and high designation shall be mapped based on the HCA Map and any necessary verification shall be done by the Planning Director.

Response: This application includes all applicable information as listed above. The criteria are met.

28.130 Grading Plan

The grading plan shall be at the same scale as the site plan (CDC 28.120) and shall show or attach:

A. The location and extent to which grading will take place indicating general contour lines, slope ratios, slope stabilization proposals, and location and height of retaining walls, if proposed.

B. Tables and maps identifying acreage, location and type of development constraints due to site characteristics such as slope, drainage and geologic hazards. For Type I, II, and III lands (refer to definitions in Chapter 02 CDC), the applicant must provide a geologic report, with text, figures and attachments as needed to meet the industry standard of practice, prepared by a certified engineering geologist and/or a geotechnical professional engineer, that includes:

    1. Site characteristics, geologic descriptions and a summary of the site investigation conducted;

    2. Assessment of engineering geological conditions and factors;

    3. Review of the City of West Linn's Natural Hazard Mitigation Plan and applicability to the site; and

    4. Conclusions and recommendations focused on geologic constraints for the proposed land use or development activity, limitations and potential risks of development, recommendations for mitigation approaches and additional work needed at future development stages including further testing and monitoring.

C. Sufficient factual data to support the conclusions of the plan.

D. Identification information, including the name and address of the owner, developer, project designer, and the project engineer.

Response: A grading plan is included in Exhibit A and a geotechnical report is included in Exhibit G. All other applicable information is provided throughout the application. The criteria are met.

28.140 Architectural Drawings

A. Architectural drawings shall be submitted at the same scale as the site plan scale, as described in the site plan, showing:

1. **Elevations of structure(s). For additions, the drawings should clearly distinguish between existing structure and proposed addition and show distance from addition and existing structure to the protected water resource.**
2. **The exterior building materials: type, color, and texture.**
3. **For docks, all pilings and their heights shall be shown. The applicant shall indicate the depth from the end of the dock to the river bottom during typical summer months. The applicant shall also provide any available product literature and photographs from the manufacturer or installer.**
4. **For docks, the applicant shall provide a plan view of the structure in relation to the shoreline and river. The plans shall also indicate graphically the OLW and the OHW and the DSL's preference rights and authorized areas.**

Response: Architectural details for a new home on Lot 802 are currently unknown. The City will ensure the applicable criteria listed above are met during the building permit submittal. The criteria do not apply.

28.150 Landscape Plan

A. The landscape plan shall be prepared per site plan standards (CDC 28.120) and in addition shall show:

1. **The location, size and type of existing trees and location and type of vegetation to be removed and to be retained;**
2. **The location and design of landscaped areas;**
3. **The varieties and sizes of trees and materials to be planted;**
4. **The location and height of fences and other buffering or screening materials; and**
5. **The location, materials, dimensions and design of terraces, decks, patios, shelters, footpaths, retaining walls and play areas.**

B. Revegetation plan per CDC 32.080.

Response: Exhibit A includes a preliminary landscaping plan with details as per above. The criteria are met.

28.160 Mitigation Plan

If any HCA is permanently disturbed as a result of the proposed development of any uses or structures, the applicant shall prepare and implement a revegetation and mitigation plan pursuant to the provisions of CDC 32.070 and 32.080.

Response: A revegetation and mitigation plan is included in Exhibit F. Responses to CDC 32.070 and 32.080 are included later in this application. This criterion is met.

Chapter 32 – WATER RESOURCE AREA PROTECTION

32.020 Applicability

A. This chapter applies to all development, activity or uses within WRAs identified on the WRA Map. It also applies to all verified, unmapped WRAs. The WRA Map shall be amended to include the previously unmapped WRAs.

B. The burden is on the property owner to demonstrate that the requirements of this chapter are met, or are not applicable to the land, development activity, or other proposed use or alteration of land. The Planning Director may make a determination of applicability based on the WRA Map, field visits, and any other relevant maps, site plans and information, as to:

1. The existence of a WRA;
2. The exact location of the WRA; and/or
3. Whether the proposed development, activity or use is within the WRA boundary.

In cases where the location of the WRA is unclear or disputed, the Planning Director may require a survey, delineation, or sworn statement prepared by a natural resource professional/wetland biologist or specialist that no WRA exists on the site. Any required survey, delineation, or statement shall be prepared at the applicant's sole expense.

Response: Exhibit F illustrates that the subject property is located within the WRA and provides the delineated boundary of the WRA. The wetlands on the site have been field delineated by an AKS Engineering & Forestry professional natural resources specialist. These criteria are met.

32.030 Prohibited Uses

Alteration, development, or use of real property designated as, and within, a WRA is strictly prohibited except as specifically allowed or exempted in this chapter.

Table 32-1: Summary Of Where Development And Activities May Occur In Areas Subject To This Chapter

Type of Development or Activity	In Water Resource	Water Resource Area
New house, principal structure(s)	No	No, except by hardship, CDC 32.100. Geotechnical study may reduce WRA width per Table 32-2 (footnote 4).
Additions to existing house, principal structure(s) and replacement in kind (replacement in kind does not count against the 500 sq. ft. limit so long as it remains within the existing footprint)	No	Yes, so long as it gets no closer to the WRA than building footprint that existed January 1, 2006. Max. 500 sq. ft. of addition(s) to side or 500 sq. ft. to side of building footprint furthest from WRA. No limit on vertical additions within existing footprint. (CDC 32.040(C)). Geotechnical study may reduce the WRA width per Table 32-2 (footnote 4).
New cantilevered decks (over 30 inches), balconies, roof overhangs and pop outs towards the WRA from existing house or principal structure(s)	No	Yes, but only 5 ft. into the WRA. Foundation or supports of structure cannot extend vertically to grade in the WRA. Geotechnical study may reduce the WRA width per Table 32-2 (footnote 4).
Decks within 30 inches of grade, at grade patios	No	Yes, but only to within 50 ft. of the water resource or 10 ft. behind the top of slope (ravine), whichever is greater.[1] Geotechnical study may reduce the WRA width per Table 32-2 (footnote 4).
New accessory structure under 120 sq. ft. and 10 ft. tall	No	Yes, but only if it is a minimum of 50 ft. from the water resource or 10 ft. behind the top of slope (ravine), whichever is greater.[1]
Repair and maintenance to existing accessory structures	No	Yes, but no increase in footprint or height.

Storm water treatment and detention (e.g., rain gardens, storm outfall/energy dissipaters)	**No**	**Yes, private and public facilities including outfall and energy dissipaters are permitted if no reasonable alternatives exist.**
Driveways/streets/bridges and parking lots	No, unless a WRA crossing is the only available route. No parking lots.	No, unless a WRA crossing is the only available route, or it is part of a hardship application. Parking lots only allowed in hardship cases the maximum distance from water resource.
New fence(s)	**No markers or posts in a water resource.**	**Yes, but only to within 50 ft. of the water resource or behind the top of slope (ravine), whichever is greater.[1] In remainder of a WRA, only City approved property markers or posts every 25 ft. to delineate property.**
Demolition of structure and/or removal of impervious surfaces in the WRA	**Yes, restoration and re-vegetation required.**	**Yes, restoration and re-vegetation required.**
Exterior lighting	**No**	**No, except on existing buildings, additions or hardship cases, but light must be directed away from the WRA and less than 12 ft. high.**
Public passive recreation facilities	**No, except for bridges and utility crossings.**	**Yes, but only soft or permeable surface trails, bridges and elevated paths, interpretive facilities and signage. Hard surface ADA trails are allowed in WRA above top of slope associated with well-defined ravine WRAs.**
Public active recreation facilities	**No, except for bridges and utility crossings.**	**Yes, but natural surface playing fields and playground areas only in WRA above top of slope associated with well-defined ravine WRAs.**
Grading, fill (see also TDAs)	**No, except for bridges and utility crossings.**	**Yes, after a WRA permit is obtained. Restoration and re-vegetation required.**
Temporarily disturbed areas (TDAs) (e.g., buried utilities)	No, except as allowed by WRA permit.	Yes, restoration and re-vegetation required.
Removal of existing vegetation or planting new vegetation	**No, except invasive plants and hazard trees per CDC 32.040(A)(2) or per CDC 32.100.**	**Yes, if it is replaced by native vegetation. Exemption CDC 32.040(A)(3) applies.**
Realigning water resources	**Yes, after "alternate review" process**	**Not applicable**

[1] Development to within 50 feet of the water resource applies to Table 32-2 WRA types (A), (C), (D), and (H). Development behind top of slope (ravine) applies to WRA type (B).

Response: This application includes a Water Resource Area Permit for the development of the subject property. The Applicant is aware that restoration and revegetation is required. A Revegetation Plan is included in Exhibit F. The criteria are met.

32.40 Exemptions

The following development, activities or uses are exempt from a WRA permit but must conform to any applicable requirements of this section.

A. Vegetation maintenance, planting and removal.

1. **The routine maintenance of any existing WRA, consistent with the provisions of this chapter such as, but not limited to, removing pollutants, trash, unauthorized fill, and dead or dying vegetation that constitutes a hazard to life or property.**
2. **Removal of plants identified as nuisance, invasive or prohibited plants; provided, that after plant removal, re-vegetation of disturbed areas is performed pursuant to CDC 32.100.**
3. **The planting or propagation of plants identified as native plants on the Portland Plant List.**

4. **Maintenance of existing gardens, pastures, lawns, and landscape perimeters, including the installation of new irrigation systems within existing gardens, lawns, and landscape perimeters.**

5. **The use of pesticides and herbicides with applicable state (e.g., Oregon DEQ) permits.**

Response: This application includes a WRA permit for the development of the subject property. The Applicant is aware of the vegetation maintenance requirements. The criteria can be met.

B. **Building, paving, grading, and testing.**

1. **Maintenance. Routine repair, maintenance and replacement of legally established above and below ground utilities and related components (including storm water catch basins, intakes, etc.), roads, driveways, paths, trails, fences and manmade water control facilities such as constructed ponds, wastewater facilities, and storm water treatment facilities that do not expand the disturbed area at grade or footprint, provided re-vegetation of disturbed areas or corridors is performed pursuant to CDC 32.100.**

2. **Trails. The establishment of unpaved trails constructed of non-hazardous, pervious materials with a maximum width of four feet in generalized corridors approved in a parks or trails master plan; provided, that:**

    a. **The trail is set back from the water resource at least 30 feet, except at stream crossing points or at points were the topography forces the trail closer to the stream.**

    b. **Foot bridge crossings shall be kept to a minimum. When the stream bank adjacent to the foot bridge is accessible (e.g., due to limited vegetation or topography), fences or railings shall be installed from the foot bridge and extend 15 feet beyond the terminus of the foot bridge to discourage trail users and pets from accessing the stream bank, disturbing wildlife and habitat areas, and causing vegetation loss, stream bank erosion and stream turbidity.**

    c. **Trails shall be designed to minimize disturbance to existing vegetation, work with natural contours, avoid the fall line on slopes where possible, and avoid areas with evidence of slope failure to ensure that trail runoff does not create channels in the WRA.**

3. **Site investigations. Temporary and minor clearing outside of wetlands not to exceed 200 square feet per acre or site, whichever is more; provided, that no individual area is greater than 200 feet in size, for the purpose of site investigations and pits for preparing soil profiles; provided, that such areas are restored to their original condition when the investigation is complete. While such temporary and minor clearing is exempt from the provisions of this chapter, it is subject to all other City codes, including provisions for erosion control and tree removal.**

4. **Support structures for overhead power or communication lines where the support structures are outside of the WRA.**

5. **The installation, within the developed portions of street rights-of-way, of new utilities, the maintenance or replacement of existing utilities and street repaving projects.**

Response: This application includes a WRA Permit for the development of the subject property. The Applicant is aware of the building, paving, grading, and testing and maintenance requirements herein stated. The applicable criteria can be met.

C. **Non-conforming structures.**

1. **Expansion of the principal non-conforming structure. Additions to the existing building footprint of a principal non-conforming structure within, or partially within, the WRA are exempt, and additionally exempt from Chapter 66 CDC, Non-Conforming Structures, as long as the addition(s) meets the following restrictions:**
    1. **Re-vegetation of temporarily disturbed areas will be performed per CDC 32.100 after the addition is completed;**
    2. **There is no net increase in storm water runoff flowing toward the water resource as a result of the addition(s);**
    3. **The addition to the principal structure is not closer to the water resource than the existing principal structure;**
    4. **If it is a lateral addition, it does not extend more than 25 feet laterally from the side of the existing principal structure;**
    5. **The addition does not increase the footprint of the existing principal structure by more than 500 square feet, at any one time or incrementally;**
    6. **Lateral additions to decks cannot come closer to the water resource than the existing deck;**
    7. **Vertical additions to existing principal structures that comply with the maximum height requirements of the underlying zone are exempt.**
2. **Repair, replacement and removal of non-conforming structures.**
    1. **Interior remodeling of a non-conforming structure.**
    2. **Repair, maintenance, rehabilitation and replacement of non-conforming structures, accessory structures, utilities and related components, roads, driveways, paths, trails, fences, and manmade water and storm water control facilities that do not expand the disturbed area or footprint. Re-vegetation of temporarily disturbed areas or corridors pursuant to CDC 32.100 is required.**
    3. **This section also applies in the event that a non-conforming structure burned down or was otherwise damaged by natural or other disaster. The structure could be re-built so long as the structure did not expand the original footprint and the original access driveway (PDA) was used.**
    4. **Demolition and removal of non-conforming structure's impervious surfaces are exempt as long as the affected areas are restored with native vegetation pursuant to CDC 32.100.**

Response: This application includes a WRA Permit for the development of the subject property and does not include any non-conforming structures. The criteria do not apply.

D. New construction activities allowed in the WRA.

1. **Structures shall be located out of the WRA, except that eaves, balconies, decks, "pop outs," and similar additions, may cantilever over the outer boundary of the WRA a maximum of five feet. No vertical supports may extend down to grade within the WRA.**
2. **Construction of an accessory structure, less than 120 square feet in size and under 10 feet tall, may be constructed to within 50 feet of the water resource or 10 feet behind the top of slope (ravine, per Figure 32-4), whichever is greater. No more than one accessory structure is permitted in the WRA. Accessory structures in the WRA that existed prior to January 1, 2006, may remain in place and not count against the limitation in new accessory structures.**

3. **Construction of a water permeable patio or deck within 30 inches of the original grade and construction of approved water permeable footpaths may be constructed to within 50 feet of the water resource or 10 feet behind the top of slope (ravine, per Figure 32-4), whichever is greater.**

4. **Fences may be built to within 50 feet of the water resource or behind the top of slope (ravine), whichever is greater.**

Response: This application is eligible to utilize the hardship provisions in CDC 32.110, which establish different development-related standards for lots created prior to January 2006. Please see responses under that section. These criteria do not apply.

E. Emergency activities. Actions authorized by the City Manager that must be taken immediately or within a period of time too short to fully comply with this chapter to:

1. **Prevent immediate danger to life or property;**
2. **Prevent immediate threat of serious environmental degradation;**
3. **Restore existing utility service; or**
4. **Reopen a public thoroughfare to traffic.**

However, after the emergency has passed any disturbed area shall be restored, pursuant to CDC 32.100.

Response: This application does not seek approval for any of those emergency activities listed above. The criteria do not apply.

F. Exempt areas.

1. **The Tualatin or Willamette Rivers are regulated by Chapter 28 CDC and are not subject to this chapter. However, wetlands and buffers, regardless of their proximity to these rivers, are subject to this chapter. In areas where there is overlap with Chapter 28 CDC, this chapter shall prevail.**
2. **Existing enclosed or piped sections of streams, including any development at right angles to the enclosed or piped sections.**

Response: The Applicant is aware of the above exemptions.

G. Metro Code Chapter 3.07 Urban Growth Management Functional Plan – Exempt uses and conditioned activities. Where construction of a residence was completed before January 1, 2006, the owners or residents shall not be restricted from engaging in any development that was allowed prior to September 22, 2005; unless such development required obtaining a land use decision, or a building, erosion control, or grading permit.

Response: This application does not include a request affecting a residence constructed prior to January 2006. This criterion is not applicable.

32.050 Application

A. An application requesting approval for a use or activity regulated by this chapter shall be initiated by the property owner, or the owner's authorized agent, and shall include an application form and the appropriate deposit or fee as indicated on the master fee schedule.

Response: An application form signed by the property owner is included in Exhibit B. The appropriate fees are also included with this application submittal. The criterion is met.

B. A pre-application conference shall be a prerequisite to the filing of the application.

Response: A pre-application conference to discuss this project was held on June 20, 2019 at West Linn City Hall. This criterion is met.

C. The applicant shall submit maps and diagrams at 11 by 17 inches and a written narrative addressing the approval criteria and requirements of this chapter, and any additional copies required by the Planning Director.

Response: The required maps and narrative are included with this submittal. The criterion is met.

D. Where review of soil maps, Department of Geology and Mineral Industries (DOGAMI) maps, or on-site inspection by the City Engineer reveals evidence of slope failures or that WRA slopes are potentially unstable or prone to failure, geotechnical studies may be required to demonstrate that the proposed development will not cause, or contribute to, slope failure or increased erosion or sedimentation in the WRA or adversely impact surface or modify groundwater flow or hydrologic conditions. These geotechnical studies shall include all necessary measures to avoid or correct the potential hazard.

Response: A geotechnical report is attached as Exhibit G and accounted for potential slope failure in its analysis and recommendations. This criterion is met.

E. Applications proposing that streets or utilities cross water resources, or any other development that modifies the water resource, shall present evidence in the form of adopted utility master plans or transportation master plans, or findings from a registered Oregon civil engineer, certified engineering geologist or similarly qualified professional to demonstrate that the development or improvements are consistent with accepted engineering practices.

Response: This application does not include a request for streets or utilities that cross water resources. The City's Pre-App Comments confirmed that the existing 8-inch sanitary sewer line in 9th Street appears to have adequate capacity and is available to serve the proposed development. The Pre-App Comments also state that the construction of a single-family home does not trigger the Applicant to upsize the 6-inch cast iron water line, per the Water Master Plan. This criterion does not apply.

F. Site plan. The applicant shall submit a site plan which contains the following information, as applicable:

1. The name, address, and telephone number of the applicant, the scale (lineal) of the plan, and a north arrow.
2. Property lines, rights-of-way, easements, etc.
3. A storm detention and treatment plan and narrative statement pursuant to CDC 92.010(E).
4. Tables and maps identifying acreage, location and type of development constraints due to site characteristics such as slope, drainage and geologic hazards. For Type I, II, and III lands (refer to definitions in Chapter 02 CDC), the applicant must provide a geologic report, with text, figures and attachments as needed to meet the industry standard of practice, prepared by a certified engineering geologist and/or a geotechnical professional engineer, that includes:
    a. Site characteristics, geologic descriptions and a summary of the site investigation conducted;
    b. Assessment of engineering geological conditions and factors;
    c. Review of the City of West Linn's Natural Hazard Mitigation Plan and applicability to the site; and
    d. Conclusions and recommendations focused on geologic constraints for the proposed land use or development activity, limitations and potential risks of development, recommendations for mitigation approaches and additional work needed at future development stages including further testing and monitoring.

5. **Boundaries of the WRA, specifically delineating the water resource, and any riparian corridor boundary. If the proposal includes development of a wetland, a wetlands delineation prepared by a professional wetland specialist will be required. The wetland delineation may be required to be accepted or waived through the Department of State Lands (DSL) delineation review process.**
6. **Location of existing and proposed development, including all existing and proposed structures, accessory structures, any areas of fill or excavation, water resource crossings, alterations to vegetation, or other alterations to the site's natural state.**
7. **Identify the location and square footage of previously disturbed areas, areas that are to be temporarily disturbed, and area to be permanently disturbed or developed.**
8. **When an application proposes development within the WRA, an inventory of vegetation within the WRA, sufficient to categorize the existing condition of the WRA, including:**
    a. **The type and general quality of ground cover, including the identification of dominant species and any occurrence of non-native, invasive species;**
    b. **Square footage of ground cover; and**
    c. **Square footage of tree canopy as measured either through aerial photographs or by determining the tree drip lines. Where only a portion of a WRA is to be disturbed, the tree inventory need only apply to the impacted area. The remaining treed area shall be depicted by outlining the canopy cover.**
9. **Locations of all significant trees as defined by the City Arborist.**
10. **Identify adopted transportation, utility and other plan documents applicable to this proposal.**
11. **For cases processed under CDC 32.110 (hardship), provide the maximum disturbed area (MDA) calculations.**

Response: This application and associated exhibits respond to all applicable submittal items as outlined above.

G. **Construction management plan. The applicant shall submit a construction management plan which includes the following:**

1. **The location of proposed TDAs (site ingress/egress for construction equipment, areas for storage of material, construction activity areas, grading and trenching, etc.) that will subsequently be restored to original grade and replanted with native vegetation, shall be identified, mapped and enclosed with fencing per subsection (G)(3) of this section.**
2. **Appropriate erosion control measures consistent with Clackamas County Erosion Prevention and Sediment Control Planning and Design Manual, rev. 2008, and a tentative schedule of work.**
3. **The WRA shall be protected, prior to construction, with an anchored chain link fence (or equivalent approved by the City) at its perimeter that shall remain undisturbed, except as specifically authorized by the approval authority. Additional fencing to delineate approved TDAs may be required. Fencing shall be mapped and identified in the construction management plan and maintained until construction is complete.**

Response: Exhibit A includes a construction management plan illustrating the above-referenced information. The criteria are met.

H. **Mitigation plan prepared in accordance with the requirements in CDC 32.090.**

Response: A Mitigation Plan, per CDC 32.090, is included as Exhibit F. This requirement is met.

I. **Re-vegetation plan prepared in accordance with the requirements in CDC 32.100.**

Response: A Re-vegetation Plan, per CDC 32.090, is included as Exhibit F. This requirement is met.

J. **The Planning Director may modify the submittal requirements per CDC 99.035.**

Response: The Applicant is aware that the Planning Director may modify the submittal requirements per CDC 99.035.

K. **The following additional requirements apply to applications being submitted under the alternative review process pursuant to CDC 32.070 and 32.080.**

1. **Identify the affected WRA and describe the functions it performs (see Table 32-4).**
2. **Provide a scaled map that delineates the proposed WRA boundaries determined to be sufficient to sustain the functions occurring at the site and a narrative that justifies the proposal, consistent with CDC 32.080.**
3. **Identify the recommended WRA boundary at the site with colored tape, survey markers or other easily identified means for field inspection by staff.**
4. **Consultant required for alternate review process.**
    a. **The narrative and analysis required by CDC 32.070 and 32.080 shall be prepared and signed by a qualified natural resource professional, such as a wildlife biologist, botanist, or hydrologist. The Planning Director shall determine the scope of work and specific products required from the consultant. The Planning Director may require a mitigation plan pursuant to CDC 32.090 and/or a re-vegetation plan pursuant to CDC 32.100.**
    b. **The Planning Director may waive the consultant requirement for simple or minor projects if he or she determines that it is not necessary in order to satisfy the requirements of this chapter.**

Response: This application does not seek approval through the alternative review process. The criteria do not apply.

32.090 Mitigation Plan

A. **A mitigation plan shall only be required if development is proposed within a WRA (including development of a PDA). (Exempted activities of CDC 32.040 do not require mitigation unless specifically stated. Temporarily disturbed areas, including TDAs associated with exempted activities, do not require mitigation, just grade and soil restoration and re-vegetation.) The mitigation plan shall satisfy all applicable provisions of CDC 32.100, Re-Vegetation Plan Requirements.**

Response: Exhibit F includes a Mitigation Plan as required under this chapter which addresses all applicable requirements for the proposed development within the WRA. This criterion is met.

B. **Mitigation shall take place in the following locations, according to the following priorities (subsections (B)(1) through (4) of this section):**

1. **On-site mitigation by restoring, creating or enhancing WRAs.**
2. **Off-site mitigation in the same sub-watershed will be allowed, but only if the applicant has demonstrated that:**
    a. **It is not practicable to complete mitigation on-site, for example, there is not enough area on-site; and**
    b. **The mitigation will provide equal or superior ecological function and value.**

3. Off-site mitigation outside the sub-watershed will be allowed, but only if the applicant has demonstrated that:
    a. It is not practicable to complete mitigation on-site, for example, there is not enough area on-site; and
    b. The mitigation will provide equal or superior ecological function and value.
4. Purchasing mitigation credits though DSL or other acceptable mitigation bank.

Response: The Mitigation Plan in Exhibit F shows that required mitigation for permanently disturbed areas will occur both on site and off site. There is not sufficient room on Lot 802 to accommodate all required mitigation on this lot. Further details are included in the Mitigation Plan in Exhibit F. This criterion is met.

C. Amount of mitigation.

1. The amount of mitigation shall be based on the square footage of the permanent disturbance area by the application. For every one square foot of non-PDA disturbed area, on-site mitigation shall require one square foot of WRA to be created, enhanced or restored.
2. For every one square foot of PDA that is disturbed, on-site mitigation shall require one half a square foot of WRA vegetation to be created, enhanced or restored.
3. For any off-site mitigation, including the use of DSL mitigation credits, the requirement shall be for every one square foot of WRA that is disturbed, two square feet of WRA shall be created, enhanced or restored. The DSL mitigation credits program or mitigation bank shall require a legitimate bid on the cost of on-site mitigation multiplied by two to arrive at the appropriate dollar amount.

Response: The Mitigation Plan in Exhibit F provides an inventory of on-site and off-site mitigation in the amounts specified above. This criterion is met.

D. The Planning Director may limit or define the scope of the mitigation plan and submittal requirements commensurate with the scale of the disturbance relative to the resource and pursuant to the authority of Chapter 99 CDC. The Planning Director may determine that a consultant is required to complete all or a part of the mitigation plan requirements.

Response: The Applicant understands that the Planning Director may limit or define the scope of the Mitigation Plan and requirements. The Mitigation Plan in Exhibit F was prepared by a professional natural resources specialist.

E. A mitigation plan shall contain the following information:

1. A list of all responsible parties including, but not limited to, the owner, applicant, contractor, or other persons responsible for work on the development site.
2. A map showing where the specific adverse impacts will occur and where the mitigation activities will occur.
3. A re-vegetation plan for the area(s) to be mitigated that meets the standards of CDC 32.100.
4. An implementation schedule, including timeline for construction, mitigation, mitigation maintenance, monitoring, and reporting. All in-stream work in fish bearing streams shall be done in accordance with the Oregon Department of Fish and Wildlife.
5. Assurances shall be established to rectify any mitigation actions that are not successful within the first three years. This may include bonding or other surety.

Response: The Mitigation Plan in Exhibit F includes all applicable information as listed above. The criteria are met.

32.100 Re-vegetation Plan Requirements

A. In order to achieve the goal of re-establishing forested canopy, native shrub and ground cover and to meet the mitigation requirements of CDC 32.090 and vegetative enhancement of CDC 32.080, tree and vegetation plantings are required according to the following standards:

1. **All trees, shrubs and ground cover to be planted must be native plants selected from the Portland Plant List.**
2. **Plant size. Replacement trees must be at least one-half inch in caliper, measured at six inches above the ground level for field grown trees or above the soil line for container grown trees (the one-half inch minimum size may be an average caliper measure, recognizing that trees are not uniformly round), unless they are oak or madrone which may be one gallon size. Shrubs must be in at least a one-gallon container or the equivalent in ball and burlap and must be at least 12 inches in height.**
3. **Plant coverage.**
    a. **Native trees and shrubs are required to be planted at a rate of five trees and 25 shrubs per every 500 square feet of disturbance area (calculated by dividing the number of square feet of disturbance area by 500, and then multiplying that result times five trees and 25 shrubs, and rounding all fractions to the nearest whole number of trees and shrubs; for example, if there will be 330 square feet of disturbance area, then 330 divided by 500 equals 0.66, and 0.66 times five equals 3.3, so three trees must be planted, and 0.66 times 25 equals 16.5, so 17 shrubs must be planted). Bare ground must be planted or seeded with native grasses or herbs. Non-native sterile wheat grass may also be planted or seeded, in equal or lesser proportion to the native grasses or herbs.**
    b. **Trees shall be planted between eight and 12 feet on center and shrubs shall be planted between four and five feet on center, or clustered in single species groups of no more than four plants, with each cluster planted between eight and 10 feet on center. When planting near existing trees, the dripline of the existing tree shall be the starting point for plant spacing measurements.**
4. **Plant diversity. Shrubs must consist of at least two different species. If 10 trees or more are planted, then no more than 50 percent of the trees may be of the same genus.**
5. **Invasive vegetation. Invasive non-native or noxious vegetation must be removed within the mitigation area prior to planting.**
6. **Tree and shrub survival. A minimum survival rate of 80 percent of the trees and shrubs planted is expected by the third anniversary of the date that the mitigation planting is completed.**
7. **Monitoring and reporting. Monitoring of the mitigation site is the ongoing responsibility of the property owner. Plants that die must be replaced in kind.**
8. **To enhance survival of tree replacement and plantings, the following practices are required:**
    a. **Mulching. Mulch new plantings a minimum of three inches in depth and 18 inches in diameter to retain moisture and discourage weed growth.**
    b. **Irrigation. Water new plantings one inch per week between June 15th to October 15th, for the three years following planting.**
    c. **Weed control. Remove, or control, non-native or noxious vegetation throughout maintenance period.**

d. **Planting season. Plant bare root trees between December 1st and February 28th, and potted plants between October 15th and April 30th.**

e. **Wildlife protection. Use plant sleeves or fencing to protect trees and shrubs against wildlife browsing and resulting damage to plants.**

Response: Exhibit F includes a Revegetation Plan which meets the applicable specifications listed above. These criteria are met.

B. **When weather or other conditions prohibit planting according to schedule, the applicant shall ensure that disturbed areas are correctly protected with erosion control measures and shall provide the City with funds in the amount of 125 percent of a bid from a recognized landscaper or nursery which will cover the cost of the plant materials, installation and any follow up maintenance. Once the planting conditions are favorable the applicant shall proceed with the plantings and receive the funds back from the City upon completion, or the City will complete the plantings using those funds.**

Response: Exhibit A identifies the erosion and sediment control measures to be taken during the development of this project. The Applicant understands that funds are to be held at the City when weather prohibits construction and changes to the planting schedule are essential. This criterion can be met.

32.110 Hardship Provisions

The purpose of this section is to ensure that compliance with this chapter does not deprive an owner of reasonable use of land. To avoid such instances, the requirements of this chapter may be reduced. The decision-making authority may impose such conditions as are deemed necessary to limit any adverse impacts that may result from granting relief. The burden shall be on the applicant to demonstrate that the standards of this chapter, including Table 32-2, Required Width of WRA, will deny the applicant "reasonable use" of his/her property.

A. **The right to obtain a hardship allowance is based on the existence of a lot of record recorded with the County Assessor's Office on, or before, January 1, 2006. The lot of record may have been, subsequent to that date, modified from its original platted configuration but must meet the minimum lot size and dimensional standards of the base zone.**

Response: Exhibits C and H show that the subject site is a legal lot of record with the Clackamas County Assessor's Office since September 3, 1908, prior to January 1, 2006. This criterion is met.

B. **For lots described in subsection A of this section that are located completely or partially inside the WRA, development is permitted, consistent with this section. The maximum disturbed area (MDA) of the WRA shall be determined on a per lot basis. The MDA shall be the greater of:**

1. **Five thousand square feet of the WRA; or**
2. **Thirty percent of the total area of the WRA.**

Response: As shown in Exhibit A, the WRA occupies all of Lot 802 (± 14,600 square feet). In the context of the subject site, the maximum disturbed area (MDA) will be 5,000 square feet (± 14,600 x 0.30 = 4,380 < 5,000 square feet)

C. **The MDA shall be located as follows:**

1. **In areas where the development will result in the least square footage encroachment into the WRA.**
2. **The applicant shall demonstrate, through site and building design, that the proposed development is the maximum practical distance from the water resource based on the functional needs of the proposed use.**

3. **The minimum distance from a water resource shall be 15 feet.**
4. **Access driveways shall be the minimum permitted width; select an alignment that is least impactful upon the WRA; and shall share use of the driveway, where possible.**

Response: As shown in Exhibit A, careful consideration for reducing impacts to the WRA was made in the preparation of the layout. The home is shifted as far to the north (away from the water resource) as possible while accommodating a reasonable building footprint and driveway from the shared accessway. The planned driveway to the new home will share access with another home on Lot 800 (via a reciprocal access easement on Lot 300; see responses to CDC Chapter 48) to further minimize impacts. Additionally, the application utilizes the setback reduction allowance in CDC 32.110(F)(1) to minimize encroachment into the WRA. Finally, no impacts will occur within 15 feet of the water resource. The criteria are met.

D. The MDA shall include:

1. **The footprints of all structures, including accessory structures, decks and paved water impermeable surfaces including sidewalks, driveways, parking pads, paths, patios and parking lots, etc. Only 75 percent of water permeable surfaces at grade shall be included in the MDA.**
2. **All graded, disturbed or modified areas that are not subsequently restored to their original grade and replanted with native ground cover per an approved plan.**

Response: As shown in Exhibit F, MDAs were calculated based on the methodology established here. The criteria are met.

E. The MDA shall not include:

1. **Temporarily disturbed areas (TDAs) adjacent to an approved structure or development area for the purpose of grading, material storage, construction activity, trenched or buried utilities and other temporary activities so long as these areas are subsequently restored to the original grades and soil permeability, and re-vegetated with native plants per CDC 32.100, such that they are at least equal in functional value to the area prior to the initiation of the permitted activity;**
2. **Bay windows and similar cantilevered elements (including decks, etc.) of the principal or secondary structure so long as they do not extend more than five feet towards the WRA from the vertical plane of the house, and have no vertical supports from grade;**
3. **PDAs that are not built upon as part of the development proposal will not count in the MDA (e.g., use of an existing access driveway). (Conversely, PDAs that are built upon as part of the development proposal will count in the MDA.);**
4. **The installation of public streets and public utilities that are specifically required to meet either the transportation system plan or a utility master plan so long as all trenched public utilities are subsequently restored to the original grades and soil permeability, and revegetated with native plants per CDC 32.100, such that they are at least equal in functional value to the area prior to the initiation of the permitted activity. All areas displaced by streets shall be mitigated for.**

Table 32-5: MDA Calculation Summary

Type of Development	Square footage included in MDA calculation?
All structures	YES
Non-water permeable paved surfaces including driveways, parking lots, patios, and paths	YES
Approved water permeable paved surfaces including driveways, parking lots, patios, and paths	YES but at 75% of total water permeable surface square footage
TDAs/graded areas that are restored and re-vegetated with native vegetation	NO
TDAs/all utility trenches and buried utilities restored or re-vegetated with native vegetation	NO
PDAs that are built upon or developed as part of the application	YES
PDAs that are not built upon or developed as part of the application	NO
Storm water detention or treatment pond	YES
Rain garden or bioswale with the native plantings as part of re-vegetation plan	NO
Storm water outfall, energy dissipaters (at, or above, grade)	YES
Non-native landscaping	YES
Sharing an existing driveway	NO
Development of lands that are not within the WRA	NO

Response: As shown in Exhibit F, MDAs were calculated based on the methodology established here. The criteria are met.

F. Development allowed under subsection A of this section may use the following provisions:

1. Setbacks required by the underlying zoning district may be reduced up to 50 percent where necessary to avoid construction within the WRA, as long as the development would otherwise meet the standards of this chapter. However, front loading garages shall be set back a minimum of 18 feet, while side loading garages shall be set back a minimum of three feet.

Response: This application includes a request to reduce the front setback from 20 feet to 12 feet to minimize impacts to the WRA. This will allow the building envelope to be moved further from the wetland boundary. This criterion can be met.

2. Landscaping and parking requirements may be reduced for hardship properties but only if all or part of the WRA is dedicated pursuant to CDC 32.060(C) or if a restrictive deed covenant is established. These reductions shall be permitted outright and, to the extent that the practices are inconsistent with other provisions or standards of the West Linn CDC, this section is given precedence so that no variance is required. The allowable reductions include:

   a. Elimination of landscaping for the parking lot interior.

b. Elimination of the overall landscape requirement (e.g., 20 percent for commercial uses).

c. Elimination of landscaping between parking lots and perimeter non-residential properties.

d. Landscaping between parking lots and the adjacent right-of-way may be reduced to eight feet. This eight-foot-wide landscaped strip may be used for vegetated storm water detention or treatment.

e. A 25 percent reduction in total required parking is permitted to minimize or avoid intrusion into the WRA.

f. Adjacent improved street frontage with curb and sidewalk may be counted towards the parking requirement at a rate of one parking space per 20 lineal feet of street frontage adjacent to the property, subject to City Engineer approval based on the street width and classification.

g. The current compact and full sized parking mix may be modified to allow up to 100 percent compact spaces and no full sized spaces. However, any required ADA compliant spaces shall be provided.

Response: This application does not seek modification to the parking and landscape requirements as provided above. The criteria do not apply.

G. Where a property owner owns multiple platted lots of record where each lot could be built upon under the hardship provisions, the property owner may either use the MDA for each lot on an individual lot by lot basis or may transfer 100 percent of the cumulative MDA of all the lots to those lots that are further away from, or less impactful upon, the WRA. Lot line adjustments may also be used to facilitate the density transfer. See Figure 32-8.

Response: The application does not seek to transfer available MDA from abutting properties owned by the Applicant (Tax Lots 800 or 803). The criterion does not apply.

H. Mitigation and re-vegetation of disturbed WRAs shall be completed per CDC 32.090 and 32.100 respectively.

Response: Mitigation and re-vegetation of disturbed WRAs have been addressed in responses to CDC 32.090 and 32.100 respectively and as further detailed in Exhibit F. This criterion is met.

I. Any further modification of the standards of this chapter or the underlying zone shall require approval of a variance pursuant to Chapter 75 CDC.

Response: This application does not include a request for modification of the standards of this chapter or the underlying zone that would require a variance. This criterion does not apply.

Chapter 46 – OFF-STREET PARKING, LOADING AND RESERVOIR AREAS

46.020 Applicability and General Provisions

A. At the time a structure is erected or enlarged, or the use of a structure or unit of land is changed within any zone, parking spaces, loading areas and reservoir areas shall be provided in accordance with the requirements of this chapter unless other requirements are otherwise established as a part of the development approval process.

Response: Exhibit A demonstrates that the required off-street parking for a new single-family detached home can be provided on Lot 802. This criterion is met.

B. The provision and maintenance of off-street parking and loading spaces are the continuing obligation of the property owner.

Response: The Applicant is aware of the property owner's obligations in relation to the provision and maintenance of off-street parking and loading spaces. This criterion can be met.

C. No building or other permit shall be issued until plans are approved that show the property that is and will remain available for exclusive use as off-street parking and loading space as required by this chapter.

D. Required parking spaces and loading areas shall be improved to the standards contained in this chapter and shall be available for use at the time of the final building inspection except as provided in CDC 46.150.

Response: Exhibit A shows that parking places and loading areas will be improved to the standards of this chapter. This criterion can be met.

46.090 Minimum Off-Street Parking Space Requirements

A.	Residential parking space requirements.		
	1.	Single-family residences (attached or detached).	1 space for each dwelling unit; may or may not be in garage or carport.

Response: Exhibit A illustrates that at a minimum, at least one off-street parking space will be provided. This criterion is met.

F. Maximum parking. Parking spaces (except for single-family and two-family residential uses) shall not exceed the minimum required number of spaces by more than 10 percent.

Response: The subject site is located in the R-10 single-family detached residential zone. This criterion does not apply.

G. Parking reductions. An applicant may reduce parking up to 10 percent for development sites within one-quarter mile of a transit corridor or within a mixed-use commercial area, and up to 10 percent for commercial development sites adjacent to multi-family residential sites with the potential to accommodate more than 20 dwelling units.

Response: This application does not include a request to reduce parking for the project site. This criterion does not apply.

H. For office, industrial, and public uses where there are more than 20 parking spaces for employees on the site, at least 10 percent of the required employee parking spaces shall be reserved for carpool use before 9:00 a.m. on weekdays. The spaces will be the closest to the building entrance, except for any disabled parking and those signed for exclusive customer use. The carpool/vanpool spaces shall be clearly marked "Reserved – Carpool/Vanpool Before 9:00 a.m."

Response: The subject site is located in a R-10 Single-Family Residential Detached zone. This criterion does not apply.

I. Existing developments along transit streets or near transit stops may redevelop up to 10 percent of the existing parking spaces to provide transit-oriented facilities, including bus pullouts, bus stops and shelters, park and ride stations, and other similar facilities.

Response: The subject site is a vacant lot. This criterion does not apply.

J. Development in water resource areas may reduce the required number of parking spaces by up to 25 percent. Adjacent improved street frontage with curb and sidewalk may also be counted towards the parking requirement at a rate of one parking space per 20 lineal feet of street frontage adjacent to the property.

Response: This application does not include a request to reduce the required number of parking spaces. This criterion does not apply.

46.150 Design and Standards

The following standards apply to the design and improvement of areas used for vehicle parking, storage, loading, and circulation:

A. Design standards.

1. **"One standard parking space" means a minimum for a parking stall of eight feet in width and 16 feet in length. These stalls shall be identified as "compact." To accommodate larger cars, 50 percent of the required parking spaces shall have a minimum dimension of nine feet in width and 18 feet in length (nine feet by 18 feet). When multi-family parking stalls back onto a main driveway, the stalls shall be nine feet by 20 feet. Parking for development in water resource areas may have 100 percent compact spaces.**

Response: Exhibit A shows the conceptual parking space designed with minimum dimensions as required herein. This criterion can be met.

2. **Disabled parking and maneuvering spaces shall be consistent with current federal dimensional standards and subsection B of this section and placed nearest to accessible building entryways and ramps.**
3. **Repealed by Ord. 1622.**
4. **Service drives shall be designed and constructed to facilitate the flow of traffic, provide maximum safety of traffic access and egress, and maximum safety of pedestrians and vehicular traffic on the site.**
5. **Each parking and/or loading space shall have clear access, whereby the relocation of other vehicles to utilize the parking space is not required.**

Response: Exhibit A shows the conceptual parking design with minimum dimensions as required for the R-10 Single-Family Residential Detached zone. These criteria are met.

6. **Except for single- and two-family residences, any area intended to be used to meet the off-street parking requirements as contained in this chapter shall have all parking spaces clearly marked using a permanent paint. All interior drives and access aisles shall be clearly marked and signed to show direction of flow and maintain vehicular and pedestrian safety. Permeable parking surface spaces may have an alternative delineation for parking spaces.**
7. **Except for residential parking, and parking for public parks and trailheads, at least 50 percent of all areas used for the parking and/or storage and/or maneuvering of any vehicle, boat and/or trailer shall be improved with asphalt or concrete surfaces according to the same standards required for the construction and acceptance of City streets. The remainder of the areas used for parking may use a permeable paving surface designed to reduce surface runoff. Parking for public parks or trailheads may use a permeable paving surface designed to reduce surface runoff for all parking areas. Where a parking lot contains both paved and unpaved areas, the paved areas shall be located closest to the use which they serve.**

Response: The subject site is located in the R-10 Single-Family Residential Detached zone. These criteria do not apply.

8. **Off-street parking spaces for single- and two-family residences shall be improved with an asphalt or concrete surface, or a permeable parking surface designed to reduce surface runoff, to specifications as approved by the Building Official. Other parking facilities for two- and single-family homes that are to accommodate additional**

vehicles, boats, recreational vehicles, and trailers, etc., need not be paved. All parking for multi-family residential development shall be paved with concrete or asphalt. Driveways shall measure at least 20 feet from the back of sidewalk to garage or the end of the parking pad to accommodate cars and sport utility vehicles without the vehicles blocking the public sidewalk.

Response: Exhibit A shows the conceptual driveway to be improved with asphalt, concrete or a permeable surface designed to reduce surface runoff pursuant to City specifications. This criterion can be met.

9. **Access drives from the street to off-street parking or loading areas shall be designed and constructed to facilitate the flow of traffic and provide maximum safety for pedestrian and vehicular traffic on the site. The number of access drives shall be limited to the minimum that will allow the property to accommodate and service the anticipated traffic. Access drives shall be clearly and permanently marked and defined through use of rails, fences, walls, or other barriers or markers on frontage not occupied by service drives.**
10. **Access drives shall have a minimum vision clearance as provided in Chapter 42 CDC, Clear Vision Areas.**

Response: Exhibit A shows the access drive from the street to off-street parking on Lot 802 is designed to comply with all application standards. The criteria are met.

11. **Parking spaces along the boundaries of a parking lot or adjacent to interior landscaped areas or sidewalks shall be provided with a wheel stop at least four inches high located two feet back from the front of the parking stall. Such parking spaces may be provided without wheel stops if the sidewalks or landscaped areas adjacent the parking stalls are two feet wider than the minimum width.**

Response: The application does not include a parking lot. This criterion does not apply.

12. **Off-street parking and loading areas shall be drained in accordance with plans and specifications approved by the City Engineer. Storm drainage at commercial sites may also have to be collected to treat oils and other residue.**

Response: A Preliminary Stormwater Report is attached as Exhibit I and illustrates the means by which stormwater runoff will appropriately be handled. This criterion is met.

13. **Artificial lighting on all off-street parking facilities shall be designed to deflect all light downward away from surrounding residences and so as not to create a hazard to the public use of any road or street.**

Response: This application does not include any off-street parking facilities. This criterion does not apply.

14. **Directional arrows and traffic control devices which are placed on parking lots shall be identified.**

Response: This application does not include any off-street parking facilities. This criterion does not apply.

15. **The maximum driveway grade for single-family housing shall be 15 percent. The 15 percent shall be measured along the centerline of the driveway only. Grades elsewhere along the driveway shall not apply. Variations require approval of a Class II variance by the Planning Commission pursuant to Chapter 75 CDC. Regardless, the last 18 feet in front of the garage must maintain a maximum grade of 12 percent as measured along the centerline of the driveway only. Grades elsewhere along the driveway shall not apply.**

Response: Exhibit A shows the grade along the centerline of the driveway exceeds the above requirements. The criterion is met.

16. **Visitor or guest parking must be identified by painted "GUEST" or "VISITOR."**

Response: This application does not include any off-street parking facilities. This criterion does not apply.

17. **The parking area shall have less than a five percent grade. No drainage across adjacent sidewalks or walkways is allowed.**
18. **Commercial, office, industrial, and public parking lots may not occupy more than 50 percent of the main lot frontage of a development site. The remaining frontage shall comprise buildings or landscaping. If over 50 percent of the lineal frontage comprises parking lot, the landscape strip between the right-of-way and parking lot shall be increased to 15 feet wide and shall include terrain variations (e.g., one-foot-high berm) plus landscaping. The defensible space of the parking lot should not be compromised.**
19. **Areas of the parking lot improved with asphalt or concrete surfaces shall be designed into areas of 12 or less spaces through the use of defined landscaped area. Groups of 12 or less spaces are defined as:**
    a. **Twelve spaces in a row, provided there are no abutting parking spaces, as in the case when the spaces are abutting the perimeter of the lot; or**
    b. **Twelve spaces in a group with six spaces abutting together; or**
    c. **Two groups of 12 spaces abutting each other, but separated by a 15-foot-wide landscape area including a six-foot-wide walkway.**
    d. **Parking areas improved with a permeable parking surface may be designed using the configurations shown in subsections (A)(19)(a), (b) and (c) of this section except that groups of up to 18 spaces are allowed.**
    e. **The requirements of this chapter relating to total parking lot landscaping, landscaping buffers, perimeter landscaping, and landscaping the parking lot islands and interior may be waived or reduced pursuant to CDC 32.110(F) in a WRA application without a variance being required.**
20. **Pedestrian walkways shall be provided in parking areas having 20 or more spaces. Walkways or sidewalks shall be constructed between major buildings/activity areas (an example in multi-family housing: between recreation center, swimming pool, manager's office, park or open space areas, parking lots, etc.) within a development, between adjacent developments and the new development, as feasible, and between major buildings/activity areas within the development and adjacent streets and all adjacent transit stops. Internal parking lot circulation and design should maintain ease of access for pedestrians from streets and transit stops. Walkways shall be constructed using a material that visually contrasts with the parking lot and driveway surface. Walkways shall be further identifiable to pedestrians and motorists by grade separation, walls, curbs, surface texture (surface texture shall not interfere with safe use of wheelchairs, baby carriages, shopping carts, etc.), and/or landscaping. Walkways shall be six feet wide. The arrangement and layout of the paths shall depend on functional requirements.**
21. **The parking and circulation patterns are easily comprehended and defined. The patterns shall be clear to minimize traffic hazards and congestion and to facilitate emergency vehicles.**

Response: This application does not include any off-street parking facilities. This criterion does not apply.

22. **The parking spaces shall be close to the related use.**

Response: Exhibit A shows the required parking space is located close to the related use. This criterion is met.

23. Permeable parking spaces shall be designed and built to City standards.

Response: The application does not anticipate the use of permeable pavement. This criterion does not apply.

B. Accessible parking standards for persons with disabilities. If any parking is provided for the public or visitors, or both, the needs of the people with disabilities shall be based upon the following standards or current applicable federal standards, whichever are more stringent:

1. Minimum number of accessible parking space requirements (see following table):

MINIMUM REQUIRED NUMBER OF TOTAL PARKING SPACES	TOTAL NUMBER OF ACCESSIBLE SPACES	NUMBER OF VAN-ACCESSIBLE SPACES REQUIRED, OF TOTAL	SPACES SIGNED "WHEELCHAIR USE ONLY"
1 – 25	1	1	–
26 – 50	2	1	–
51 – 75	3	1	–
76 – 100	4	1	–
101 – 150	5	–	1
151 – 200	6	–	1
201 – 300	7	–	2
301 – 400	8	–	2
401 –500	9	–	2
501 – 999	2 percent of total spaces	–	1 in every 6 accessible spaces or portion thereof
Over 1,000	20 spaces plus 1 for every 100 spaces, or fraction thereof, over 1,000	–	1 in every 6 spaces or portion thereof

2. Location of parking spaces. Parking spaces for the individual with a disability that serve a particular building shall be located on the shortest possible accessible circulation route to an accessible entrance to a building. In separate parking structures or lots that do not serve a particular building, parking spaces for the persons with disabilities shall be located on the shortest possible circulation route to an accessible pedestrian entrance of the parking facility.

3. Accessible parking space and aisle shall meet ADA vertical and horizontal slope standards.

4. Where any differences exist between this section and current federal standards, those standards shall prevail over this code section.

5. One in every eight accessible spaces, but not less than one, shall be served by an access aisle 96 inches wide.

6. Van-accessible parking spaces shall have an additional sign marked "Van Accessible" mounted below the accessible parking sign. A van-accessible parking space reserved for wheelchair users shall have a sign that includes the words "Wheelchair Use Only." Van-accessible parking shall have an adjacent eight-foot-wide aisle. All other accessible stalls shall have a six-foot-wide aisle. Two vehicles may share the same aisle if it is between them. The vertical clearance of the van space shall be 96 inches.

Response: This application does not include any off-street parking facilities. This criterion does not apply.

C. Landscaping in parking areas. Reference Chapter 54 CDC, Landscaping.

Response: This application does not include any off-street parking facilities. This criterion does not apply.

D. Bicycle facilities and parking.

1. Provisions shall be made for pedestrian and bicycle ways if such facilities are shown on an adopted plan.
2. Bicycle parking facilities shall either be lockable enclosures in which the bicycle is stored, or secure stationary racks which accommodate bicyclist's locks securing the frame and both wheels. The bicycle parking shall be no more than 50 feet from the entrance to the building, well-lit, observable, and properly signed.
3. Bicycle parking must be provided in the following amounts:

Response: This application does not include any off-street parking facilities. This criterion does not apply.

Chapter 48 – ACCESS, EGRESS AND CIRCULATION

48.020 Applicability and General Provisions

A. The provisions of this chapter do not apply where the provisions of the Transportation System Plan or land division chapter are applicable and set forth differing standards.

B. All lots shall have access from a public street or from a platted private street approved under the land division chapter.

Response: A 20-foot Egress and Ingress Easement and Utility Easement was recorded on Tax Lot 300 for the benefit of Tax Lots 300, 800, and 802. These lots were also platted on Partition Plat 2019-007 recorded February 7, 2019 in Clackamas County Records as Document No. 2019-6705. These criteria are met.

C. No building or other permit shall be issued until scaled plans are presented to the City and approved by the City as provided by this chapter, and show how the access, egress, and circulation requirements are to be fulfilled. Access to State or County roads may require review, approval, and permits from the appropriate authority.

Response: Exhibit A includes scaled plans to be approved by the City as required in this chapter. The plans include conceptual drawings that show the access and circulation off 9th Street to Lots 300, 800, and 802. This criterion is met.

D. Should the owner or occupant of a lot, parcel or building enlarge or change the use to which the lot, parcel or building is put, resulting in increasing any of the requirements of this chapter, it shall be unlawful and a violation of this code to begin or maintain such altered use until the provisions of this chapter have been met, and, if required, until the appropriate approval authority under Chapter 99 CDC has approved the change.

Response: The Applicant is aware that any modifications to the planned development require appropriate approval under this chapter.

E. Owners of two or more uses, structures, lots, parcels, or units of land may agree to utilize jointly the same access and egress when the combined access and egress of both uses, structures, or parcels of land satisfies the requirements as designated in this code; provided, that satisfactory legal evidence is presented to the City Attorney in the form of deeds, easements, leases, or contracts to establish joint use. Copies of said instrument shall be placed on permanent file with the City Recorder.

Response: A 20-foot Egress and Ingress Easement and Utility Easement was recorded in Clackamas County Records as Document No. 2019-6706 for the benefit of Tax Lots 300, 800, and

802. These lots were also platted on Partition Plat 2019-007 recorded February 7, 2019 in Clackamas County Records as Document No. 2019-6705. This criterion is met.

F. **Property owners shall not be compelled to access their homes via platted stems of flag lots if other driveways and easements are available and approved by the City Engineer.**

Response: This application does not include a request including a flag lot. This criterion does not apply.

48.025 Access Control

B. Access control standards.

1. **Traffic impact analysis requirements. The City or other agency with access jurisdiction may require a traffic study prepared by a qualified professional to determine access, circulation and other transportation requirements. (See also CDC 55.125, Transportation Impact Analysis.)**

Response: The Pre-App Comments received from the City indicates that a Traffic Impact Analysis is not anticipated for this project.

2. **The City or other agency with access permit jurisdiction may require the closing or consolidation of existing curb cuts or other vehicle access points, recording of reciprocal access easements (i.e., for shared driveways), development of a frontage street, installation of traffic control devices, and/or other mitigation as a condition of granting an access permit, to ensure the safe and efficient operation of the street and highway system. Access to and from off-street parking areas shall not permit backing onto a public street.**

Response: Exhibit A shows the existing curb cuts and recorded access easement for the shared driveway, as well as frontage improvements along 9th Street.

3. **Access options. When vehicle access is required for development (i.e., for off-street parking, delivery, service, drive-through facilities, etc.), access shall be provided by one of the following methods (planned access shall be consistent with adopted public works standards and TSP). These methods are "options" as approved by the City Engineer.**
    - a. **Option 1. Access is from an existing or proposed alley or mid-block lane. If a property has access to an alley or lane, direct access to a public street is not permitted.**
    - b. **Option 2. Access is from a private street or driveway connected to an adjoining property that has direct access to a public street (i.e., "shared driveway"). A public access easement covering the driveway shall be recorded in this case to assure access to the closest public street for all users of the private street/drive.**
    - c. **Option 3. Access is from a public street adjacent to the development lot or parcel. If practicable, the owner/developer may be required to close or consolidate an existing access point as a condition of approving a new access. Street accesses shall comply with the access spacing standards in subsection (B)(6) of this section.**

Response: This application includes a request for "Option 2" as stated above. The Applicant and owner of Tax Lot 300 have a shared 20-foot Egress and Ingress Easement and Utility Easement that was recorded in Clackamas County Records as Document No. 2019-6706 for the benefit of Tax Lots 300, 800, and 802.

4. **Subdivisions fronting onto an arterial street. New residential land divisions fronting onto an arterial street shall be required to provide alleys or secondary (local or collector) streets for access to individual lots. When alleys or secondary streets cannot be constructed due to topographic or other physical constraints, access may be provided by consolidating driveways for clusters of two or more lots (e.g., includes flag lots and mid-block lanes).**

Response: This application does not include a request for a subdivision. This criterion does not apply.

5. **Double-frontage lots. When a lot or parcel has frontage onto two or more streets, access shall be provided first from the street with the lowest classification. For example, access shall be provided from a local street before a collector or arterial street. When a lot or parcel has frontage opposite that of the adjacent lots or parcels, access shall be provided from the street with the lowest classification.**

Response: This application does not include a request for double frontage lots. This criterion does not apply.

6. **Access spacing.**
    a. **The access spacing standards found in the adopted Transportation System Plan (TSP) shall be applicable to all newly established public street intersections and non-traversable medians. Deviation from the access spacing standards may be granted by the City Engineer if conditions are met as described in the access spacing variances section in the adopted TSP.**
    b. **Private drives and other access ways are subject to the requirements of CDC 48.060.**

Response: This application does not include newly established public street intersections or non-traversable medians. Responses to CDC 48.060 are provided below.

7. **Number of access points. For single-family (detached and attached), two-family, and duplex housing types, one street access point is permitted per lot or parcel, when alley access cannot otherwise be provided; except that two access points may be permitted corner lots (i.e., no more than one access per street), subject to the access spacing standards in subsection (B)(6) of this section. The number of street access points for multiple family, commercial, industrial, and public/institutional developments shall be minimized to protect the function, safety and operation of the street(s) and sidewalk(s) for all users. Shared access may be required, in conformance with subsection (B)(8) of this section, in order to maintain the required access spacing, and minimize the number of access points.**

Response: Exhibit A illustrates one shared access point for Tax Lots 300, 800, and 802 by way of an Egress and Ingress Easement and Utility Easement recorded in Clackamas County Records as Document No. 2019-6706. The criteria are met.

8. **Shared driveways. The number of driveway and private street intersections with public streets shall be minimized by the use of shared driveways with adjoining lots where feasible. The City shall require shared driveways as a condition of land division or site design review, as applicable, for traffic safety and access management purposes in accordance with the following standards:**
    a. **Shared driveways and frontage streets may be required to consolidate access onto a collector or arterial street. When shared driveways or frontage streets are required, they shall be stubbed to adjacent developable parcels to indicate future extension. "Stub" means that a driveway or street temporarily**

ends at the property line, but may be extended in the future as the adjacent lot or parcel develops. "Developable" means that a lot or parcel is either vacant or it is likely to receive additional development (i.e., due to infill or redevelopment potential).

b. Access easements (i.e., for the benefit of affected properties) shall be recorded for all shared driveways, including pathways, at the time of final plat approval or as a condition of site development approval.

c. Exception. Shared driveways are not required when existing development patterns or physical constraints (e.g., topography, lot or parcel configuration, and similar conditions) prevent extending the street/driveway in the future.

Response: Exhibit A illustrates one shared driveway for Tax Lots 300, 800, and 802 by way of an Egress and Ingress Easement and Utility Easement recorded in Clackamas County Records as Document No. 2019-6706. The criteria are met.

C. Street connectivity and formation of blocks required. In order to promote efficient vehicular and pedestrian circulation throughout the City, land divisions and large site developments shall produce complete blocks bounded by a connecting network of public and/or private streets, in accordance with the following standards:

1. Block length and perimeter. The maximum block length shall not exceed 800 feet or 1,800 feet along an arterial.
2. Street standards. Public and private streets shall also conform to Chapter 92 CDC, Required Improvements, and to any other applicable sections of the West Linn Community Development Code and approved TSP.
3. Exception. Exceptions to the above standards may be granted when blocks are divided by one or more pathway(s), in conformance with the provisions of CDC 85.200(C), Pedestrian and Bicycle Trails, or cases where extreme topographic (e.g., slope, creek, wetlands, etc.) conditions or compelling functional limitations preclude implementation, not just inconveniences or design challenges.

Response: This application does not include a land division or a large site development. However, Exhibit A represents half-street improvements along Lot 802 and 9th Street frontage in accordance with the City's standard for local streets. The criteria are met.

48.030 Minimum Vehicular Requirements for Residential Uses

A. Direct individual access from single-family dwellings and duplex lots to an arterial street, as designated in the transportation element of the Comprehensive Plan, is prohibited for lots or parcels created after the effective date of this code where an alternate access is either available or is expected to be available by imminent development application. Evidence of alternate or future access may include temporary cul-de-sacs, dedications or stubouts on adjacent lots or parcels, or tentative street layout plans submitted at one time by adjacent property owner/developer or by the owner/developer, or previous owner/developer, of the property in question.

In the event that alternate access is not available as determined by the Planning Director and City Engineer, access may be permitted after review of the following criteria:

1. Topography.
2. Traffic volume to be generated by development (i.e., trips per day).
3. Traffic volume presently carried by the street to be accessed.
4. Projected traffic volumes.

5. **Safety considerations such as line of sight, number of accidents at that location, emergency vehicle access, and ability of vehicles to exit the site without backing into traffic.**
6. **The ability to consolidate access through the use of a joint driveway.**
7. **Additional review and access permits may be required by State or County agencies.**

Response: This application does not include a request for direct individual access from the proposed development to an arterial street. The criteria are not applicable.

B. When any portion of any house is less than 150 feet from the adjacent right-of-way, access to the home is as follows:

1. **One single-family residence, including residences with an accessory dwelling unit as defined in CDC 02.030, shall provide 10 feet of unobstructed horizontal clearance. Dual-track or other driveway designs that minimize the total area of impervious driveway surface are encouraged.**
2. **Two to four single-family residential homes equals a 14- to 20-foot-wide paved or all-weather surface. Width shall depend upon adequacy of line of sight and number of homes.**
3. **Maximum driveway grade shall be 15 percent. The 15 percent shall be measured along the centerline of the driveway only. Variations require approval of a Class II variance by the Planning Commission pursuant to Chapter 75 CDC. Regardless, the last 18 feet in front of the garage shall be under 12 percent grade as measured along the centerline of the driveway only. Grades elsewhere along the driveway shall not apply.**
4. **The driveway shall include a minimum of 20 feet in length between the garage door and the back of sidewalk, or, if no sidewalk is proposed, to the paved portion of the right-of-way.**

Response: Exhibit A illustrates the proposed driveway will have a maximum grade of less than 15 percent and will include sufficient distance between the garage and side property line. The criteria are met.

C. When any portion of one or more homes is more than 150 feet from the adjacent right-of-way, the provisions of subsection B of this section shall apply in addition to the following provisions.

1. **A turnaround may be required as prescribed by the Fire Chief.**
2. **Minimum vertical clearance for the driveway shall be 13 feet, six inches.**
3. **A minimum centerline turning radius of 45 feet is required unless waived by the Fire Chief.**
4. **There shall be sufficient horizontal clearance on either side of the driveway so that the total horizontal clearance is 20 feet.**

Response: Exhibit A shows the planned home will be less than 150 feet from the adjacent right-of-way. The above criteria do not apply.

F. Where on-site maneuvering and/or access drives are necessary to accommodate required parking, in no case shall said maneuvering and/or access drives be less than that required in Chapters 46 and 48 CDC.

Response: Responses to requirements for on-site maneuvering and access drives are included in CDC Chapters 46 and 48 in this application.

G. **The number of driveways or curb cuts shall be minimized on arterials or collectors. Consolidation or joint use of existing driveways shall be required when feasible.**

Response: This application does not include arterial or collector streets. This criterion does not apply.

48.060 Width and Location of Curb Cuts and Access Separation Requirements

A. **Minimum curb cut width shall be 16 feet.**

B. **Maximum curb cut width shall be 36 feet, except along Highway 43 in which case the maximum curb cut shall be 40 feet. For emergency service providers, including fire stations, the maximum shall be 50 feet.**

Response: Exhibit A shows the width of the curb cut for the new driveway serving Lot 802 as 25-feet-wide. This criterion is met.

C. **No curb cuts shall be allowed any closer to an intersecting street right-of-way line than the following:**

1. **On an arterial when intersected by another arterial, 150 feet.**
2. **On an arterial when intersected by a collector, 100 feet.**
3. **On an arterial when intersected by a local street, 100 feet.**
4. **On a collector when intersecting an arterial street, 100 feet.**
5. **On a collector when intersected by another collector or local street, 35 feet.**
6. **On a local street when intersecting any other street, 35 feet.**

Response: The subject property is not located on an intersecting street. The criteria do not apply.

D. **There shall be a minimum distance between any two adjacent curb cuts on the same side of a public street, except for one-way entrances and exits, as follows:**

1. **On an arterial street, 150 feet.**
2. **On a collector street, 75 feet.**
3. **Between any two curb cuts on the same lot or parcel on a local street, 30 feet.**

Response: Exhibit A illustrates that a curb is not present along 9th Street in the vicinity of the site. The criterion is met.

E. **A rolled curb may be installed in lieu of curb cuts and access separation requirements.**

Response: Exhibit A shows the proposed design with curb cuts and compliance with the access separation requirements in this chapter.

F. **Curb cuts shall be kept to the minimum, particularly on Highway 43. Consolidation of driveways is preferred. The standard on Highway 43 is one curb cut per business if consolidation of driveways is not possible.**

Response: Exhibit A shows that lots 300 and 802 will share the accessway with minimal curb cuts. The subject property is not located on Highway 43. This criterion is met.

G. **Adequate line of sight pursuant to engineering standards should be afforded at each driveway or accessway.**

Response: Exhibit A shows the accessway is designed with adequate line of sight pursuant to the engineering standards. This criterion is met.

Chapter 85 – GENERAL PROVISIONS

85.210 Property Line Adjustments – Approval Standards

A. The Director shall approve or deny a request for a property line adjustment based on the criteria stated below:

1. An additional lot or parcel shall not be created by the property line adjustment.

Response: As shown in Exhibit A, this application for a property line adjustment does not include a request to create an additional lot or parcel. This criterion does not apply.

2. The existing property shall not be reduced in size by the adjustments below the minimum lot or parcel size established by the approved zoning for that district. The property line adjustment shall not enlarge, increase or extend the non-conformity of a non-conforming lot or non-conforming structure.

Response: The minimum lot size in the R-10 Single-Family Residential Zone is 10,000 square feet. Exhibit A shows the adjusted size of Lot 802 will be ±14,600 square feet. The adjusted size of Lot 800 will be ±57,451 square feet. This criterion is met.

3. Property line adjustments shall be either:

a. A straight line;

b. A line with maximum of two 45- to 90-degree turns; or

c. A maximum of three turns less than 45 degrees.

Response: As shown in Exhibit A, property lines are consistent with the above requirements. This criterion is met.

4. The property line adjustment shall not create a lot or parcel that violates applicable site development regulations.

Response: As shown in Exhibit A, adjusted Tax Lots 800 and 802 comply with all applicable lot requirements.

5. The property line adjustment will not adversely affect existing easements or existing utilities unless an easement vacation is obtained, replacement easements are established, or any required utility relocations are paid for by the applicant.

Response: This application for a property line adjustment does not adversely affect any existing easements or existing utilities. This criterion is met.

6. Proposed property line adjustments that cannot meet these standards are subject to review under CDC 99.060(B)(2)(e).

Response: This application for a property line adjustment meets all applicable standards in this chapter. This criterion does not apply.

7. Any appeal must be filed in accordance with CDC 99.240.

Response: The Applicant understands the process for filing an appeal, if necessary.

B. The provisions of CDC 85.070 shall also apply to property line adjustments.

Response: The Applicant is aware of the administrative provisions in CDC 85.070.

Chapter 96 – STREET IMPROVEMENT CONSTRUCTION

96.010 Construction Required

A. New construction.

1. **Building permits shall not be issued for the construction of any new building or structure, or for the remodeling of any existing building or structure, which results in an increase in size or includes a change in use, including building permits for single-family dwellings but excepting building permits for alteration or addition to an existing single-family dwelling, unless the applicant for said building permit agrees to construct street improvements as required by the land use decision authorizing the construction activity. The placement of new curbs and the drainage facilities required shall be determined by the City Manager or the Manager's designee.**

Response: This application includes half-street improvements along Lot 802 and 9th Street frontage in accordance with the City's standard for local streets. This criterion is met.

2. **If the building permit did not require a prior land use decision, the applicant shall construct street improvements which shall include curbs, sidewalks, drainage facilities, and pavement widening to meet new curbs, along all City streets which abut the property described in the building permits.**

Response: A building permit for a new home on this lot will be subject to the approval decision herein. This criterion does not apply.

3. **An applicant for a building permit may apply for a waiver of street improvements and the option to make a payment in lieu of construction. The option is available if the City Manager or the Manager's designee determines the transportation system plan does not include the street improvement for which the waiver is requested.**

Response: This application does not include a request for a waiver of street improvements. This criterion does not apply.

4. **When an applicant applies for and is granted a waiver of street improvements under subsection (A)(3) of this section, the applicant shall pay an in-lieu fee equal to the estimated cost, accepted by the City Engineer, of the otherwise required street improvements. As a basis for this determination, the City Engineer shall consider the cost of similar improvements in recent development projects and may require up to three estimates from the applicant. The in-lieu fee shall be used for in kind or related improvements.**

Response: This application does not include a request for a waiver of street improvements. This criterion does not apply.

B. Remodeling of an existing building.

1. **Building permits shall not be issued for the remodeling and conversion of any existing building or structure which results in an increase in size or includes a change of use excepting building permits for the alteration or addition to an existing single-family dwelling, unless:**
    - **a. The applicant for said building permit agrees to construct street improvements; and**
    - **b. The City Manager or the Manager's designee determines that the remodeling of a structure or change of use is sufficient to cause construction of street improvements.**
2. **The determination of whether the remodeling of an existing building or structure is sufficient to cause the property owner to construct street improvements, shall be made by the City Manager or the Manager's designee. This determination shall be based upon finding that the increase in building size or change of use results in either:**
    - **a. An increase in floor area which creates the need for additional on-site parking in accordance with the Community Development Code; or**

b. A change in use that results in a need for additional on-site parking; or

c. An increase in the dwelling unit density on the site; or

d. A change in the type, number, or location of accessways where off-site traffic will be affected.

3. An applicant for a remodeling of an existing building or structure change may apply for a waiver of street improvements and the option to make a payment in lieu of construction utilizing the process described in subsection (A)(3) of this section.

Response: This application does not include a request for remodeling of an existing building or structure. The criteria do not apply.

C. Replacement of an existing building.

1. Building permits shall not be issued for the replacement of any existing building or structure which results in an increase in size unless:

a. The applicant for said building permit agrees to construct street improvements; and

b. The City Manager or the Manager's designee determines the replacement is sufficiently increased in size to cause construction of street improvements.

Response: This application does not include a request for replacement of an existing building or structure. The criteria do not apply.

D. Notwithstanding any other provisions of this chapter, in cases where the issuance of the building permit pertains to the construction or reconstruction of a building or structure within a large development owned by the same owner or owners, the City Council may, in its sole discretion, authorize the installation of street improvements of equivalent cost on another portion of the total development area.

Response: This application does not include a request for a building permit for construction of a building or structure within a large development. This criterion does not apply.

96.020 Standards

Street improvements shall be installed according to the City standards and shall be completed prior to the issuance of any occupancy permit for the new or remodeled structure or building. In unimproved areas of the City, the City Engineer may grant a time extension of the provisions of this section; provided, that the applicant provides sufficient security in amount and quantity satisfactory to the City Attorney to assure payment of such improvement costs.

Response: The Applicant is aware that street improvements shall be completed prior to issuance of any occupancy permit. This standard can be met.

IV. Conclusion

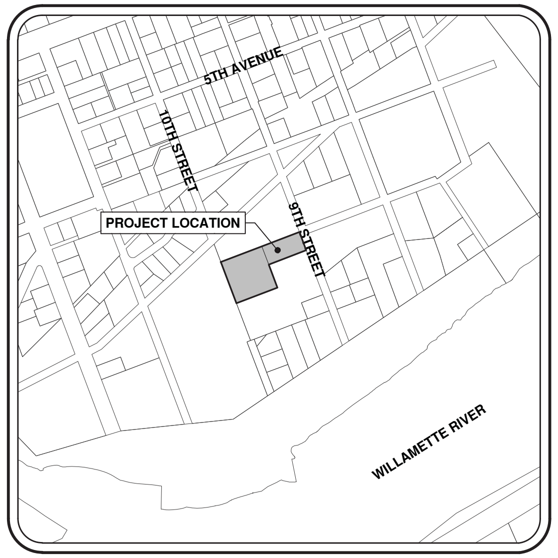
The required findings have been made and this written narrative and accompanying documentation demonstrate that the application is consistent with the applicable provisions of the City of West Linn Community Development Code. The evidence in the record is substantial and supports approval of the application. Therefore, the City can rely upon this information in its approval of the application.

Exhibit A: Preliminary Plans

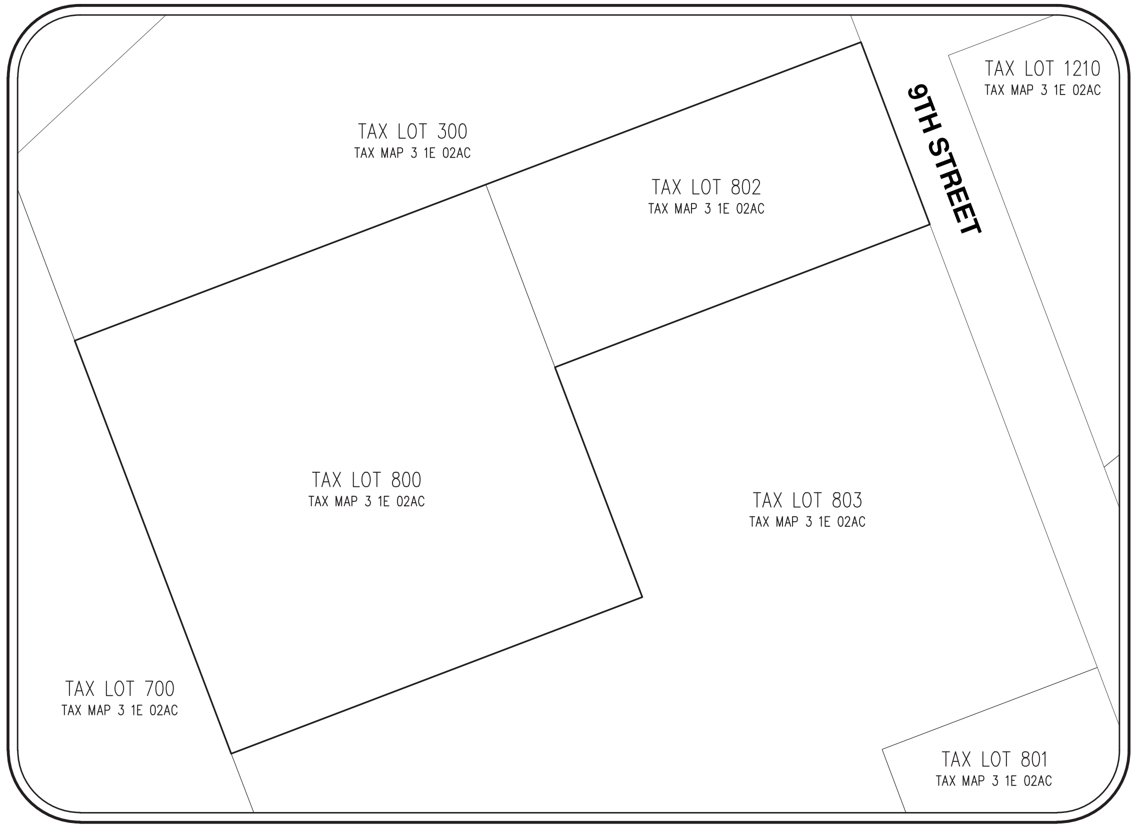
Exhibit A: Preliminary Plans

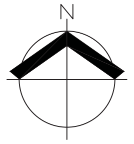
9TH STREET CONSOLIDATED LAND USE APPLICATION

PRELIMINARY PLANS

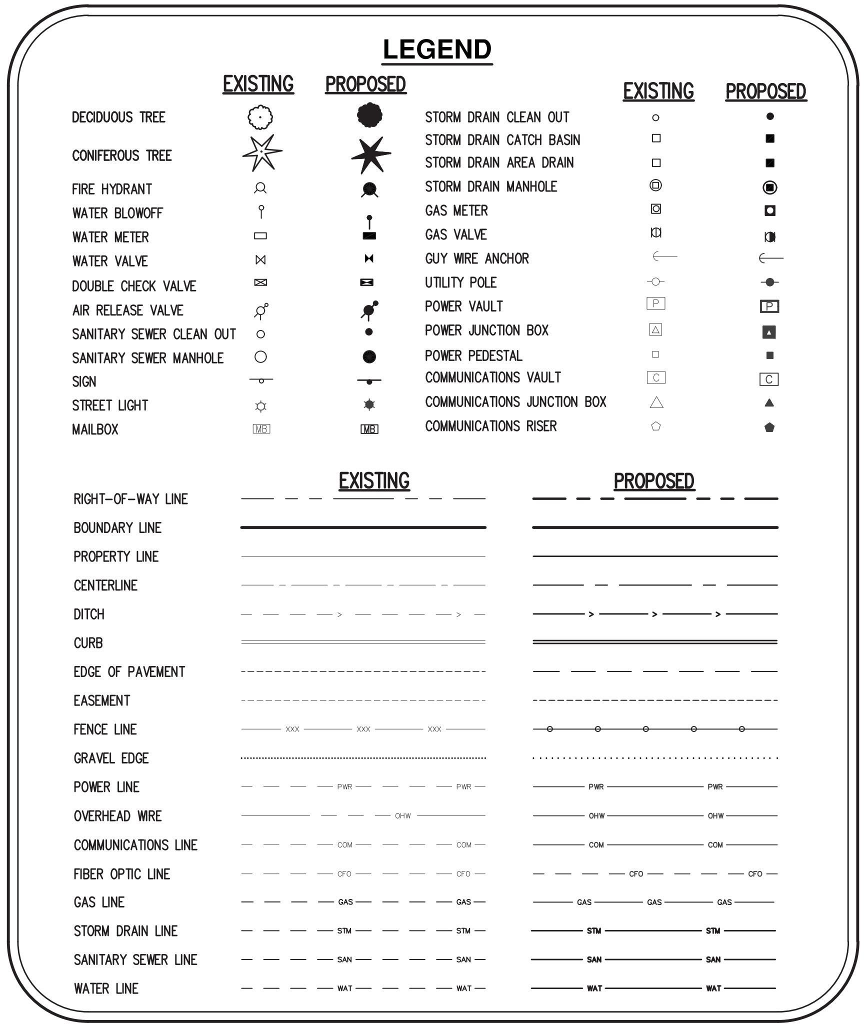


VICINITY MAP
NOT TO SCALE





SITE MAP
SCALE: 1" = 50'



APPLICANT:
MALIBAR GROUP, LLC
615 NW TERRITORIAL ROAD
CANBY, OR 97013

PLANNING/CIVIL ENGINEERING/SURVEYING/ LANDSCAPE ARCHITECTURE/ARBORISTS (APPLICANT'S CONSULTANT):
AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN ROAD, SUITE 100
TUALATIN, OR 97062
CONTACT: JONATHON MORSE/ZACH PELZ
PHONE: (503) 563-6151
FAX: (503) 563-6152

SITE LOCATION AND ZONING:
CLACKAMAS COUNTY ASSESSOR'S MAP 3 1E 2AC TAX LOT 802
WEST LINN, OR 97068
ZONING: R10

SITE DESCRIPTION:
TAX LOT 800 AND 802, CLACKAMAS COUNTY ASSESSOR'S MAP 3 1E 2AC. LOCATED IN THE SOUTHWEST 1/4 OF THE NORTHEAST 1/4 OF SECTION 2, TOWNSHIP 3 SOUTH, RANGE 1 EAST, WILLAMETTE MERIDIAN, CITY OF WEST LINN, CLACKAMAS COUNTY, OREGON.

PROJECT PURPOSE:
PROPERTY LINE ADJUSTMENT, NATURAL RESOURCES OVERLAY PERMIT, AND ASSOCIATED FRONTAGE IMPROVEMENTS.

BENCHMARK:
VERTICAL DATUM: ELEVATIONS ARE BASED ON NGS BENCHMARK NO. RD1501, LOCATED ON HWY 99E
ELEVATION = 81.25 FEET (NAVD 88).

SHEET INDEX

P01	COVER SHEET WITH VICINITY AND SITE MAP
P02	EXISTING CONDITIONS PLAN
P03	PRELIMINARY PLA PLAN WITH BUILDING SETBACKS
P04	PRELIMINARY DEMOLITION AND GRADING PLAN
P05	CONSTRUCTION MANAGEMENT PLAN
P06	PRELIMINARY COMPOSITE UTILITY AND SITE PLAN
P07	PRELIMINARY STREET PLAN
P08	PRELIMINARY AERIAL PHOTOGRAPH PLAN
P09	PRELIMINARY STREET TREE AND STORMWATER FACILITY PLANTING PLAN
P10	PRELIMINARY WRA-HCA MITIGATION ENHANCEMENT PLANTING PLAN

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM

AKS
ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

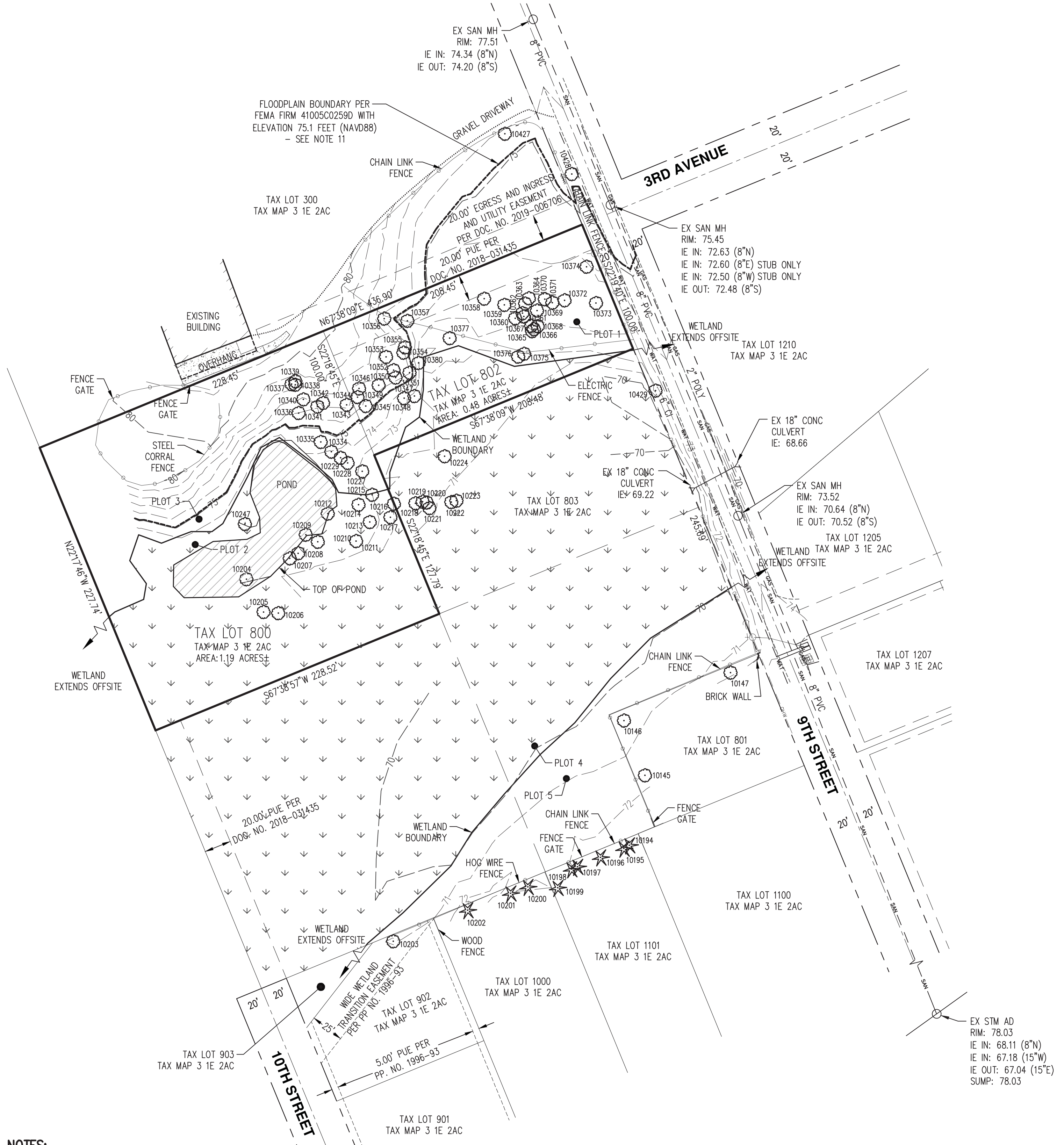
COVER SHEET WITH VICINITY AND SITE MAP
9TH STREET
CONSOLIDATED LAND USE APPLICATION
WEST LINN, OREGON (TAX LOT 802 TAX MAP 3 1E 2AC)

PRELIMINARY NOT FOR CONSTRUCTION
JONATHON M. MORSE
OREGON
RENEWAL DATE: 12/31/20

JOB NUMBER:	5926
DATE:	01/02/2020
DESIGNED BY:	APC & LTP
DRAWN BY:	APC
CHECKED BY:	JMM

P01

AKS DRAWING FILE: 5926 COVER.DWG | LAYOUT: COVR



NOTES:

1. UTILITIES SHOWN ARE BASED ON UNDERGROUND UTILITY LOCATE MARKINGS AS PROVIDED BY OTHERS, PROVIDED PER UTILITY LOCATE TICKET NUMBER 17115124. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND LOCATES REPRESENT THE ONLY UTILITIES IN THE AREA. CONTRACTORS ARE RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO BEGINNING CONSTRUCTION.
2. FIELD WORK WAS CONDUCTED MAY 16–17, 2017.
3. VERTICAL DATUM: ELEVATIONS ARE BASED ON NGS BENCHMARK NO. RD1501, LOCATED ON HWY 99E ELEVATION = 81.25 FEET (NAVD 88).
4. THIS MAP DOES NOT CONSTITUTE A PROPERTY BOUNDARY SURVEY.
5. SURVEY IS ONLY VALID WITH SURVEYOR'S STAMP AND SIGNATURE.
6. BUILDING FOOTPRINTS ARE MEASURED TO SIDING UNLESS NOTED OTHERWISE. CONTACT SURVEYOR WITH QUESTIONS REGARDING BUILDING TIES.
7. CONTOUR INTERVAL IS 1 FOOT.
8. TREES WITH DIAMETER OF 6" AND GREATER ARE SHOWN. TREE DIAMETERS WERE MEASURED UTILIZING A DIAMETER TAPE AT BREAST HEIGHT. TREE INFORMATION IS SUBJECT TO CHANGE UPON ARBORIST INSPECTION.
10. WETLAND BOUNDARIES SHOWN WERE DELINEATED BY AKS ENGINEERING & FORESTRY, LLC. ON MARCH 27, 2017 AND WERE PROFESSIONALLY SURVEYED BY AKS ON JUNE 23, 2017.
11. SUBJECT PROPERTY IS SUBJECT TO FEMA FLOOD INSURANCE RATE MAP (FIRM) 41005C0259D WITH AN EFFECTIVE DATE OF JUNE 17, 2008. PORTIONS OF PROPERTY BELOW THE BASE FLOOD ELEVATION (ELEVATION 75.1 – NAVD88) ARE IN ZONE AE.

TREE TABLE

TREE NUMBER	TYPE	DBH (IN.)	PRESERVE/REMOVE
10145	DECIDUOUS	9	PRESERVE
10146	DECIDUOUS	8	PRESERVE
10147	DECIDUOUS	8	PRESERVE
10194	CONIFEROUS	22	PRESERVE
10195	CONIFEROUS	22	PRESERVE
10196	CONIFEROUS	16	PRESERVE
10197	CONIFEROUS	14	PRESERVE
10198	CONIFEROUS	24	PRESERVE
10199	CONIFEROUS	48	PRESERVE
10200	CONIFEROUS	28	PRESERVE
10201	CONIFEROUS	18,18,18	PRESERVE
10202	CONIFEROUS	60	PRESERVE
10203	DECIDUOUS	16	PRESERVE
10204	DECIDUOUS	13	PRESERVE
10205	DECIDUOUS	47	PRESERVE
10206	DECIDUOUS	20	PRESERVE
10207	DECIDUOUS	12	PRESERVE
10208	DECIDUOUS	12	PRESERVE
10209	DECIDUOUS	5,6	PRESERVE
10210	DECIDUOUS	14	PRESERVE

TREE TABLE

TREE NUMBER	TYPE	DBH (IN.)	PRESERVE/REMOVE
10356	DECIDUOUS	20	PRESERVE
10357	DECIDUOUS	9	PRESERVE
10358	DECIDUOUS	42	REMOVE
10359	DECIDUOUS	28	REMOVE
10360	DECIDUOUS	17	REMOVE
10361	DECIDUOUS	11	REMOVE
10362	DECIDUOUS	8	REMOVE
10363	DECIDUOUS	11	REMOVE
10364	DECIDUOUS	15	REMOVE
10365	DECIDUOUS	19	REMOVE
10366	DECIDUOUS	12	REMOVE
10367	DECIDUOUS	7	REMOVE
10368	DECIDUOUS	7,7,12	REMOVE
10369	DECIDUOUS	7	REMOVE
10370	DECIDUOUS	6,11,13	REMOVE
10371	DECIDUOUS	6,14,15	REMOVE
10372	DECIDUOUS	7	REMOVE
10373	DECIDUOUS	19	REMOVE
10374	DECIDUOUS	20	REMOVE
10375	DECIDUOUS	8,10	PRESERVE

TREE TABLE

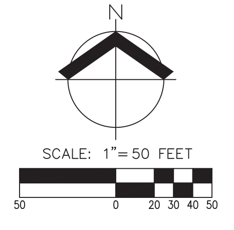
TREE NUMBER	TYPE	DBH (IN.)	PRESERVE/REMOVE
10211	DECIDUOUS	40	PRESERVE
10212	DECIDUOUS	6,7	PRESERVE
10213	DECIDUOUS	20	PRESERVE
10214	DECIDUOUS	22	PRESERVE
10215	DECIDUOUS	29	PRESERVE
10216	DECIDUOUS	5,7,8	PRESERVE
10217	DECIDUOUS	6,7	PRESERVE
10218	DECIDUOUS	5,6,9	PRESERVE
10219	DECIDUOUS	8	PRESERVE
10220	DECIDUOUS	6	PRESERVE
10221	DECIDUOUS	5,7	PRESERVE
10222	DECIDUOUS	6	PRESERVE
10223	DECIDUOUS	5,6	PRESERVE
10224	DECIDUOUS	13	PRESERVE
10227	DECIDUOUS	7,7,9	PRESERVE
10228	DECIDUOUS	8,8,9	PRESERVE
10229	DECIDUOUS	8,11	PRESERVE
10247	DECIDUOUS	15	PRESERVE
10334	DECIDUOUS	8,9	PRESERVE
10335	DECIDUOUS	7,8,8,9	PRESERVE

TREE TABLE

TREE NUMBER	TYPE	DBH (IN.)	PRESERVE/REMOVE
10376	DECIDUOUS	12	PRESERVE
10377	DECIDUOUS	9,11	PRESERVE
10380	DECIDUOUS	6	PRESERVE
10427	DECIDUOUS	22	PRESERVE
10428	DECIDUOUS	34	PRESERVE
10429	DECIDUOUS	6,6,8,8	PRESERVE

TREE TABLE

TREE NUMBER	TYPE	DBH (IN.)	PRESERVE/REMOVE
10336	DECIDUOUS	10	PRESERVE
10337	DECIDUOUS	10,11	PRESERVE
10338	DECIDUOUS	10	PRESERVE
10339	DECIDUOUS	6	PRESERVE
10340	DECIDUOUS	13	PRESERVE
10341	DECIDUOUS	34	PRESERVE
10342	DECIDUOUS	12,13	PRESERVE
10343	DECIDUOUS	29	PRESERVE
10344	DECIDUOUS	22	PRESERVE
10345	DECIDUOUS	23	PRESERVE
10346	DECIDUOUS	10	PRESERVE
10347	DECIDUOUS	8,14,20	PRESERVE
10348	DECIDUOUS	7,9,16,16,16	PRESERVE
10349	DECIDUOUS	16	PRESERVE
10350	DECIDUOUS	20	PRESERVE
10351	DECIDUOUS	22	PRESERVE
10352	DECIDUOUS	7,9	PRESERVE
10353	DECIDUOUS	20	PRESERVE
10354	DECIDUOUS	26	PRESERVE
10355	DECIDUOUS	7,12	PRESERVE



SCALE: 1"=50 FEET

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EXISTING CONDITIONS PLAN
9TH STREET
CONSOLIDATED LAND USE APPLICATION
WEST LINN, OREGON (TAX LOT 802 TAX MAP 3 1E 2AC)

REGISTERED
PROFESSIONAL
LAND SURVEYOR
REVIEW COPY
OREGON
JANUARY 11, 2005
ROBERT D. RETTIG
60124LS
RENEWS: 12/31/20

JOB NUMBER:	5926
DATE:	12/17/2019
DESIGNED BY:	APC &
DRAWN BY:	MTB
CHECKED BY:	RDR

P02

AKS DRAWING FILE: 5926EXCOND.DWG | LAYOUT: LAYOUT1

AKS DRAWING FILE: 5926 20191031 PLA.DWG | LAYOUT: P03

PRELIMINARY PLA PLAN WITH BUILDING SETBACKS
9TH STREET
CONSOLIDATED LAND USE APPLICATION
WEST LINN, OREGON (TAX LOT 802 TAX MAP 3 1E 2AC)

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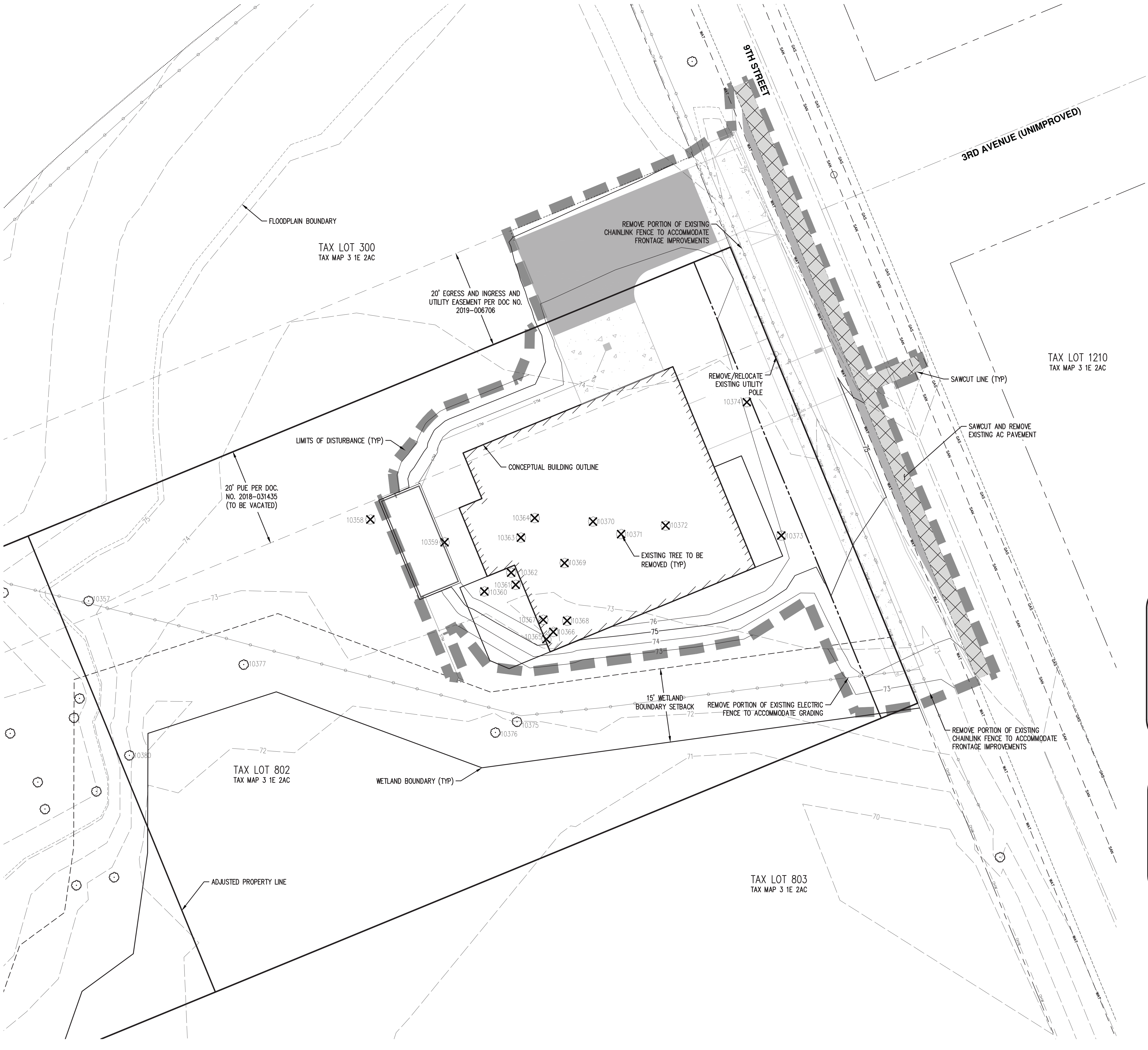
PRELIMINARY NOT FOR CONSTRUCTION
RENEWAL DATE: 12/31/20

JOB NUMBER:	5926
DATE:	01/02/2020
DESIGNED BY:	APC & LTP
DRAWN BY:	APC
CHECKED BY:	JMM

P03



AKS DRAWING FILE: 5926 GRADING AND ESC.DWG | LAYOUT: P04

LEGEND

EXISTING GROUND CONTOUR (1 FT)	— — 74 — —
EXISTING GROUND CONTOUR (5 FT)	— — 75 — —
FINISHED GRADE CONTOUR (1 FT)	—— 74 ——
FINISHED GRADE CONTOUR (5 FT)	—— 75 ——
LIMITS OF DISTURBANCE	▬ ▬
AC PAVEMENT TO BE REMOVED	▨

SUMMARY OF SITE DISTURBANCE

MAXIMUM DISTURBED AREA (MDA) ALLOWED IN WRA:	5,000± SF
PERMANENTLY DISTURBED AREA IN WRA:	3,791± SF
UN-UTILIZED MDA IN WRA:	1,209± SF
TEMPORARILY DISTURBED AREA IN WRA:	0± SF
TOTAL DISTURBED AREA ON TAX LOT 802:	5,000± SF

SITE CUT AND FILL VOLUMES:

*CUT VOLUME:	150.0± C.Y.
**FILL VOLUME:	550.0± C.Y.

*INCLUDES STRIPING VOLUME.

**FILL ON TAX LOT 802 TO BE BALANCED WITH CUT ON TAX LOT 803.

N

SCALE: 1"=10 FEET

10 0 2 5 10

ORIGINAL PAGE SIZE: 22" x 34"

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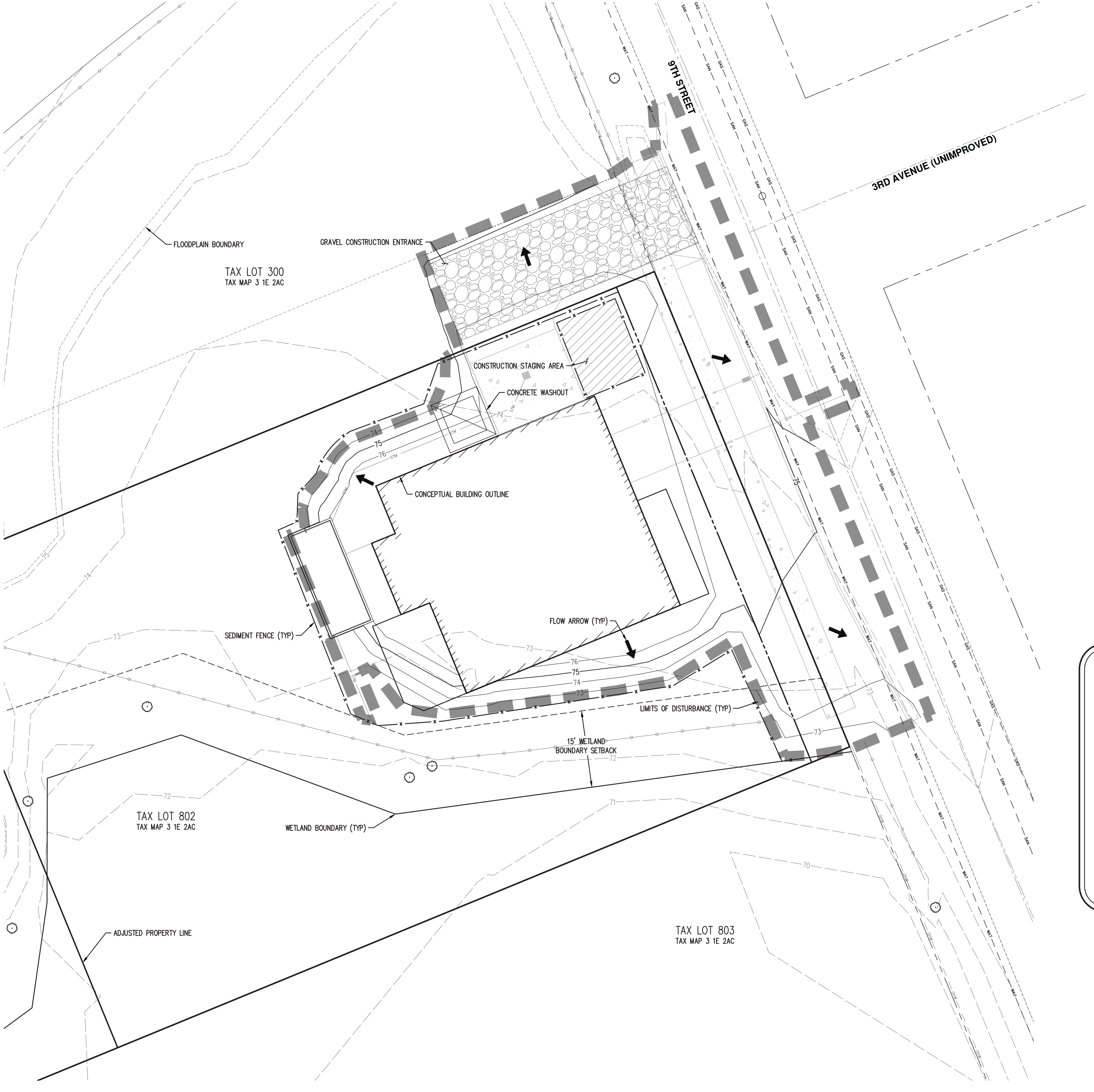
PRELIMINARY DEMOLITION AND GRADING PLAN

9TH STREET
CONSOLIDATED LAND USE APPLICATION

WEST LINN, OREGON (TAX LOT 802 TAX MAP 3 1E 2AC)

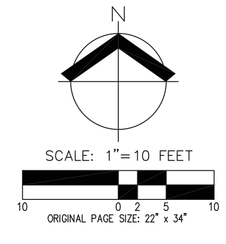
REGISTERED PROFESSIONAL ENGINEER
OREGON
JONATHON M. MORSE
PRELIMINARY NOT FOR CONSTRUCTION
RENEWAL DATE: 12/31/20

JOB NUMBER:	5926
DATE:	01/02/2020
DESIGNED BY:	APC & LTP
DRAWN BY:	APC
CHECKED BY:	JMM



LEGEND

EXISTING GROUND CONTOUR (1 FT)	— — —
EXISTING GROUND CONTOUR (5 FT)	——350——
FINISHED GRADE CONTOUR (1 FT)	———
FINISHED GRADE CONTOUR (5 FT)	——345——
SEDIMENT FENCE	—x—x—
CONCRETE WASHOUT AREA	⊠
DRAINAGE FLOW DIRECTION	→
GRAVEL CONSTRUCTION ENTRANCE	▨
LIMITS OF DISTURBANCE	▬ ▬



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ORIGINAL PAGE SIZE: 22" x 34"

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CONSTRUCTION MANAGEMENT PLAN
9TH STREET
CONSOLIDATED LAND USE APPLICATION
WEST LINN, OREGON (TAX LOT 802 TAX MAP 3 1E 2AC)

JONATHON M. MORSE

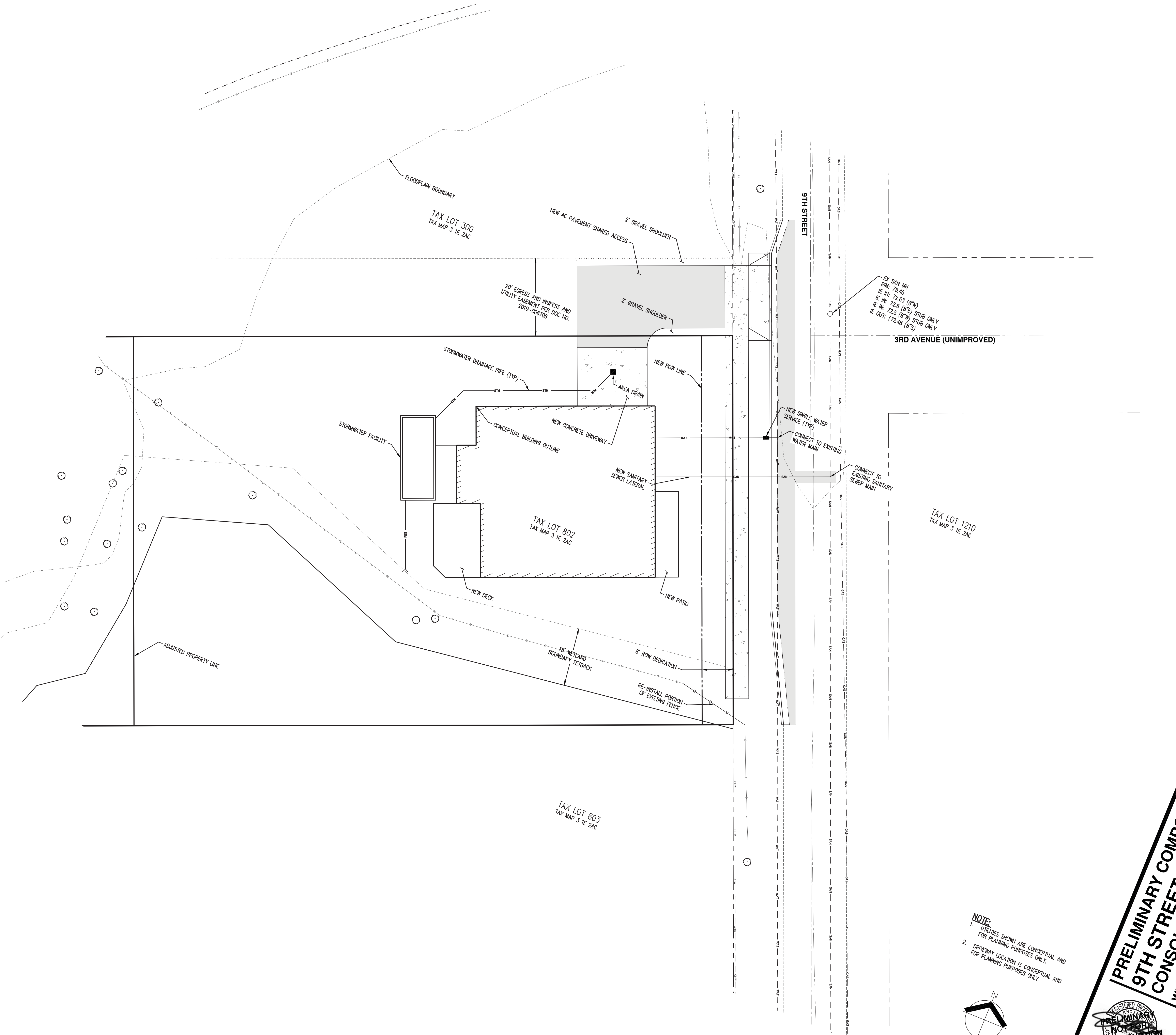
PRELIMINARY
NOT FOR
CONSTRUCTION

RENEWAL DATE: 12/31/20

JOB NUMBER:	5926
DATE:	01/02/2020
DESIGNED BY:	APC & LTP
DRAWN BY:	APC
CHECKED BY:	JMM

P05

AKS DRAWING FILE: 5926 CONST MNGMT.DWG | LAYOUT: P05



AKS DRAWING FILE: 5926 UTILITY.DWG | LAYOUT: P05

NOTE:

1. UTILITIES SHOWN ARE CONCEPTUAL AND FOR PLANNING PURPOSES ONLY.
2. DRIVEWAY LOCATION IS CONCEPTUAL AND FOR PLANNING PURPOSES ONLY.

N

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ORIGINAL PAGE SIZE: 22" x 34"

PRELIMINARY COMPOSITE UTILITY AND SITE PLAN
9TH STREET
CONSOLIDATED LAND USE APPLICATION
WEST LINN, OREGON (TAX LOT 802 TAX MAP 3 1E 2AC)

REGISTERED PROFESSIONAL ENGINEER
OREGON
JONATHON M. MORSE
PRELIMINARY NOT FOR CONSTRUCTION
RENEWAL DATE: 12/31/20

JOB NUMBER:	5926
DATE:	01/02/2020
DESIGNED BY:	APC & LTP
DRAWN BY:	APC
CHECKED BY:	JMM

P06

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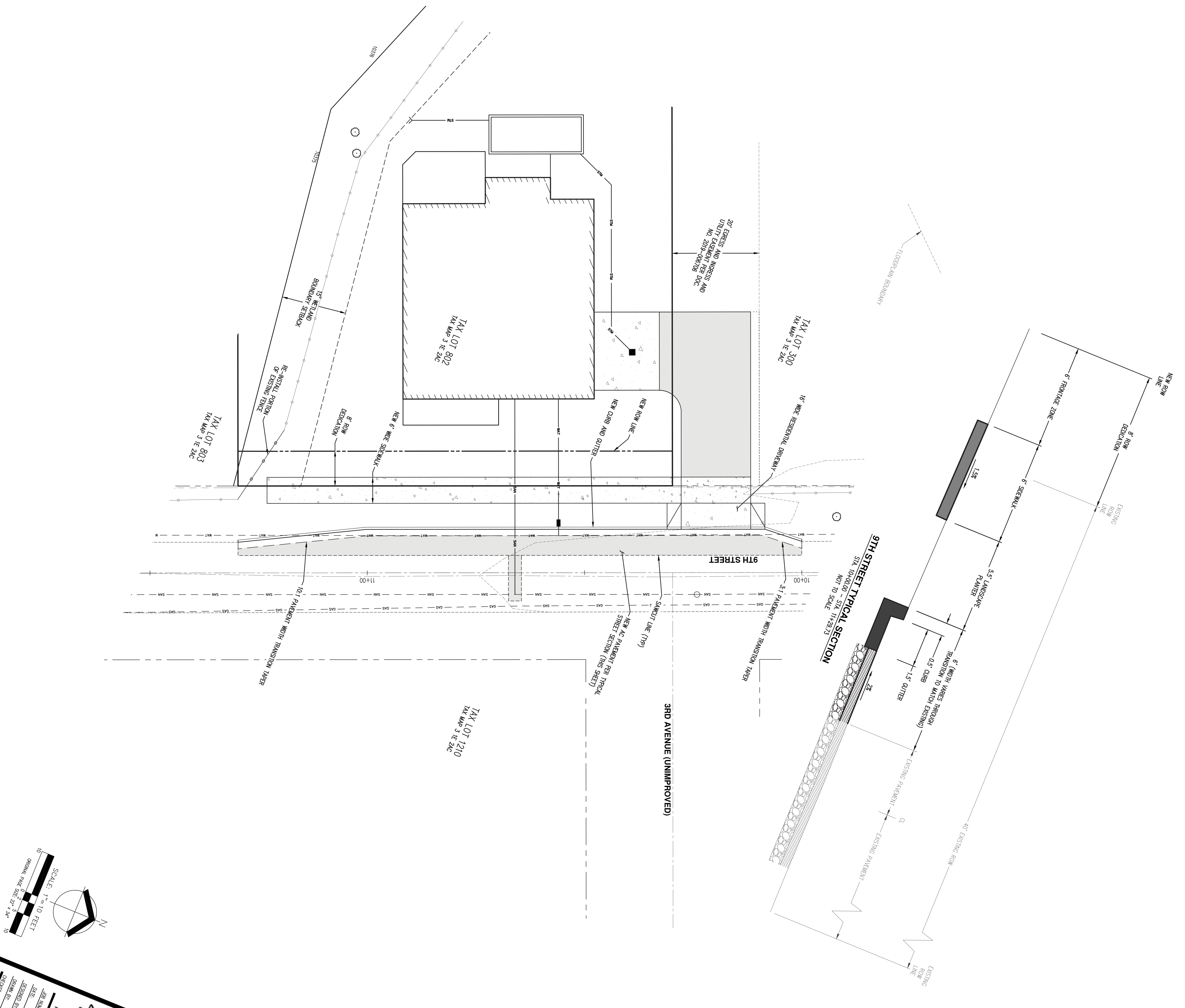

PRELIMINARY STREET PLAN
9TH STREET
CONSOLIDATED LAND USE APPLICATION
WEST LINN, OREGON (TAX LOT 802 TAX MAP 3 1E 2AC)

PRELIMINARY NOT FOR CONSTRUCTION
JONATHON M. MORSE
RENEWAL DATE: 12/31/20

JOB NUMBER: 5926
DATE: 01/02/2020
DESIGNED BY: APC & LTP
DRAWN BY: APC
CHECKED BY: JMM

P07

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CHECKED BY: JMM
DRAWN BY: APC
DESIGNED BY: APC & LTP
DATE: 01/02/2020
JOB NUMBER: 5926

RENEWAL DATE: 12/31/20

PRELIMINARY
NOT FOR
CONSTRUCTION

JONATHON M. MORSE

PRELIMINARY AERIAL PHOTOGRAPH PLAN
9TH STREET
CONSOLIDATED LAND USE APPLICATION
WEST LINN, OREGON (TAX LOT 802 TAX MAP 3 1E 2AC)

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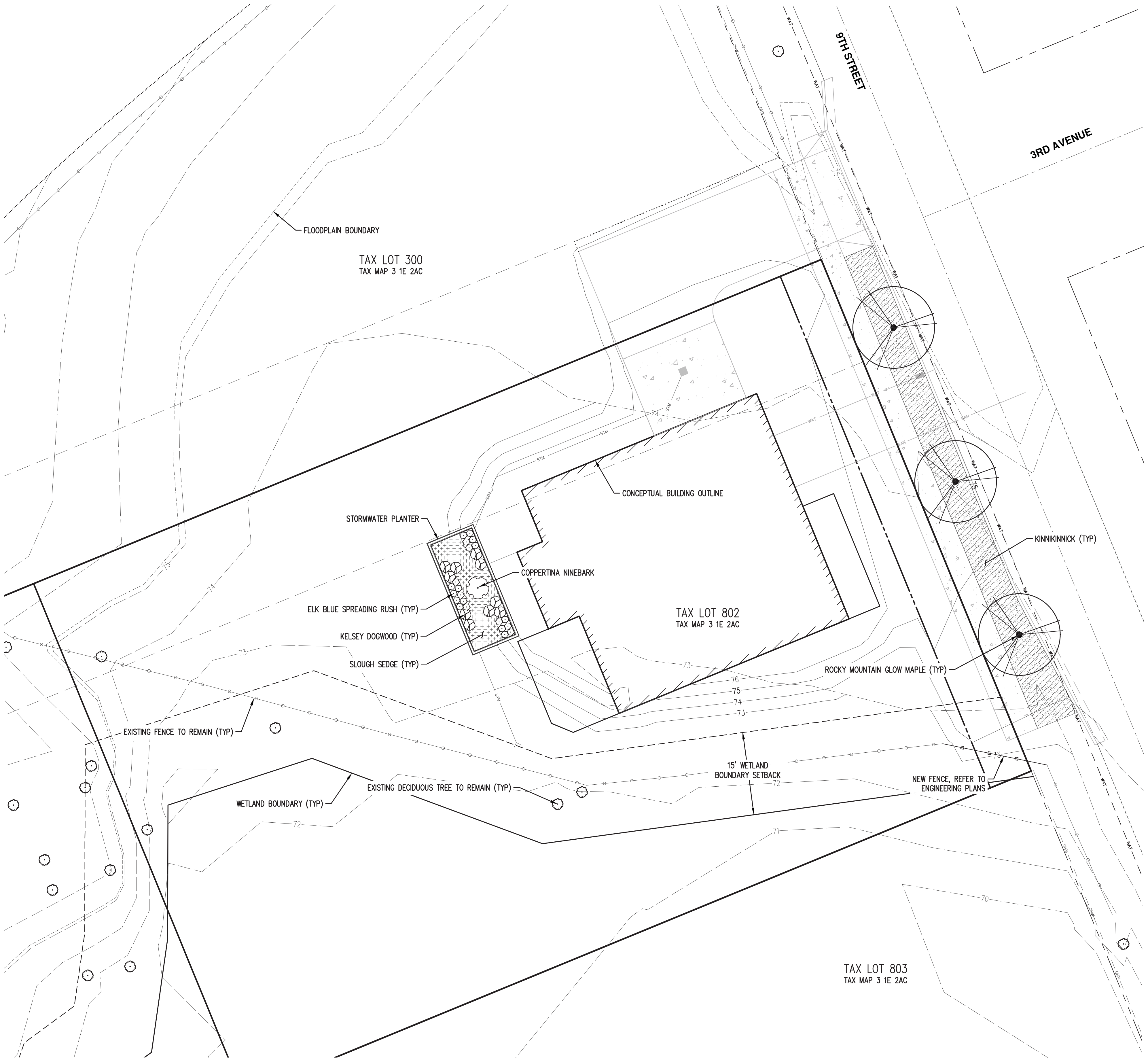


PRELIMINARY PLANT SCHEDULE - STREET TREES

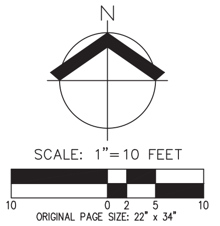
STREET TREES	QTY	BOTANICAL NAME	COMMON NAME	SIZE/CONTAINER	SPACING
○	3	ACER GRANDIDENTATUM 'SCHMIDT'	ROCKY MOUNTAIN GLOW MAPLE	2" CAL. B&B	AS SHOWN
GROUND COVERS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE/CONTAINER**	**SPACING**
▨	139	ARCTOSTAPHYLOS UVA-URSI	KINNIKINNICK	1 GAL CONT	24" o.c.

PRELIMINARY PLANT SCHEDULE - STORMWATER PLANTER

SHRUBS	QTY	BOTANICAL NAME	COMMON NAME	SIZE/CONTAINER	SPACING
○	10	CORNUS SERICEA 'KELSEYI'	KELSEY DOGWOOD	1 GAL CONT.	24" o.c.
○	1	PHYSOCARPUS OPULIFOLIUS 'COPPERTINA'	COPPERTINA NINEBARK	3 GAL CONT.	48" o.c.
HERBACEOUS PLANTS	**QTY**	**BOTANICAL NAME**	**COMMON NAME**	**SIZE/CONTAINER**	**SPACING**
⬡	21	JUNCUS PATENS 'ELK BLUE'	SPREADING RUSH	1 GAL CONT.	15" o.c.
⊞	64	CAREX OBNUPTA	SLOUGH SEDGE	1 GAL CONT	15" o.c.

GENERAL NOTES

1. PLANTING PLAN IS PRELIMINARY AND MEANT TO PORTRAY THE CHARACTER OF THE SITE LANDSCAPING. REVISIONS OR SUBSTITUTIONS TO PLANTINGS, INCLUDING CHANGES TO LOCATION, QUANTITIES, SPECIES, SIZES, SPACING, ETC. MAY BE MADE WHERE ALLOWED BY CITY OF WEST LINN DESIGN STANDARDS, PRIOR TO INSTALLATION.
2. CONTRACTOR IS RESPONSIBLE FOR VERIFYING PLANT AND MATERIAL QUANTITIES. IF DISCREPANCIES OCCUR, DESIGN INTENT PREVAILS OVER QUANTITIES LISTED.
3. ALL PLANTS AND TREES INSTALLED WITHIN THE CITY OF WEST LINN SHALL CONFORM WITH AMERICAN STANDARDS FOR NURSERY STOCK, ANSI Z60.1 CURRENT EDITION IN ALL WAYS. PLANTS SHALL BE SOUND, HEALTHY, VIGOROUS, AND FREE OF PLANT DISEASE AND INSECT PESTS AND THEIR EGGS. CONTAINER STOCK SHALL BE GROWN FOR AT LEAST 8-MONTHS IN CONTAINERS IN WHICH DELIVERED AND SHALL NOT BE ROOT BOUND OR HAVE GIRDLING ROOTS. TREES SHALL NOT HAVE BEEN TOPPED OR HEADED. PLANTS AND TREES WITH BROKEN TOPS, BRANCHES OR INJURED TRUNKS SHALL BE REJECTED.
4. MULCH: APPLY 3" DEEP WELL-AGED MEDIUM GRIND OR SHREDDED DARK HEMLOCK BARK MULCH IN PLANTING BEDS, EXCLUDING STORMWATER PLANTER, TAKING CARE NOT TO COVER FOLIAGE OR BURY ROOT CROWNS OF PLANT MATERIAL.
5. ALL PLANTS AND PLANTINGS WITHIN THE STORMWATER PLANTER SHALL CONFORM TO STORMWATER DESIGN STANDARDS AS ADOPTED BY CITY OF WEST LINN AND TO AMERICAN NURSERY STANDARDS (ANSI Z60.1). PLANTINGS SHOULD PREFERABLY BE INSTALLED BETWEEN FEBRUARY 1 AND MAY 1 OR BETWEEN OCTOBER 1 AND NOVEMBER 15. IF PLANTING OCCURS DURING OTHER TIMES OF THE YEAR, ADDITIONAL MEASURES, SUCH AS DEEP WATERING, MAY BE NECESSARY TO ENSURE PLANT SURVIVAL.
6. SOIL PLACEMENT AND PLANTING SHALL OCCUR IN CONDITIONS THAT DO NOT RESULT IN OVER-COMPACTION OR EROSION, SATURATED SOIL OR OTHER CONDITIONS SUCH AS FREEZING OR ABOVE AVERAGE TEMPERATURES, RAINY CONDITIONS, ETC. SOIL SHALL BE IN FRIABLE (WORKABLE) CONDITION WHEN PLACED. FINISH GRADE OF NEW PLANTING AREAS SHALL SEAMLESSLY MEET FINISH GRADE SET IN GRADING PLANS.
7. TEMPORARY IRRIGATION HAND WATERING, OR OTHER METHODS OF IRRIGATION FOR NEW PLANTS SHALL BE PROVIDED FOR 2 YEARS OR UNTIL ESTABLISHED.
8. STORMWATER PLANTER IS TO BE MAINTAINED IN GOOD CONDITION, FREE OF WEEDS AND OTHER INVASIVE SPECIES.



SCALE: 1"=10 FEET

ORIGINAL PAGE SIZE: 22" x 34"

PRELIMINARY STREET TREE AND STORMWATER FACILITY PLANTING PLAN

9TH STREET
CONSOLIDATED LAND USE APPLICATION

WEST LINN, OREGON (TAX LOT 802 TAX MAP 3 1E 2AC)

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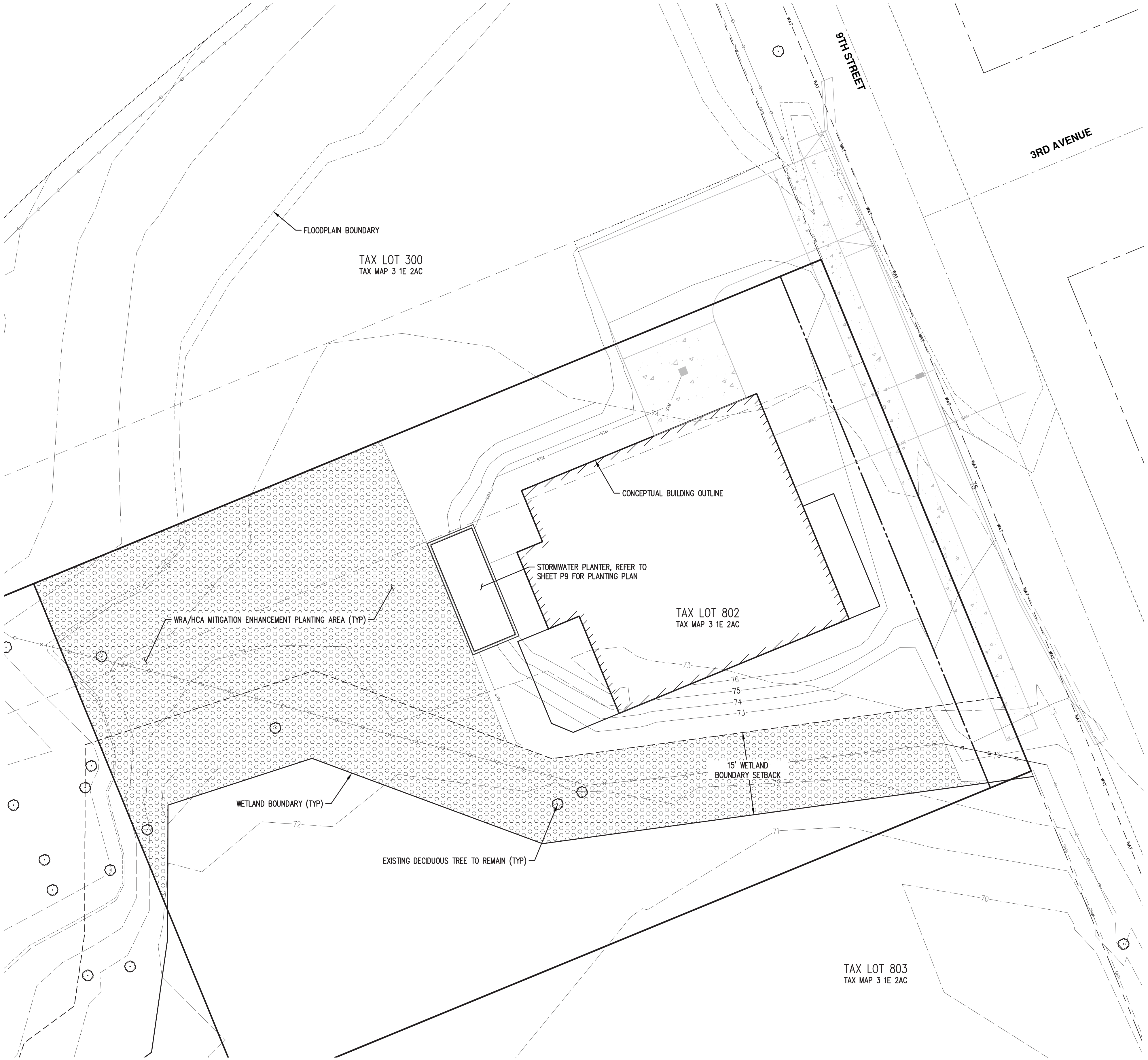
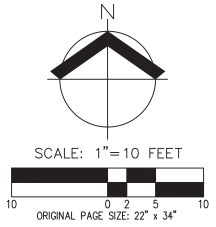
PRELIMINARY NOT FOR CONSTRUCTION
1025
TIMOTHY E. BAUER
OREGON

JOB NUMBER: 5926
DATE: 01/02/2020
DESIGNED BY: TEB
DRAWN BY: TEB
CHECKED BY: KAH/TEB

P09

AKS DRAWING FILE: 5926 LANDSCAPE.DWG | LAYOUT: P09





Tax Lots 800 & 802 West Linn –
WRA/HCA Mitigation Enhancement Planting Specifications

Planting specifications for the enhancement of 4,999 square feet of enhancement area.

▨

Scientific Name	Common Name	Size*	Spacing/Seeding Rate	Quantity
Trees (total 43)				
Alnus rubra	red alder	1 gallon	8-12 feet on center	20
Populus balsamifera	Balsam poplar	1 gallon	8-12 feet on center	20
Salix sitchensis	Sika willow	1 gallon	8-12 feet on center	10
Shrubs (total 250)				
Athyrium filix-femina	lady fern	1 gallon	4-5 feet on center	50
Cornus alba	red-osier dogwood	1 gallon	4-5 feet on center	50
Pysocarpus capitatus	Pacific ninebark	1 gallon	4-5 feet on center	50
Rosa pisocarpa	swamp rose	1 gallon	4-5 feet on center	50
Rubus spectabilis	salmonberry	1 gallon	4-5 feet on center	50
Seed Mix				
Agrostis exarata	spike bent grass	seed	1 lb pls/acre	As needed for bare-soil areas >25 square feet
Glyceria elata	tall manna-grass	seed	2 lbs pls/acre	

**Bare-root plants may be substituted for container plants based on availability. If bare-root plants are used, they must be planted during the late winter/early spring dormancy period.*

Planting Notes (per City of West Linn Community Development Code (CDC) Chapter 32, Water Resource Area Protection, Section 32.100, Re-Vegetation Plan Requirements):

1) Plantings should preferably be installed between December 1 and February 28 for bare roots and seeds and between October 15 and April 30 for containers.

2) Tree plantings must be at least 0.5 inches in caliper measured at 6 inches above the ground level or soil line. Shrub plantings must be in at least a 1-gallon container, or the equivalent in ball and burlap, and must be at least 12 inches in height. All plantings must be selected from the Portland Plant List.

3) All non-native, invasive, or noxious vegetation shall be removed from mitigation planting area prior to installing native enhancement plantings. Invasive species control shall continue throughout the maintenance period.

4) Irrigation may be necessary for the survival of the enhancement plantings. Irrigation or other water practices (i.e., polymer plus watering) are recommended during the three-year monitoring period following planting. Watering shall be provided at a rate of at least 1 inch per week between June 15 and October 15.

5) Plantings shall be mulched a minimum of 3 inches in depth and 18 inches in diameter to retain moisture and discourage weed growth around newly installed plant material.

6) When weather or other conditions prohibit planting according to schedule, the applicant will ensure that disturbed areas are correctly protected with erosion control measures and provide the City with funds in the amount of 125% of a bid from a recognized landscaper or nursery to cover the cost of the plant materials, installation, and any follow-up maintenance. Once the planting conditions are favorable, the applicant will proceed with the plantings and receive the funds back from the City upon completion, or the City will complete the plantings using those funds.

Maintenance and Monitoring Plan

1) **Monitoring and Reporting:** The City requires a three-year maintenance period for the WRA mitigation enhancement area. Monitoring of the mitigation site is the ongoing responsibility of the property owner. Plants that die must be replaced in kind.

2) **Plant Survival:** The City's success criterion for WRA enhancement is 80% survival of tree and shrub plantings expected by the third anniversary of the date the mitigation planting was installed. If any mortality is noted on the site, the factor likely to have caused mortality of the plantings is to be determined and corrected if possible. If survival falls below 80% at any time during the three-year maintenance period, the plantings shall be replaced and other corrective measures, such as mulching or irrigation, may need to be implemented.

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PRELIMINARY WRA-HCA MITIGATION ENHANCEMENT PLANTING PLAN

9TH STREET
CONSOLIDATED LAND USE APPLICATION

WEST LINN, OREGON (TAX LOT 802 TAX MAP 3 1E 2AC)

REGISTERED LANDSCAPE ARCHITECT
1025
TIMOTHY E. BAUER
OREGON
PRELIMINARY NOT FOR CONSTRUCTION

JOB NUMBER: 5926
DATE: 01/02/2020
DESIGNED BY: TEB
DRAWN BY: TEB
CHECKED BY: KAH/TEB

P10

Exhibit B: Development Review Application

CITY OF West Linn

Planning & Development • 22500 Salamo Rd #1000 • West Linn, Oregon 97068
Telephone 503.656.4211 • Fax 503.656.4106 • westlinnoregon.gov

DEVELOPMENT REVIEW APPLICATION

For Office Use Only

STAFF CONTACT	PROJECT NO(S).	
NON-REFUNDABLE FEE(S)	REFUNDABLE DEPOSIT(S)	TOTAL

Type of Review ~~(Please check all that apply)~~:

☐ Annexation (ANX)
☐ Appeal and Review (AP) *
☐ Conditional Use (CUP)
☐ Design Review (DR)
☐ Easement Vacation
☐ Extraterritorial Ext. of Utilities
☐ Final Plat or Plan (FP)
☒ Flood Management Area
☐ Hillside Protection & Erosion Control
☐ Historic Review
☐ Legislative Plan or Change
☒ Lot Line Adjustment (LLA) */**
☐ Minor Partition (MIP) (Preliminary Plat or Plan)
☐ Non-Conforming Lots, Uses & Structures
☐ ~~Planned Unit Development (PUD)~~
☐ Pre-Application Conference (PA) */**
☐ Street Vacation
☐ Subdivision (SUB)
☐ Temporary Uses *
☐ Time Extension *
☐ Variance (VAR)
☐ Water Resource Area Protection/Single Lot (WAP)
☒ ~~Water Resource Area Protection/Wetland (WAP)~~
☒ Willamette & Tualatin River Greenway (WRG)
☐ Zone Change

Home Occupation, Pre-Application, Sidewalk Use, Sign Review Permit, and Temporary Sign Permit applications require different or additional application forms, available on the City website or at City Hall.

Site Location/Address:
Clackamas County Assessor's Map No. 31E02AC, Tax Lots 800 and 802

Assessor's Map No.: 31E02AC
Tax Lot(s): 800 and 802
Total Land Area: +- 72,087 SF

Brief Description of Proposal:
Lot Line Adjustment (LLA) between TL 800 and 802, and HCA, FMA, WRG and WRA for TL 802.

Applicant Name: (please print) Roy Marvin
Phone: *Please contact Consultant
Address: 615 NW Territorial Road
Email: *Please contact Consultant
City State Zip: Canby, OR 97013

Owner Name (required): (please print) Malibar Group LLC, Retirement Plan fbo Roy Marvin
Phone: *Please contact Consultant
Address: 615 NW Territorial Road
Email: *Please contact Consultant
City State Zip: Canby, OR 97013

Consultant Name: (please print) Zach Pelz, AICP, AKS Engineering & Forestry, LLC
Phone: (503) 400-6028
Address: 3700 River Road N, Suite 1
Email: PelzZ@aks-eng.com
City State Zip: Keizer, OR 97303

1. All application fees are non-refundable (excluding deposit). **Any overruns to deposit will result in additional billing.**
2. The owner/applicant or their representative should be present at all public hearings.
3. A denial or approval may be reversed on appeal. No permit will be in effect until the appeal period has expired.
4. **Three (3) complete hard-copy sets (single sided) of application materials must be submitted with this application. One (1) complete set of digital application materials must also be submitted on CD in PDF format. If large sets of plans are required in application please submit only two sets.**

* No CD required / ** Only one hard-copy set needed

The undersigned property owner(s) hereby authorizes the filing of this application, and authorizes on site review by authorized staff. I hereby agree to comply with all code requirements applicable to my application. Acceptance of this application does not infer a complete submittal. All amendments to the Community Development Code and to other regulations adopted after the application is approved shall be enforced where applicable. Approved applications and subsequent development is not vested under the provisions in place at the time of the initial application.

Applicant's signature — Date 12-10-19

Owner's signature *(required)* — Date 12-10-19

Exhibit C: Verification of Property Ownership

BLLL

53

ENCORE HOMES LLC.
7989 SE TOWHEE CT.
MILWAUKIE, OR. 97267
Grantor's Name and Address

MALIBAR GROUP LLC. RETIREMENT
PLAN FBO ROY MARVIN
2332 BLUE SKY LN, ASHLAND, OR 97520
Grantee's Name and Address

After recording, return to (Name and Address):
Roy Marvin – counter
2332 Blueskyln
Ashland OR 97520

Until requested otherwise, send all tax statements to (Name and Address):
Roy Marvin
2332 Blue Sky Ln
Ashland OR 97520

Clackamas County Official Records
Sherry Hall, County Clerk

2017-048042

$53.00

02067407201700480420010013

07/14/2017 09:53:09 AM

D-D Cnt=1 Stn=2 COUNTER3
$5.00 $16.00 $22.00 $10.00

QUITCLAIM DEED – STATUTORY FORM

ENCORE HOMES LLC, Grantor, releases and quitclaims to MALIBAR GROUP LLC. RETIREMENT PLAN FBO ROY MARVIN, Grantee, all right, title and interest in and to the following described real property situated in CLACKAMAS County, Oregon: TRACTS A, B AND C, BLOCK 20 WILLAMETTE AND TUALATIN TRACTS IN THE CITY OF WEST LINN, OREGON TAX LOT 800

(IF SPACE INSUFFICIENT, CONTINUE DESCRIPTION ON REVERSE)

The true consideration for this conveyance is $500. (Here, comply with the requirements of ORS 93.030.)

DATED 5-24-2017; any signature on behalf of a business or other entity is made with the authority of that entity.

ENCORE HOMES, LLC

BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON TRANSFERRING FEE TITLE SHOULD INQUIRE ABOUT THE PERSON'S RIGHTS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010. THIS INSTRUMENT DOES NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY THAT THE UNIT OF LAND BEING TRANSFERRED IS A LAWFULLY ESTABLISHED LOT OR PARCEL, AS DEFINED IN ORS 92.010 OR 215.010, TO VERIFY THE APPROVED USES OF THE LOT OR PARCEL, TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES, AS DEFINED IN ORS 30.930, AND TO INQUIRE ABOUT THE RIGHTS OF NEIGHBORING PROPERTY OWNERS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010.

STATE OF OREGON, County of Washington) ss.

This instrument was acknowledged before me on ________,
by ________.

This instrument was acknowledged before me on 5-24-2017,
by Emery Smith
as MEMBER
of ENCORE HOMES, LLC

OFFICIAL STAMP
MAUREEN ALTA CASEY
NOTARY PUBLIC - OREGON
COMMISSION NO. 959424
MY COMM. EXPIRES FEBRUARY 12, 2021

Notary Public for Oregon
My commission expires 2-12-21

PUBLISHER'S NOTE: If using this form to convey real property subject to ORS 92.027, include the required reference.

3f

RECORDING COVER SHEET (Please Print or Type) this cover sheet was prepared by the person presenting the instrument for recording. The information on this sheet is a reflection of the attached instrument and was added for the purpose of meeting first page recording requirements in the State of Oregon, ORS 205.234, and does NOT affect the instrument.

Clackamas County Official Records
Sherry Hall, County Clerk
2017-055155
$63.00
02075643201700551550030034
08/14/2017 11:32:21 AM
D-D Cnt=1 Stn=9 COUNTER1
$15.00 $16.00 $22.00 $10.00

AFTER RECORDING RETURN TO:

Roy Marvin
615 Territorial Rd NW
Canby, OR 97013

SEND TAX STATEMENTS TO:

Malibar Group LLC, Retire-
ment Plan FBO: Roy Marvin
615 NW-Territorial Rd
Canby, OR 97013

TITLE(S) OF THE TRANSACTION(S) ORS 205.234(a)

Quitclaim Deed

DIRECT PARTY(S) -- (i.e., DEEDS: Seller/Grantor; MORTGAGES: Borrower/Grantor; LIENS; Creditor/Plaintiff) ORS 205.125(1) (b) and 205.160

Encore Homes LLC.

Malibar Group LLC Retirement Plan: FBO Roy Marvin

INDIRECT PARTY(S) -- (i.e., DEEDS: Buyer/Grantee; MORTGAGES: Beneficiary/Lender; LIENS: Debtor/Defendant) ORS 205.125(1) (a) and 205.160

TRUE AND ACTUAL CONSIDERATION– (Amount in dollars or other) ORS 93.030(5)

$\$ 5^{00}$

JUDGMENT AMOUNT– (obligation imposed by the order or warrant) ORS 205.125(1) (c)

$

8) If this instrument is being Re-Recorded, complete the following statement, in accordance with ORS 205.244:

"RERECORDED AT THE REQUEST OF Dept of Assessment & Taxation
TO CORRECT Legal Description
See Attached Exhibit A For New Legal
PREVIOUSLY RECORDED IN BOOK/PAGE/FEE NUMBER 2017-048042

BLLL

53

ENCORE HOMES LLC.
7989 SE TOWHEE CT.
MILWAUKIE, OR. 97267
Grantor's Name and Address

MALIBAR GROUP LLC. RETIREMENT
PLAN FBO ROY MARVIN
2332 BLUE SKY LN, ASHLAND, OR 97520
Grantee's Name and Address

After recording, return to (Name and Address):
Roy Marvin – counter
2332 Blueskyln
Ashland OR 97520

Until requested otherwise, send all tax statements to (Name and Address):
Roy Marvin
2332 Blue Sky Ln
Ashland OR 97520

Clackamas County Official Records
Sherry Hall, County Clerk

2017-048042

$53.00

02067407201700480420010013

07/14/2017 09:53:09 AM

D-D Cnt=1 Stn=2 COUNTER3
$5.00 $16.00 $22.00 $10.00

QUITCLAIM DEED – STATUTORY FORM

ENCORE HOMES LLC, Grantor,
releases and quitclaims to MALIBAR GROUP LLC. RETIREMENT PLAN FBO ROY MARVIN, Grantee,
all right, title and interest in and to the following described real property situated in CLACKAMAS County,
Oregon: TRACTS A, B AND C, BLOCK 20 WILLAMETTE AND TUALATIN TRACTS IN THE CITY OF WEST LINN, OREGON TAX LOT 800

(IF SPACE INSUFFICIENT, CONTINUE DESCRIPTION ON REVERSE)

The true consideration for this conveyance is $500. (Here, comply with the requirements of ORS 93.030.)

DATED 5-24-2017; any signature on behalf of a business or other entity is made with the authority of that entity.

ENCORE HOMES, LLC

BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON TRANSFERRING FEE TITLE SHOULD INQUIRE ABOUT THE PERSON'S RIGHTS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010. THIS INSTRUMENT DOES NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY THAT THE UNIT OF LAND BEING TRANSFERRED IS A LAWFULLY ESTABLISHED LOT OR PARCEL, AS DEFINED IN ORS 92.010 OR 215.010, TO VERIFY THE APPROVED USES OF THE LOT OR PARCEL, TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES, AS DEFINED IN ORS 30.930, AND TO INQUIRE ABOUT THE RIGHTS OF NEIGHBORING PROPERTY OWNERS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010.

STATE OF OREGON, County of Washington) ss.

This instrument was acknowledged before me on ,
by .

This instrument was acknowledged before me on 5-24-2017,
by Emery Smith
as MEMBER
of ENCORE HOMES, LLC

OFFICIAL STAMP
MAUREEN ALTA CASEY
NOTARY PUBLIC - OREGON
COMMISSION NO. 959424
MY COMM. EXPIRES FEBRUARY 12, 2021

Notary Public for Oregon
My commission expires 2-12-21

PUBLISHER'S NOTE: If using this form to convey real property subject to ORS 92.027, include the required reference.

Exhibit A

FIRST AMERICAN 2830854.KV

After recording return to:
Encore Homes, LLC
7989 SE Towhee Court
Milwaukie, OR 97267

Until a change is requested all tax statements shall be sent to the following address:
Encore Homes, LLC
7989 SE Towhee Court
Milwaukie, OR 97267

File No.: 7031-2830854 (mac)
Date: March 14, 2017

THIS SPACE RESERVED FOR RECORDER'S USE

Clackamas County Official Records
Sherry Hall, County Clerk
2017-031854
05/12/2017 10:19:00 AM
D-D Cnt=1 Stn=0 CONNIE
$10.00 $16.00 $10.00 $22.00
$58.00

STATUTORY WARRANTY DEED

Thomas C. Farwell and Susan H. Farwell, Grantor, conveys and warrants to **Encore Homes, LLC** , Grantee, the following described real property free of liens and encumbrances, except as specifically set forth herein:

LEGAL DESCRIPTION: Real property in the County of Clackamas, State of Oregon, described as follows:

TRACTS A, B, C AND D, BLOCK 20, WILLAMETTE & TUALATIN TRACTS, IN THE CITY OF WEST LINN, CLACKAMAS COUNTY AND STATE OF OREGON. EXCEPTING THEREFROM THAT PORTION CONVEYED TO SCOTT CASEY CLARK AND DAISY H. CLARK AS DESCRIBED IN THAT CERTAIN LOT LINE ADJUSTMENT DEED RECORDED JANUARY 10, 2003 AS FEE NO. 2003-003474.

Subject to:

1. Covenants, conditions, restrictions and/or easements, if any, affecting title, which may appear in the public record, including those shown on any recorded plat or survey.

The true consideration for this conveyance is **$125,000.00.** (Here comply with requirements of ORS 93.030)

Exhibit D: Pre-Development Elevation Certificate

Exhibit D: Pre-Development Elevation Certificate

U.S. DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
National Flood Insurance Program

OMB No. 1660-0008
Expiration Date: November 30, 2018

ELEVATION CERTIFICATE

Important: Follow the instructions on pages 1–9.

Copy all pages of this Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.

SECTION A – PROPERTY INFORMATION

FOR INSURANCE COMPANY USE

A1. Building Owner's Name
Malibar Group, LLC

Policy Number:

A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.
No Site Address

Company NAIC Number:

City	State	ZIP Code
West Linn	Oregon	97068

A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.)
Tax Lot 802, Clackamas County Tax Map 3 1E 2AC

A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) Residential

A5. Latitude/Longitude: Lat. 45.342073 Long. -122.647541 Horizontal Datum: ☐ NAD 1927 ☒ NAD 1983

A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.

A7. Building Diagram Number ______ SEE COMMENTS ON PAGE 2

A8. For a building with a crawlspace or enclosure(s): SEE COMMENTS ON PAGE 2

a) Square footage of crawlspace or enclosure(s) ______ sq ft

b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade ______

c) Total net area of flood openings in A8.b ______ sq in

d) Engineered flood openings? ☐ Yes ☐ No

A9. For a building with an attached garage: SEE COMMENTS ON PAGE 2

a) Square footage of attached garage ______ sq ft

b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade ______

c) Total net area of flood openings in A9.b ______ sq in

d) Engineered flood openings? ☐ Yes ☐ No

SECTION B – FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number	B2. County Name	B3. State
City of West Linn 410024	Clackamas County	Oregon

B4. Map/Panel Number	B5. Suffix	B6. FIRM Index Date	B7. FIRM Panel Effective/ Revised Date	B8. Flood Zone(s)	B9. Base Flood Elevation(s) (Zone AO, use Base Flood Depth)
41005C0259	D	01-18-2019	06-17-2008	AE	75.1

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9:
☒ FIS Profile ☐ FIRM ☐ Community Determined ☐ Other/Source: ______

B11. Indicate elevation datum used for BFE in Item B9: ☐ NGVD 1929 ☒ NAVD 1988 ☐ Other/Source: ______

B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☒ No

Designation Date: ______ ☐ CBRS ☐ OPA

ELEVATION CERTIFICATE

OMB No. 1660-0008
Expiration Date: November 30, 2018

IMPORTANT: In these spaces, copy the corresponding information from Section A.

Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.
No Site Address

City: West Linn
State: Oregon
ZIP Code: 97068

FOR INSURANCE COMPANY USE
Policy Number:
Company NAIC Number

SECTION C – BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)

C1. Building elevations are based on: ☒ Construction Drawings* ☐ Building Under Construction* ☐ Finished Construction

*A new Elevation Certificate will be required when construction of the building is complete.

C2. Elevations – Zones A1–A30, AE, AH, A (with BFE), VE, V1–V30, V (with BFE), AR, AR/A, AR/AE, AR/A1–A30, AR/AH, AR/AO. Complete Items C2.a–h below according to the building diagram specified in Item A7. In Puerto Rico only, enter meters.

Benchmark Utilized: NGS NO. RD1501 Vertical Datum: NAVD 88

Indicate elevation datum used for the elevations in items a) through h) below.

☐ NGVD 1929 ☒ NAVD 1988 ☐ Other/Source:

Datum used for building elevations must be the same as that used for the BFE.

Check the measurement used.

a) Top of bottom floor (including basement, crawlspace, or enclosure floor) SEE COMMENTS ☐ feet ☐ meters
b) Top of the next higher floor 76.2 ☒ feet ☐ meters
c) Bottom of the lowest horizontal structural member (V Zones only) N/A ☐ feet ☐ meters
d) Attached garage (top of slab) SEE COMMENTS ☐ feet ☐ meters
e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments) SEE COMMENTS ☐ feet ☐ meters
f) Lowest adjacent (finished) grade next to building (LAG) 74.2 ☒ feet ☐ meters
g) Highest adjacent (finished) grade next to building (HAG) 76.2 ☒ feet ☐ meters
h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support SEE COMMENTS ☐ feet ☐ meters

SECTION D – SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION

This certification is to be signed and sealed by a land surveyor, engineer, or architect authorized by law to certify elevation information. *I certify that the information on this Certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.*

Were latitude and longitude in Section A provided by a licensed land surveyor? ☒ Yes ☐ No ☐ Check here if attachments.

Certifier's Name: Benjamin Huff
License Number: 84738PLS

Title: Land Surveyor

Company Name: AKS Engineering and Forestry

Address: 12965 SW Herman Road, Suite 100

City: Tualatin
State: Oregon
ZIP Code: 97062

1-3-2020

REGISTERED
PROFESSIONAL
LAND SURVEYOR

OREGON
MARCH 14, 2017
BENJAMIN R HUFF
84738PLS
RENEWS: 6/30/21

Signature
Date: 01-03-2020
Telephone: (503) 563-6151
Ext.: 212

Copy all pages of this Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.

Comments (including type of equipment and location, per C2(e), if applicable)

**This pre-construction elevation certificate is to be included in a Consolidated Land Use Application. Values reported in this certificate were taken from the consolidated land use application plan-set, and are subject to change upon final engineering design.

**Items A7-A9, and C2a, d, e & h were intentionally left blank, as the final design is not complete at the time of this certification.

**This certificate is not be be used for the building permit application. An updated certificate that reflects final design values will be provided after construction plans are approved.

ELEVATION CERTIFICATE

OMB No. 1660-0008
Expiration Date: November 30, 2018

IMPORTANT: In these spaces, copy the corresponding information from Section A.			FOR INSURANCE COMPANY USE
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. No Site Address			Policy Number:
City West Linn	State Oregon	ZIP Code 97068	Company NAIC Number

SECTION E – BUILDING ELEVATION INFORMATION (SURVEY NOT REQUIRED) FOR ZONE AO AND ZONE A (WITHOUT BFE)

For Zones AO and A (without BFE), complete Items E1–E5. If the Certificate is intended to support a LOMA or LOMR-F request, complete Sections A, B,and C. For Items E1–E4, use natural grade, if available. Check the measurement used. In Puerto Rico only, enter meters.

E1. Provide elevation information for the following and check the appropriate boxes to show whether the elevation is above or below the highest adjacent grade (HAG) and the lowest adjacent grade (LAG).

a) Top of bottom floor (including basement, crawlspace, or enclosure) is ____________ ☐ feet ☐ meters ☐ above or ☐ below the HAG.

b) Top of bottom floor (including basement, crawlspace, or enclosure) is ____________ ☐ feet ☐ meters ☐ above or ☐ below the LAG.

E2. For Building Diagrams 6–9 with permanent flood openings provided in Section A Items 8 and/or 9 (see pages 1–2 of Instructions), the next higher floor (elevation C2.b in the diagrams) of the building is ____________ ☐ feet ☐ meters ☐ above or ☐ below the HAG.

E3. Attached garage (top of slab) is ____________ ☐ feet ☐ meters ☐ above or ☐ below the HAG.

E4. Top of platform of machinery and/or equipment servicing the building is ____________ ☐ feet ☐ meters ☐ above or ☐ below the HAG.

E5. Zone AO only: If no flood depth number is available, is the top of the bottom floor elevated in accordance with the community's floodplain management ordinance? ☐ Yes ☐ No ☐ Unknown. The local official must certify this information in Section G.

SECTION F – PROPERTY OWNER (OR OWNER'S REPRESENTATIVE) CERTIFICATION

The property owner or owner's authorized representative who completes Sections A, B, and E for Zone A (without a FEMA-issued or community-issued BFE) or Zone AO must sign here. The statements in Sections A, B, and E are correct to the best of my knowledge.

Property Owner or Owner's Authorized Representative's Name

Address	City	State	ZIP Code
Signature	Date	Telephone	

Comments

☐ Check here if attachments.

ELEVATION CERTIFICATE

OMB No. 1660-0008
Expiration Date: November 30, 2018

IMPORTANT: In these spaces, copy the corresponding information from Section A.	FOR INSURANCE COMPANY USE
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. No Site Address	Policy Number:
City: West Linn · State: Oregon · ZIP Code: 97068	Company NAIC Number

SECTION G – COMMUNITY INFORMATION (OPTIONAL)

The local official who is authorized by law or ordinance to administer the community's floodplain management ordinance can complete Sections A, B, C (or E), and G of this Elevation Certificate. Complete the applicable item(s) and sign below. Check the measurement used in Items G8–G10. In Puerto Rico only, enter meters.

G1. ☐ The information in Section C was taken from other documentation that has been signed and sealed by a licensed surveyor, engineer, or architect who is authorized by law to certify elevation information. (Indicate the source and date of the elevation data in the Comments area below.)

G2. ☐ A community official completed Section E for a building located in Zone A (without a FEMA-issued or community-issued BFE) or Zone AO.

G3. ☐ The following information (Items G4–G10) is provided for community floodplain management purposes.

G4. Permit Number	G5. Date Permit Issued	G6. Date Certificate of Compliance/Occupancy Issued

G7. This permit has been issued for: ☐ New Construction ☐ Substantial Improvement

G8. Elevation of as-built lowest floor (including basement) of the building: ________ ☐ feet ☐ meters Datum ________

G9. BFE or (in Zone AO) depth of flooding at the building site: ________ ☐ feet ☐ meters Datum ________

G10. Community's design flood elevation: ________ ☐ feet ☐ meters Datum ________

Local Official's Name	Title
Community Name	Telephone
Signature	Date

Comments (including type of equipment and location, per C2(e), if applicable)

☐ Check here if attachments.

ELEVATION CERTIFICATE

BUILDING PHOTOGRAPHS

See Instructions for Item A6.

OMB No. 1660-0008
Expiration Date: November 30, 2018

IMPORTANT: In these spaces, copy the corresponding information from Section A.			FOR INSURANCE COMPANY USE
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. No Site Address			Policy Number:
City West Linn	State Oregon	ZIP Code 97068	Company NAIC Number

If using the Elevation Certificate to obtain NFIP flood insurance, affix at least 2 building photographs below according to the instructions for Item A6. Identify all photographs with date taken; "Front View" and "Rear View"; and, if required, "Right Side View" and "Left Side View." When applicable, photographs must show the foundation with representative examples of the flood openings or vents, as indicated in Section A8. If submitting more photographs than will fit on this page, use the Continuation Page.

Photo One

Photo One

Photo One Caption

Clear Photo One

Photo Two

Photo Two

Photo Two Caption

Clear Photo Two

ELEVATION CERTIFICATE

BUILDING PHOTOGRAPHS

Continuation Page

OMB No. 1660-0008
Expiration Date: November 30, 2018

IMPORTANT: In these spaces, copy the corresponding information from Section A.

FOR INSURANCE COMPANY USE

Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.
No Site Address

Policy Number:

City	State	ZIP Code
West Linn	Oregon	97068

Company NAIC Number

If submitting more photographs than will fit on the preceding page, affix the additional photographs below. Identify all photographs with: date taken; "Front View" and "Rear View"; and, if required, "Right Side View" and "Left Side View." When applicable, photographs must show the foundation with representative examples of the flood openings or vents, as indicated in Section A8.

Photo Three

Photo Three

Photo Three Caption

Clear Photo Three

Photo Four

Photo Four

Photo Four Caption

Clear Photo Four

Exhibit E: DSL Wetland Delineation Report and DSL Concurrence

Oregon

Kate Brown, Governor

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

State Land Board

Kate Brown
Governor

Bev Clarno
Secretary of State

Tobias Read
State Treasurer

December 19, 2019

Malibar Group, LLC
Attn: Roy Marvin
615 NW Territorial Rd
Canby, OR 97013

Re: WD # 2019-0614 **Approved**
Wetland Delineation Report for Tax Lots 800, 802, 803
Clackamas County; T3S R1E S2AC TLs 800, 802, 803
West Linn Local Wetlands Inventory, W1-01

Dear Mr. Marvin:

The Department of State Lands has reviewed the wetland delineation report prepared by AKS Engineering & Forestry, LLC for the site referenced above. Based upon the information presented in the report, we concur with the wetland and waterway boundaries as mapped in Figure 5 of the report. Please replace all copies of the preliminary wetland map with this final Department-approved map.

Within the study area, one wetland (Wetland A, totaling approximately 2.67 acres) and one pond were identified. The wetland and pond are subject to the permit requirements of the state Removal-Fill 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 the waterway (or the 2-year recurrence interval flood elevation if OHWL cannot be determined).

This concurrence is for purposes of the state Removal-Fill Law only. We recommend that you attach a copy of this concurrence letter to any subsequent state permit application to speed application review. Federal or local permit requirements may apply as well. The U.S. Army Corps of Engineers will determine jurisdiction under the Clean Water Act, which may require submittal of a complete Wetland Delineation Report.

Please be advised that state law establishes a preference for avoidance of wetland impacts. Because measures to avoid and minimize wetland impacts may include reconfiguring parcel layout and size or development design, we recommend that you work with Department staff on appropriate site design before completing the city or county land use approval process.

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. If you have any questions, please contact Chris Stevenson, the Jurisdiction Coordinator for Clackamas County at (503) 986-5246.

Sincerely,

Peter Ryan, PWS
Aquatic Resource Specialist

Enclosures

ec: Stacey Reed, PWS, AKS Engineering & Forestry, LLC
City of West Linn Planning Department (Maps enclosed for updating LWI)
Jessica Menichino, Corps of Engineers
Anita Huffman, DSL

WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

Fully completed and signed report cover forms and applicable fees are required before report review timelines are initiated by the Department of State Lands. Make checks payable to the Oregon Department of State Lands. To pay fees by credit card, go online at: https://apps.oregon.gov/DSL/EPS/program?key=4.

Attach this completed and signed form to the front of an unbound report or include a hard copy with a digital version (single PDF file of the report cover form and report, minimum 300 dpi resolution) and submit to: **Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279.** A single PDF of the completed cover from and report may be e-mailed to: **Wetland_Delineation@dsl.state.or.us**. For submittal of PDF files larger than 10 MB, e-mail DSL instructions on how to access the file from your ftp or other file sharing website.

Contact and Authorization Information

☒ Applicant ☒ Owner Name, Firm and Address:

Malibar Group, LLC
Attn: Roy Marvin
615 NW Territorial Road
Canby, OR 97013

Business phone #
Mobile phone # (optional)
E-mail: marvinfamily@aol.com

☐ Authorized Legal Agent, Name and Address (if different):

Business phone #
Mobile phone # (optional)
E-mail:

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

Typed/Printed Name: Roy marvin **Signature:**

Date: 11/05/2019 Special instructions regarding site access: ____

Project and Site Information

Project Name: Tax Lots 800, 802, and 803

Latitude: 45.341461 Longitude: -122.647849
decimal degree - centroid of site or start & end points of linear project

Proposed Use:
Residential

Tax Map # 3S 1E 2AC
Tax Lot(s) 800, 802, 803

Tax Map #
Tax Lot(s)

Project Street Address (or other descriptive location):
West of 9th Street and north of 1040 9th Street.

Township 3S Range 1E Section 2 QQ AC
Use separate sheet for additional tax and location information

City: West Linn County: Clackamas

Waterway: NA River Mile: NA

Wetland Delineation Information

Wetland Consultant Name, Firm and Address:

AKS Engineering & Forestry, LLC
Stacey Reed, PWS
12965 SW Herman Road, Suite 100
Tualatin, OR 97062

Phone # (503) 563-6151
Mobile phone # (if applicable)
E-mail: staceyr@aks-eng.com

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

Consultant Signature: Stacey Reed Date: 11/14/2019

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

Wetland/Waters Present? ☒ Yes ☐ No Study Area size: 4.16 Total Wetland Acreage: 2.8200

Check Applicable Boxes Below

- ☐ R-F permit application submitted
- ☐ Mitigation bank site
- ☐ Industrial Land Certification Program Site
- ☐ Wetland restoration/enhancement project (not mitigation)
- ☐ Previous delineation/application on parcel
  If known, previous DSL # ____
- ☒ Fee payment submitted $ 454
- ☐ Fee ($100) for resubmittal of rejected report
- ☐ Request for Reissuance. See eligibility criteria. (no fee)
  DSL # ____ Expiration date ____
- ☒ LWI shows wetlands or waters on parcel
  Wetland ID code WI-01

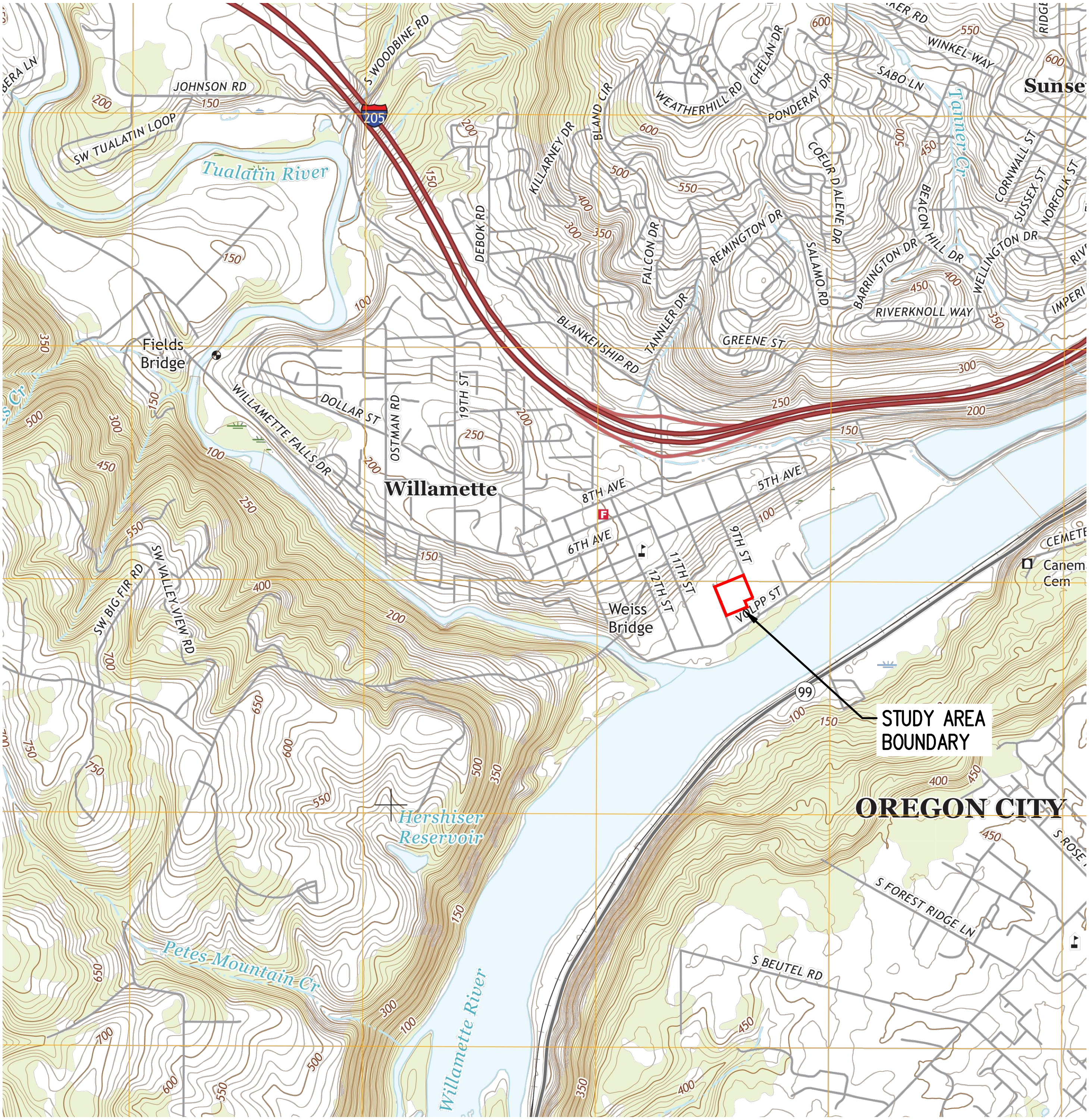
For Office Use Only

DSL Reviewer: CS Fee Paid Date: ___ / ___ / ___ DSL WD # 2019-0614

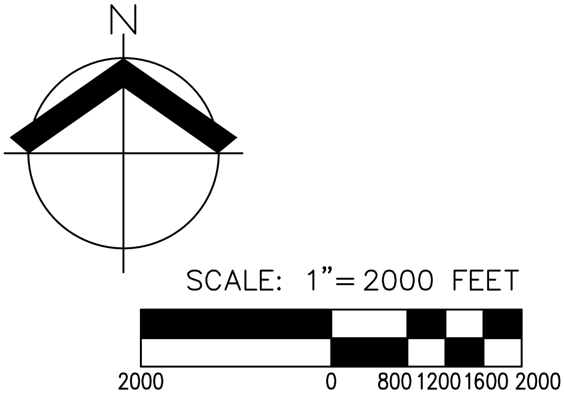
Date Delineation Received: 11 / 15 / 19 Scanned: ☐ Electronic: ☐ DSL App.# ____

Electronic Submittal

Project #79041



USGS 7.5' TOPOGRAPHIC SERIES
QUADRANGLE: CANBY, OR (2017)



DATE: 08/28/2019

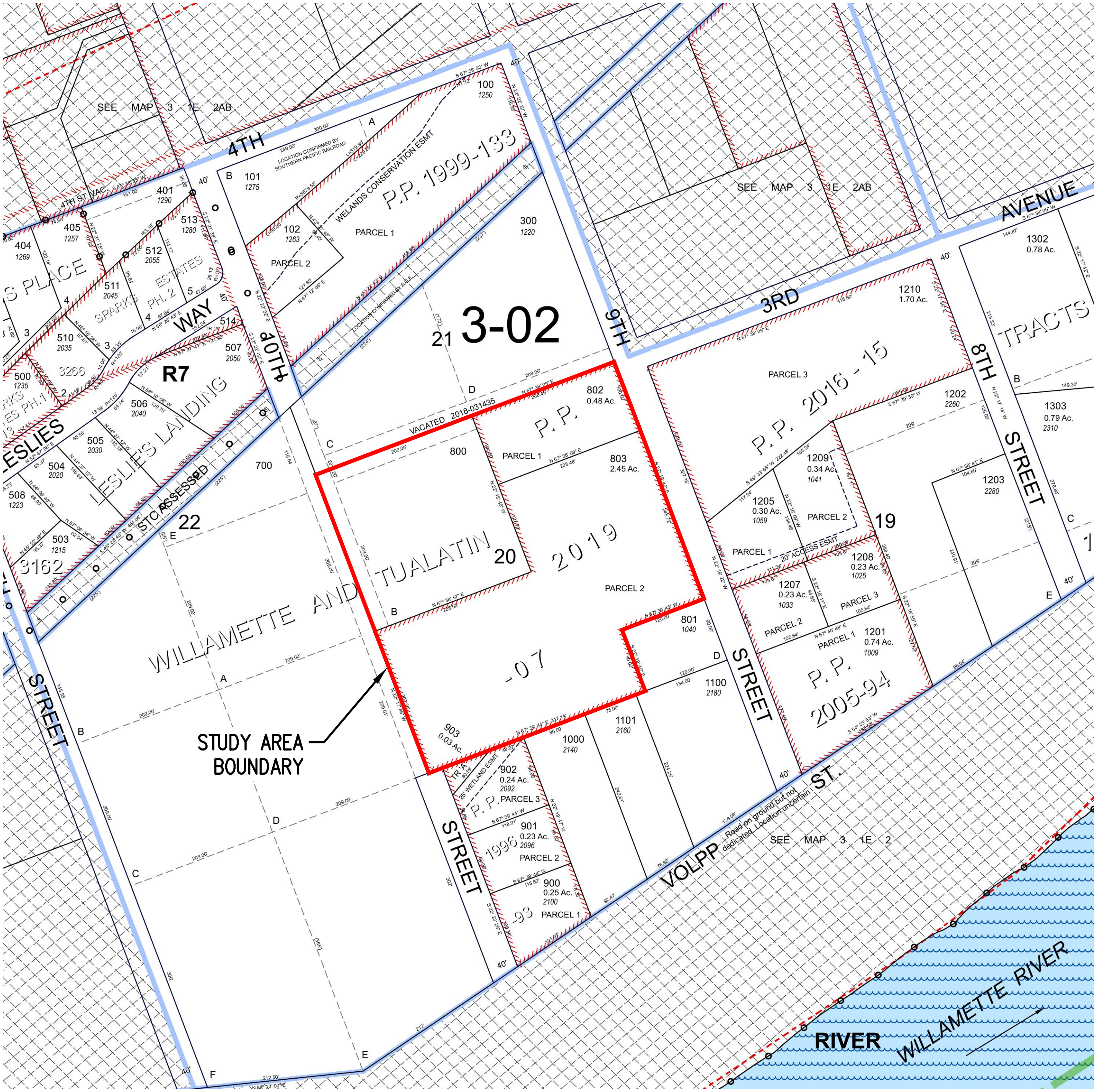
USGS VICINITY MAP
9TH STREET WEST LINN WETLAND DELINEATION REPORT

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

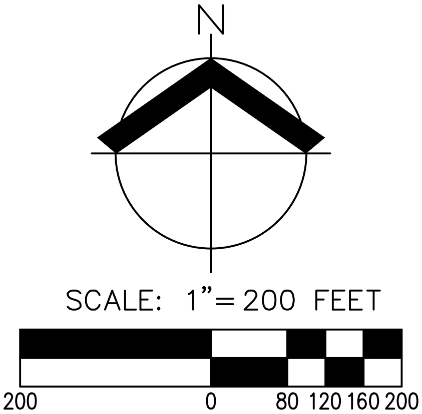
FIGURE
1

DRWN: SAS
CHKD: SAR
AKS JOB:
5926

DWG: 5926 NR FIGURES | FIGURE 1



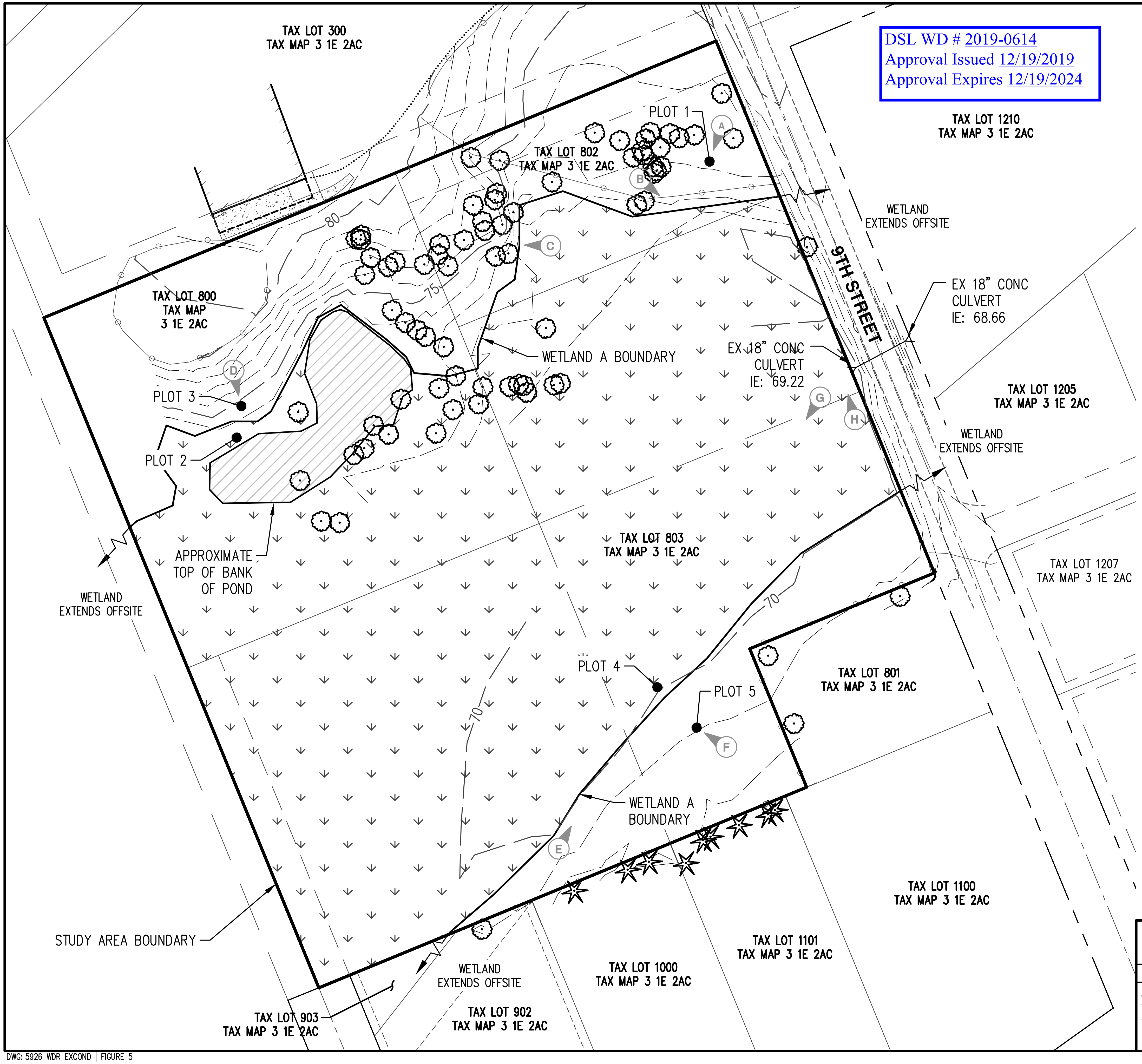
CLACKAMAS COUNTY
TAX LOTS 800, 802, & 803
TAX MAP 3 1E 2AC



DATE: 10/08/2019

CLACKAMAS COUNTY ASSESSOR'S TAX MAP 9TH STREET WEST LINN WETLAND DELINEATION REPORT	FIGURE 2
AKS ENGINEERING & FORESTRY, LLC 12965 SW HERMAN RD, STE 100 TUALATIN, OR 97062 503.563.6151 WWW.AKS-ENG.COM	DRWN: SAS CHKD: SAR AKS JOB: 5926

DSL WD # 2019-0614
Approval Issued 12/19/2019
Approval Expires 12/19/2024



LEGEND:

↓ ↓ ↓ ON-SITE WETLAND A AREA: 116,431 SF± (2.67 ACRES±)

▨ APPROXIMATE ON-SITE POND AREA WITHIN WETLAND A: 6,368 SF± (0.15 ACRES±)

TOTAL WETLAND A AREA INCLUDING POND: 122,799 SF± (2.82 ACRES±)

Ⓐ▶ PHOTO POINT LOCATIONS

WETLAND BOUNDARY SHOWN WAS DELINEATED BY AKS ENGINEERING & FORESTRY, LLC. ON MARCH 27, 2017, AND WAS PROFESSIONALLY SURVEYED BY AKS ON MAY 16–17, 2017.

1-FOOT INTERVAL GROUND CONTOURS DERIVED FROM LAND SURVEY.

TREES WITH DIAMETER OF 6" AND GREATER ARE SHOWN. TREE DIAMETERS WERE MEASURED UTILIZING A DIAMETER TAPE AT BREAST HEIGHT. TREE INFORMATION IS SUBJECT TO CHANGE UPON ARBORIST INSPECTION.

N

SCALE: 1"=60 FEET

60 0 12 30 60

ORIGINAL PAGE SIZE: 11" x 17"

DATE: 10/08/2019

WETLAND DELINEATION MAP

9TH STREET WEST LINN WETLAND DELINEATION REPORT

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

FIGURE
5

DRWN: JRI
CHKD: SAR
AKS JOB:
5926

DWG: 5926 WDR EXCOND | FIGURE 5

Tax Lots 800, 802, and 803 West Linn, Oregon Wetland Delineation Report

Date:	October 8, 2019
Prepared for:	Malibar Group, LLC Attn: Roy Marvin 615 NW Territorial Road Canby, OR 97013
Prepared By:	AKS Engineering & Forestry, LLC Haley Teach, MS, Natural Resource Specialist
Site Information:	Tax Lots 800, 802, and 803 T3S, R1W, Section 2AC Clackamas County West Linn, Oregon
AKS Project:	#5926

AKS Engineering & Forestry
12965 SW Herman Road, Suite 100
Tualatin, OR 97062
(503) 563-6151

Table of Contents

Tables

Appendices

Introduction

This report was prepared by AKS Engineering & Forestry, LLC (AKS) in accordance with Oregon Administrative Rules (OAR) 141-090-0030 and OAR 141-090-0035 (1-17). The report describes the results of a wetland delineation conducted on Tax Lots 800, 802, and 803 of Clackamas County Assessor's Tax Map 3 1E 2AC, which is located near 1220 9th Street in West Linn, Clackamas County, Oregon (Figures 1-2 in Appendix A). The study area for the wetland delineation is ±4.16 acres and is shown in Figures 1-5 in Appendix A.

The on-site boundary of one palustrine forested/emergent (PFO/PEM) wetland (referred to as Wetland A) was delineated within the study area. Wetland A extends off-site to the west and to the east within the 9th Street right-of-way.

A. Landscape Setting and Land Use

The study area consists of an undeveloped field with a forested riparian area in the north. The site is mapped within the FEMA 100-year floodplain. The tax lot to the north (Tax lot 300) also contains a corral and fenced area, as it is currently used for horses. The wetland on-site features a dominant vegetative community of reed canary grass (*Phalaris arundinacea*, FACW), yellow-skunk-cabbage (*Lysichiton americanus*, OBL), field meadow-foxtail (*Alopecurus pratensis*, FAC), and creeping buttercup (*Ranunculus repens*, FAC). The forested portion of the study area is dominated by balsam poplar (*Populus balsamifera,* FAC), Pacific ninebark (*Physocarpus capitatus*, FACW), tall false rye grass (*Schedonorus arundinaceus*, FAC), and reed canary grass (FACW). A subtle depression (i.e. pond) is present in the northern portion of the delineated wetland. The pond was shallow (less than 5 feet deep) and lacked vegetation during the March 2017 site visit. Topography on-site consists of a slight, south-facing hillslope (less than 25% slope).

According to the Natural Resources Conservation Service (NRCS) Clackamas County Area Soil Survey Map, the following soil units are mapped within the study area, (Figure 3 in Appendix A):

- (Unit 19) Cloquato silt loam - Non-hydric; with 2% hydric Wapato inclusions and 1% hydric Aquolls inclusions in flood plains
- (Unit 84) Wapato silty clay loam - Hydric; with 6% hydric Cove inclusions and 4% hydric Humaquepts inclusions in flood plains

B. Site Alterations

Historical aerial images dating from 1994 to 2018 were obtained from Google Earth and are included in Appendix B. According to historical imagery, the study area has been undeveloped since as early as 1994. The pond appears to be present in the 1994 aerial and it does not seem to have changed the extent of the wetland on-site. Additionally, the pond appears to contain surface water year-round. No recent site alterations appear to have taken place since our March 27, 2017 site visit.

C. Precipitation Data and Analysis

Observed precipitation data were obtained from the National Weather Service (NWS) Portland station. The closest WETS (wetlands climate analysis) station to the project site is the Portland KGW-TV station.

According to the NWS Portland station, 0.01 inches of rainfall was received the day of the March 27, 2017 site visit and 4.08 inches were received for the two weeks prior. Observed water year-to-date (starting October 1, 2016) was 41.24 inches, which was 15.33 inches above normal. Table 1 shows antecedent rainfall according to the NWS Portland station for the three months prior to the March 27, 2017 site visit (raw data included in Appendix C).

Table 1. Precipitation Data – Monthly Averages Based on the Climate Period 1971-2000 (Inches)

Prior Months	Observed Precipitation (Inches)	Average	30% Chance Will Have		Condition Dry, Wet, Normal	Condition Value (1=dry, 2=normal, 3=wet)	Month Weight	Multiply Previous Two Columns
			Less Than	More Than				
March 1-27, 2017	7.01	4.44	3.39	5.17	Wet	3	3	9
February 2017	10.36	5.29	3.57	6.32	Wet	3	2	6
January 2017	4.13	6.05	3.77	7.31	Normal	2	1	2
							Sum	17
								Wetter
Rainfall of prior period was: **drier** than normal (sum is 6-9), **normal** (sum is 10-14), **wetter** than normal (sum is 15-18)								

According to the WETS table, monthly observed precipitation for the area was wetter than normal for the three months preceding the site visit. Rainfall was above average in February and March 2017. According to the Portland WETS table, the growing season is defined as January 30 to December 24. The March 27, 2017 site visit was conducted within the growing season.

D. Methods

The methodology used to determine the presence of wetlands followed the U.S. Army Corps of Engineers (USACE) *Wetland Delineation Manual* (Environmental Laboratory, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0). The National Wetland Plant List 2016* (Lichvar, 2016) was used to assign wetland indicator status for the appropriate region.

Field work was conducted on March 27, 2017 by AKS Senior Wetland Scientist, Stacey Reed, PWS, and Natural Resource Specialist, Haley Teach, MS. Soils, vegetation, and indicators of hydrology were recorded at five sample plot locations on standardized wetland determination data forms (Appendix D) to document site conditions.

Representative ground-level site photographs are included in Appendix E. References cited and literature used are listed at the end of this report.

F. Description of Wetland

Wetland A

Wetland A is a mostly a palustrine emergent (PEM) wetland, with a portion that is forested. An 18-inch concrete culvert under 9th Street connects hydrology associated with the wetland located east of 9th Street. A pond is present in the northwestern corner of Wetland A and is located entirely within the wetland boundary. The approximate location of the pond is shown on Figure 5. Scattered ponding was observed throughout the wetland during the March 27, 2017 site visit.

The PFO portion of the wetland was dominated by balsam poplar (FAC), Pacific ninebark (FACW), reed canary grass (FACW), and yellow-skunk-cabbage (OBL). The PEM portion of the wetland was dominated by field meadow-foxtail (FAC), reed canary grass (FACW) and creeping buttercup (FAC). Soils in the wetland met hydric soil indicators F3 Depleted Matrix and F6 Redox Dark Surface. Wetland plots (Plots 2 and 4) documented a groundwater table within the surface 12 inches during the March 2017 site visit. Plot 4 had ¼-inch of surface water present.

The wetland boundary was defined by a change in landform from a low-elevation concave wetland to a slightly higher elevation and convex landform north of the wetland. The change in landform coincided with a change in vegetation from hydrophytic species such as reed canary grass (FACW) and yellow-skunk-cabbage (OBL) in the wetland to tall false rye grass (FAC) and a blue grass (*Poa species*, FAC) in the upland. The upland north and south of Wetland A lacked hydric soil indicators. Upland plots (Plot 3 and Plot 5) contained a high groundwater table due to the above-average rainfall within the two weeks prior to the site visit.

F. Deviation from LWI

According to the City of West Linn's Local Wetland Inventory (LWI) map, a field-verified wetland and drainage are mapped on-site (Figure 4). Our study determined the mapped wetland and pond to be in the approximate location of Wetland A. A drainage was not observed on site.

G. Mapping Method

The locations for Plots 1-5 and the Wetland A boundary were flagged in the field and professionally land surveyed by AKS. Wetland A and Plots 1-5 are shown on Figure 5 Wetland Delineation Map in Appendix A.

H. Additional Information

Wetland A would likely be determined jurisdictional to DSL. The wetland continues off-site to the southwest and drains to the Willamette River (Waters of the U.S.); therefore, Wetland A would likely be determined jurisdictional to USACE.

I. Summary of Results and Conclusions

Table 2 below provides a summary of the on-site sizes of the features, hydrologic connections to other nearby waters, the Cowardin and HGM classifications for the wetlands, latitude and longitude of center of each feature, and our prediction of whether each feature would likely be determined jurisdictional by DSL or the USACE.

Table 2. Summary of Study Results and Conclusions

Potentially Jurisdictional Feature	Size (acres)	Cowardin Class	HGM Subclass / Flow Regime	Connection to Other Waters	DSL/ USACE Predicted Jurisdiction	Latitude and Longitude
Wetland A	2.82	PFO/PEM	Slope	Willamette River	DSL & USACE	45.341489 -122.647822

J. Required Disclaimer

This report documents the investigation, best professional judgment, and conclusions of the investigators. It is correct and complete to the best of our knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk, unless it has been reviewed and approved in writing by the Oregon Department of State Lands in accordance with Oregon Administrative Rules (OAR) 141-090-0005 through 141-090-0055.

K. List of Preparers

Haley Teach

Haley Teach, MS
Natural Resource Specialist
Fieldwork and Report Preparation

Stacey Reed

Stacey Reed, PWS
Senior Wetland Scientist
Fieldwork and Report QA/QC

Literature Cited and Referenced

Adams, P.R. 2001. Guidebook for Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Sites: Statewide Classification and Profiles. Available at: http://www.oregon.gov/dsl/WW/Documents/hydro_guide_class.pdf.

Cowardin, L.M. 1979. *Classification of Wetland and Deepwater Habitats of the United States*. Jamestown (ND): Northern Prairie Wildlife Research Center, U.S. Fish and Wildlife Service.

Environmental Laboratory. 1987. Technical Report Y-87-1. In: *Corps of Engineers Wetlands Delineation Manual*. Vicksburg (MS): U.S. Army Engineer Waterways Experiment Station. Available at: http://el.erdc.usace.army.mil/wetlands/pdfs/wlman87.pdf.

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016*. The National Wetland Plant List: 2016 wetland ratings.* Phytoneuron 2016-30: 1-17. Published 28 April 2016. Available at: http://wetland-plants.usace.army.mil/nwpl_static/index.html.

National Weather Service (NWS). 2017. *Portland, OR*. Available at: http://www.weather.gov/climate/index.php?wfo=pqr.

Natural Resources Conservation Service (NRCS). 2006. *Hydric Soils List: Clackamas County, Oregon*. Washington (DC): U.S. Department of Agriculture.

Natural Resources Conservation Service (NRCS). 2014a. *Official soil series descriptions*. Washington (DC): U.S. Department of Agriculture. Available at: http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/soils/home/?cid=nrcs142p2_053587.

Natural Resources Conservation Service (NRCS). 2014b. *Web soil survey*. Washington (DC): U.S. Department of Agriculture. Available at: http://websoilsurvey.nrcs.usda.gov/app/.

Oregon Department of State Lands (DSL). 2014. *Administrative Rules for Wetland Delineation Report Requirements*. Salem (OR): Department of State Lands. Available at: http://arcweb.sos.state.or.us/pages/rules/oars_100/oar_141/141_090.html.

Oregon Map. 2019. *Tax lot map 3 1E 2AC.* Oregon: State of Oregon. Available at: http://www.ormap.net/.

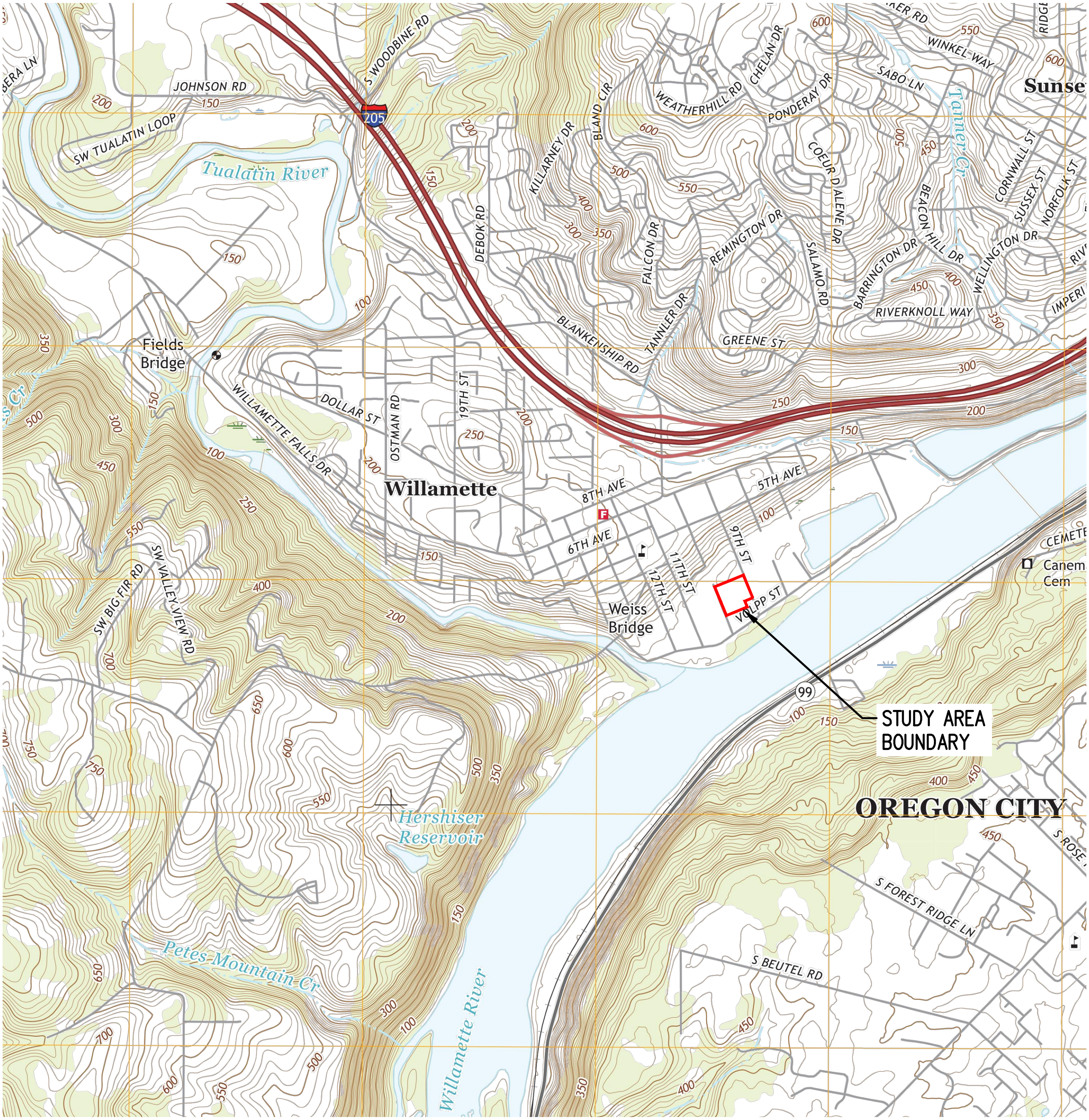
Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and W.D. Broderson, eds. 2002. *Field Book for Describing and Sampling Soils, Version 2.0*. Lincoln (NE): U.S. Department of Agriculture Natural Resources Conservation Service, National Soil Survey Center.

Vasilas, L.M., G.W. Hurt, and C.V. Noble, eds. 2010. *Field Indicators of Hydric Soils in the United States. A Guide for Identifying and Delineating Hydric Soils, Version 7.0, 2010.* Washington (DC): U.S. Department of Agriculture Natural Resources Conservation Service. Available at: http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1046970.pdf.

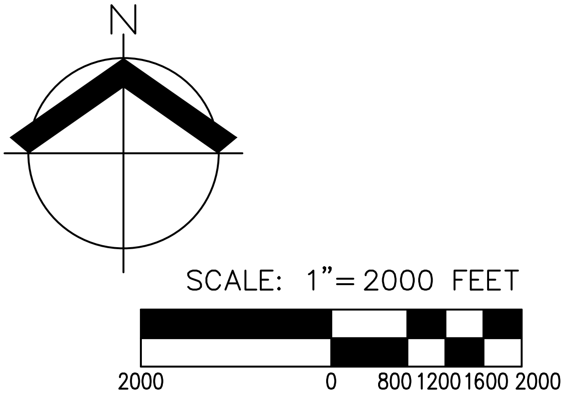
Wakeley, J.S., R.W. Lichvar, and C.V. Noble, eds. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0).* ERDC/EL TR-10-3. Vicksburg (MS): U.S. Army Engineer Research and Development Center, U.S. Army Corps of Engineers.

X-Rite. 2000. *Year 2000 revised washable edition, Munsell soil color charts*. Grand Rapids (MI): X-Rite.

Appendix A: Maps



USGS 7.5' TOPOGRAPHIC SERIES
QUADRANGLE: CANBY, OR (2017)



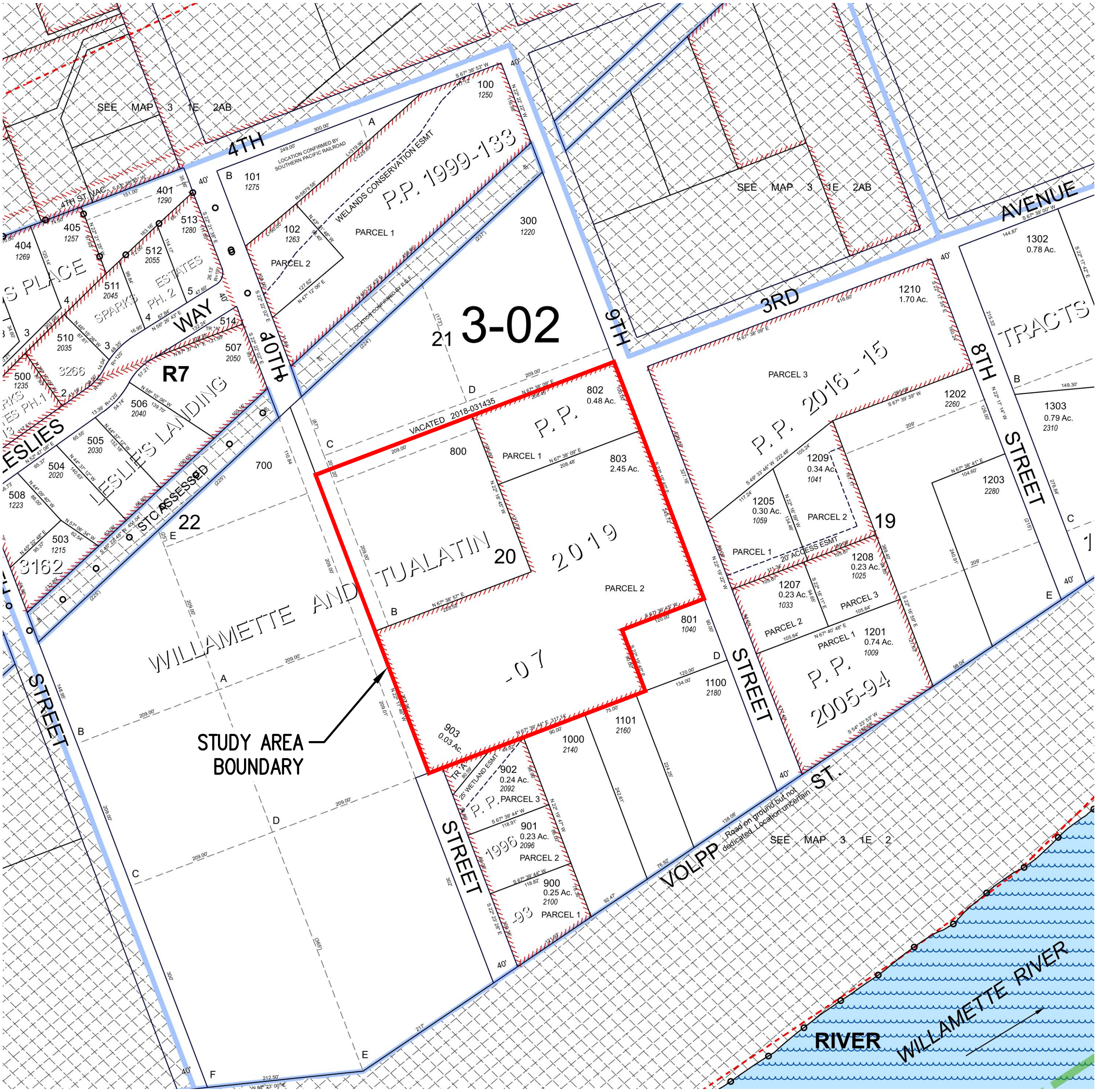
DATE: 08/28/2019

USGS VICINITY MAP
9TH STREET WEST LINN WETLAND DELINEATION REPORT

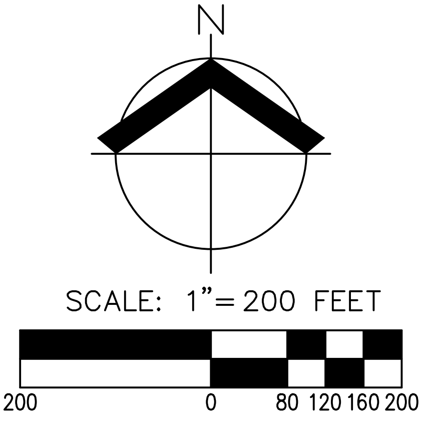
AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

FIGURE
1

DRWN: SAS
CHKD: SAR
AKS JOB:
5926



CLACKAMAS COUNTY
TAX LOTS 800, 802, & 803
TAX MAP 3 1E 2AC



DATE: 10/08/2019

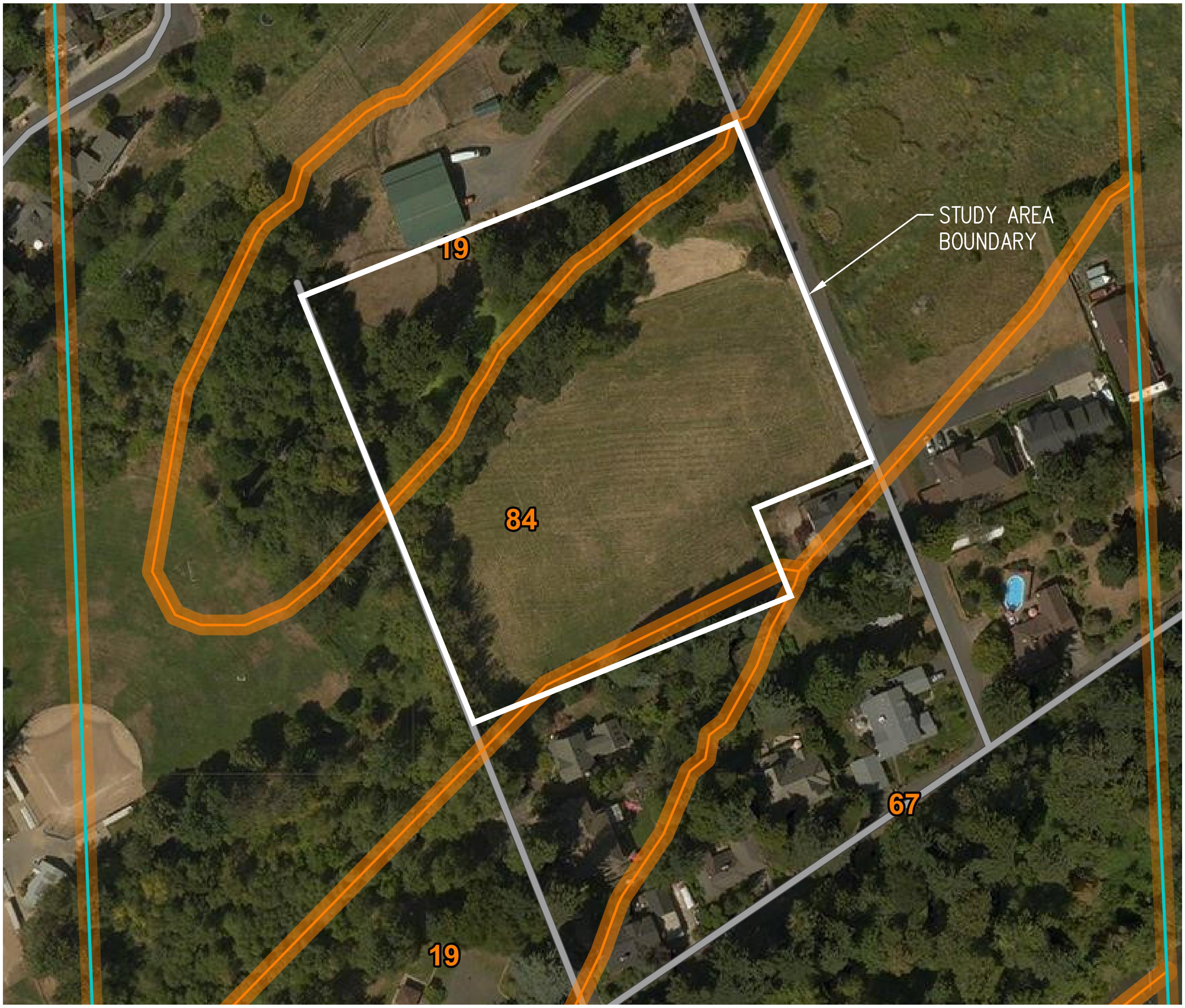
CLACKAMAS COUNTY ASSESSOR'S TAX MAP
9TH STREET WEST LINN WETLAND DELINEATION REPORT

FIGURE
2

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

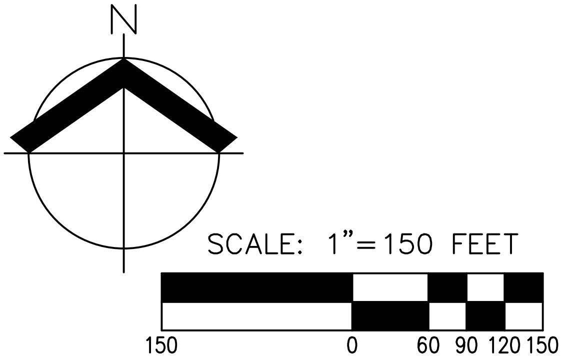
DRWN: SAS
CHKD: SAR
AKS JOB:
5926

DWG: 5926 NR FIGURES | FIGURE 2



MAP UNIT SYMBOL	MAP UNIT NAME
19	CLOQUATO SILT LOAM; NON-HYDRIC
84	WAPATO SILTY CLAY LOAM; HYDRIC

NRCS WEB SOIL SURVEY FOR
CLACKAMAS COUNTY



DATE: 08/28/2019

NRCS SOIL SURVEY MAP
9TH STREET WEST LINN WETLAND DELINEATION REPORT

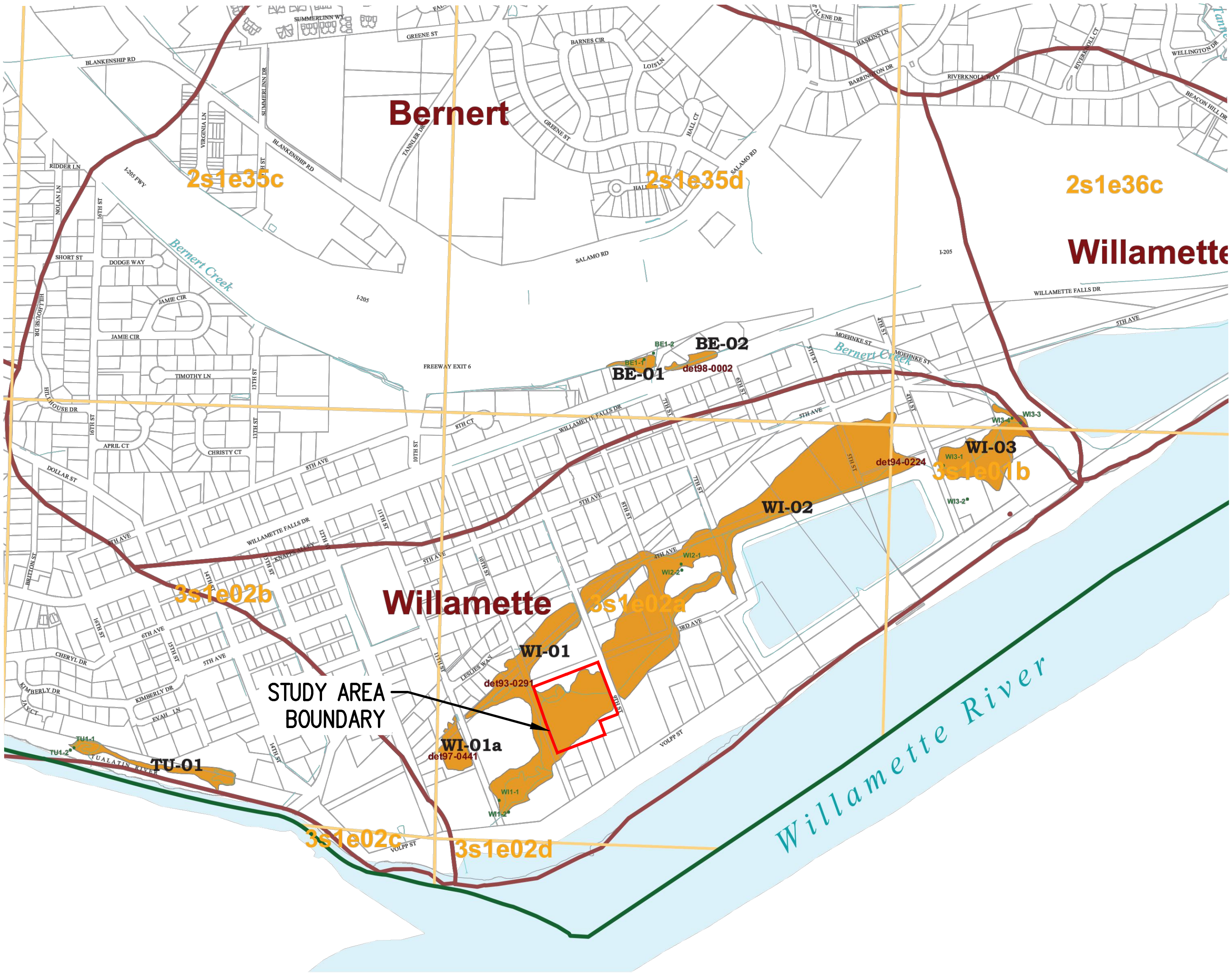
FIGURE
3

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

AKS

DRWN: SAS
CHKD: SAR
AKS JOB:
5926

DWG: 5926 NR FIGURES | FIGURE 3



Legend

🟥 Wetlands, Winterbrook Planning 2002

▨ Field Verified Wetlands, Winterbrook Planning 2002

● Possible Wetlands, Winterbrook Planning 2002

• Wetland Sample Plots, Winterbrook Planning 2002

∧/ Potential Jurisdictional Drainages, West Linn GIS 2002

☐ Potential Jurisdictional Waters, West Linn GIS 2002

☐ Taxlot COGO, West Linn GIS 2002

☐ Basin Boundaries, Winterbrook Planning 2002

CITY OF WEST LINN
LOCAL WETLAND INVENTORY (2004)

N

SCALE: 1"=1000 FEET

1000 0 400 600 800 1000

DATE: 08/28/2019

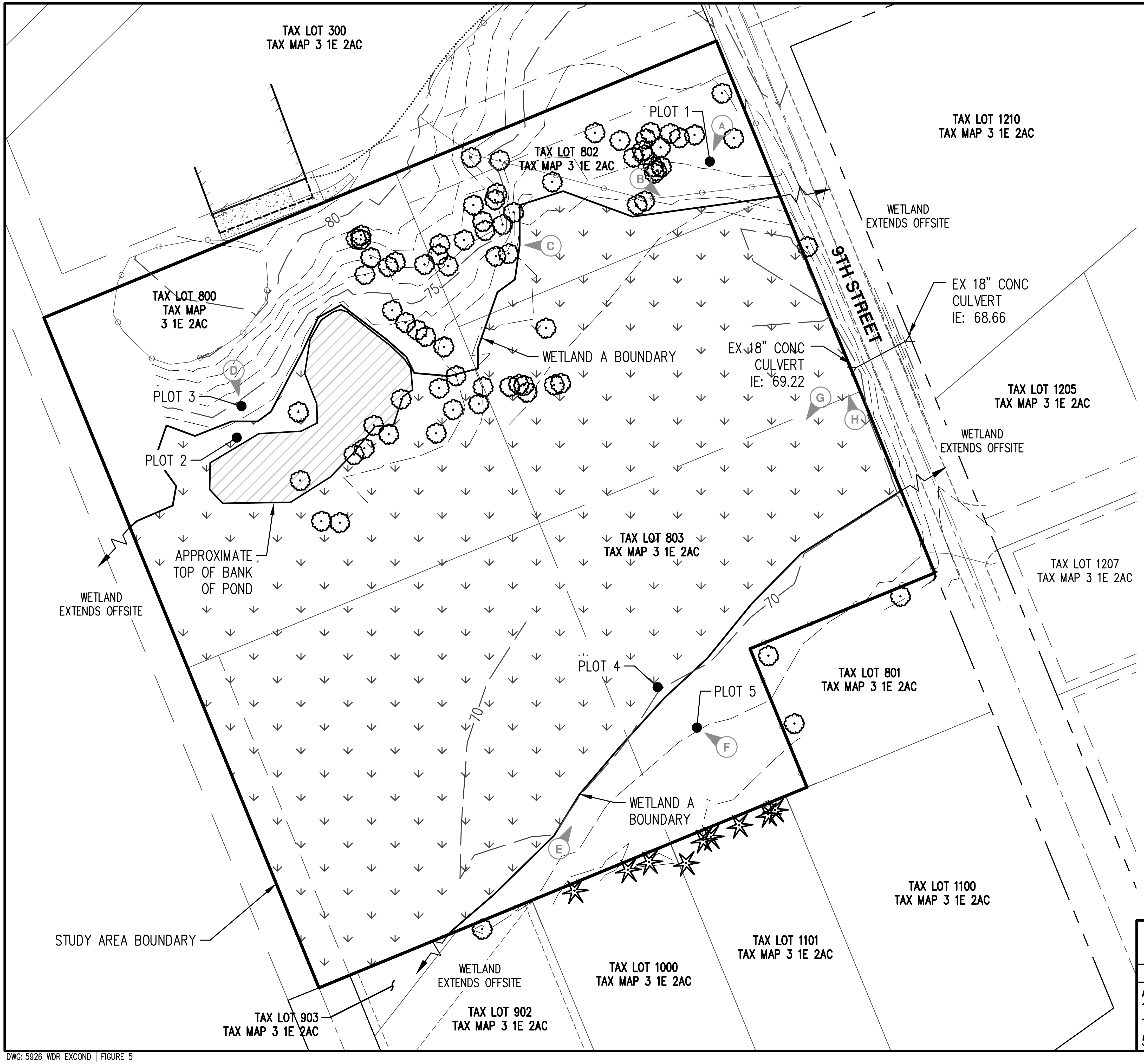
LOCAL WETLAND INVENTORY MAP
9TH STREET WEST LINN WETLAND DELINEATION REPORT

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

FIGURE
4

DRWN: SAS
CHKD: SAR
AKS JOB:
5926

DWG: 5926 NR FIGURES | FIGURE 4-LWI



LEGEND:

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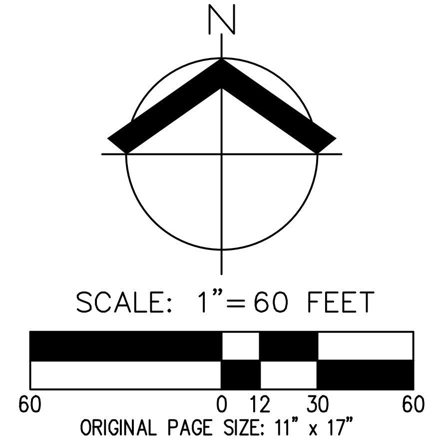

SCALE: 1"=60 FEET

ORIGINAL PAGE SIZE: 11" x 17"

DATE: 10/08/2019

WETLAND DELINEATION MAP

FIGURE 5

9TH STREET WEST LINN WETLAND DELINEATION REPORT

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TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

DRWN: JRI
CHKD: SAR
AKS JOB: 5926

DWG: 5926 WDR EXCOND | FIGURE 5

Appendix B: Historical Aerial Photographs


AKS Job #5926
June 1994
Legend
1220 9th St
9th St
Volpp St
Google Earth
© 2018 Google
N
200 ft


AKS Job #5926
May 2002
Legend
1220 9th St
9th St
Volpp St
Google Earth
© 2018 Google
200 ft
N

AKS Job #5926

March 2005

AKS Job #5926

May 2010


AKS Job #5926
December 2013
Legend
1220 9th St
9th St
Volpp St
N
200 ft
Google Earth
© 2018 Google


AKS Job #5926
May 2017
Legend
1220 9th St
9th St
Volpp St
Google Earth
© 2018 Google
N
200 ft


AKS Job #5926
July 2018
Legend
1220 9th St
9th St
Volpp St
Google Earth
© 2018 Google
N
200 ft

Appendix C: Precipitation Data

Explanation of the Preliminary Monthly Climate Data (F6) Product

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

WFO Monthly/Daily Climate Data

```
532
CXUS56 KPQR 090229
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

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

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

 1  40  32  36  -4  29   0 0.05    T    0  7.8 17 210   M    M   8 1       22 210
 2  35  29  32  -8  33   0 0.00  0.0    0 19.4 28  90   M    M   8         36  90
 3  34  27  31  -9  34   0 0.00  0.0    0 23.1 35  90   M    M   1         45  80
 4  33  27  30 -10  35   0 0.00  0.0    0 21.2 33  80   M    M   5         48  70
 5  35  17  26 -14  39   0 0.00  0.0    0  7.1 15 120   M    M   0         18 130
 6  34  17  26 -14  39   0 0.00  0.0    0 12.7 20 110   M    M   1         24 130
 7  30  24  27 -13  38   0 0.02  0.4    T 17.6 36 100   M    M  10 16      44 100
 8  34  28  31 -10  34   0 0.53  0.0    0 15.2 32 100   M    M  10 16      42 100
 9  41  30  36  -5  29   0 0.28  0.0    0  9.8 17 190   M    M  10 16      23 180
10  38  31  35  -6  30   0 0.65  6.5    0 13.3 28 100   M    M  10 1       35 100
11  32  26  29 -12  36   0 0.07  1.5    7 12.2 24  90   M    M  10 1       29  90
12  33  18  26 -15  39   0 0.00  0.0    6  5.0 13 130   M    M   4         15 130
13  29  11  20 -21  45   0 0.00  0.0    5  6.8 17 120   M    M   7 1       21 130
14  29  19  24 -17  41   0 0.00  0.0    5 14.2 23 120   M    M   2         29 110
15  28  19  24 -17  41   0 0.00  0.0    4 10.9 23 140   M    M   4         25 140
16  29  22  26 -16  39   0 0.00  0.0    4 14.2 22 130   M    M   8         26 130
17  34  24  29 -13  36   0 0.70  0.0    3 18.2 32 120   M    M   9 16      36 110
18  47  33  40  -2  25   0 1.06  0.0    3 15.0 30 110   M    M  10 1       35 110
19  52  35  44   2  21   0    T  0.0    T 11.9 23 200   M    M   8         28 210
```

```
20  42  37  40  -2  25   0 0.26  0.0    0 11.4 20 120   M    M  10 1      23 120
21  47  36  42   0  23   0 0.33  0.0    0 11.6 22 110   M    M   8 1      25 120
22  46  36  41  -1  24   0 0.15  0.0    0  9.9 23  80   M    M   9 1      26  70
23  50  32  41  -1  24   0    T  0.0    0  5.8 15  80   M    M   7         18  90
24  41  26  34  -8  31   0    T  0.0    0  2.7  8 290   M    M   6 1      10 290
25  45  35  40  -2  25   0 0.01     M    0  2.7  9 100   M    M  10 1      10 100
26  48  35  42   0  23   0    T  0.0    0  4.2 10 110   M    M   8 1      11 110
27  48  29  39  -3  26   0 0.00  0.0    0  6.7 16 120   M    M   5 12     20 110
28  44  31  38  -4  27   0 0.00  0.0    0  8.0 17 120   M    M   7         20 110
29  46  33  40  -2  25   0 0.01  0.0    0  7.5 17 110   M    M   9 1      21 120
30  44  35  40  -3  25   0    T  0.0    0  4.0 12 110   M    M  10 1      13 120
31  41  33  37  -6  28   0 0.01  0.0    0  7.9 16  80   M    M   8 1      21  70
================================================================================
SM 1209  867       969   0  4.13     8.4 338.0          M      222
================================================================================
AV 39.0 28.0                              10.9 FASTST   M    M   7    MAX(MPH)
                                 MISC ----> # 36 100               # 48   70
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

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

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

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

AVERAGE MONTHLY: 33.5   TOTAL FOR MONTH:   4.13    1 = FOG OR MIST
DPTR FM NORMAL:  -7.9   DPTR FM NORMAL:   -0.75    2 = FOG REDUCING VISIBILITY
HIGHEST:    52 ON 19    GRTST 24HR  1.06 ON 18-18      TO 1/4 MILE OR LESS
LOWEST:     11 ON 13                               3 = THUNDER
                        SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                        TOTAL MONTH:   8.4 INCHES  5 = HAIL
                        GRTST 24HR   6.5 ON 10-10  6 = FREEZING RAIN OR DRIZZLE
                        GRTST DEPTH:   7 ON 11     7 = DUSTSTORM OR SANDSTORM:
                                                       VSBY 1/2 MILE OR LESS
                                                   8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                   X = TORNADO

MAX 32 OR BELOW:   6    0.01 INCH OR MORE:  14
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:   8
MIN 32 OR BELOW:  21    0.50 INCH OR MORE:   4
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   1
```

```
[HDD (BASE 65) ]
TOTAL THIS MO.   969    CLEAR  (SCALE 0-3)   4
DPTR FM NORMAL   237    PTCLDY (SCALE 4-7)  13
TOTAL FM JUL 1  2533    CLOUDY (SCALE 8-10) 14
DPTR FM NORMAL    69

[CDD (BASE 65) ]
TOTAL THIS MO.     0
DPTR FM NORMAL     0    [PRESSURE DATA]
TOTAL FM JAN 1     0    HIGHEST SLP M ON M
DPTR FM NORMAL     0    LOWEST  SLP 29.09 ON 20

[REMARKS]
#FINAL-01-17#
```

Explanation of the Preliminary Monthly Climate Data (F6) Product

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

WFO Monthly/Daily Climate Data

```
039
CXUS56 KPQR 011200
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

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

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

 1  41  35  38  -5  27   0 0.00  0.0    0 27.9 38 100   M    M   7         50  80
 2  39  32  36  -7  29   0    T    T    0 29.5 40  90   M    M   9         51  90
 3  34  31  33 -10  32   0 0.55  0.0    0 14.5 24 100   M    M  10 146     30 110
 4  52  33  43   0  22   0 0.59  0.0    0 13.6 21 200   M    M  10 1       26 200
 5  46  34  40  -3  25   0 2.19    T    0  5.5 16 230   M    M  10 1       21 230
 6  44  33  39  -4  26   0 0.04  0.0    0  8.1 22 200   M    M   8 1       28 190
 7  39  32  36  -7  29   0 0.08    T    0  6.0 14 120   M    M  10 12      15 120
 8  37  35  36  -7  29   0 1.01  0.0    0 12.6 26 110   M    M  10 1       31 120
 9  59  37  48   5  17   0 0.96  0.0    0 14.8 26 220   M    M   8 13      35 210
10  51  36  44   1  21   0 0.09  0.0    0  9.5 22 240   M    M   8         29 240
11  53  35  44   1  21   0    T  0.0    0  1.5  7 120   M    M   7          8 130
12  51  31  41  -2  24   0 0.00  0.0    0  3.4 10 290   M    M   8 12      13 280
13  53  29  41  -3  24   0 0.00  0.0    0 10.0 21 120   M    M   1 1       25 120
14  50  33  42  -2  23   0 0.01  0.0    0 10.8 28 110   M    M   6         33 120
15  43  38  41  -3  24   0 0.98  0.0    0 17.2 25 120   M    M  10 1       32 120
16  49  41  45   1  20   0 1.70  0.0    0 10.1 22 110   M    M  10 1       30 250
17  57  40  49   5  16   0    T  0.0    0  3.5 13  90   M    M   8 12      16  70
18  46  40  43  -1  22   0 0.25  0.0    0  6.0 13 110   M    M  10 1       16 110
19  51  40  46   2  19   0 0.27  0.0    0 10.5 24 180   M    M   9 1       38 180
```

```
20  50  40  45   1  20   0 0.81  0.0    0  6.5 18 210   M    M  10 1      23 210
21  48  36  42  -2  23   0 0.52  0.0    0  3.7 17 190   M    M   9 1      21 190
22  45  31  38  -6  27   0    T  0.0    0  2.4 13 300   M    M   9 12     16 300
23  44  32  38  -7  27   0    T    T    0  3.6 10 300   M    M   8 18     13 300
24  41  32  37  -8  28   0 0.07  0.0    0  6.1 14 110   M    M   9 1      17 100
25  48  31  40  -5  25   0 0.05  0.0    0  3.0  9 160   M    M   8 1      11 310
26  43  35  39  -6  26   0 0.14  0.0    0  8.8 17 180   M    M  10 1      23 180
27  45  36  41  -4  24   0 0.03  0.0    0  7.7 18 210   M    M  10        23 210
28  50  36  43  -3  22   0 0.02  0.0    0  5.3 15 240   M    M   8        20 240
================================================================================
SM 1309  974       672   0 10.36    T    262.1          M      240
================================================================================
AV 46.8 34.8                               9.4 FASTST   M    M   9    MAX(MPH)
                                 MISC ---->  # 40  90               # 51   90
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

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

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

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

AVERAGE MONTHLY: 40.8   TOTAL FOR MONTH:  10.36    1 = FOG OR MIST
DPTR FM NORMAL:  -3.0   DPTR FM NORMAL:    6.70    2 = FOG REDUCING VISIBILITY
HIGHEST:    59 ON  9    GRTST 24HR  2.19 ON  5- 5      TO 1/4 MILE OR LESS
LOWEST:     29 ON 13                               3 = THUNDER
                        SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                        TOTAL MONTH:    T          5 = HAIL
                        GRTST 24HR    T  ON 23-23  6 = FREEZING RAIN OR DRIZZLE
                        GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                                       VSBY 1/2 MILE OR LESS
                                                   8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                   X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:  20
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:  12
MIN 32 OR BELOW:   9    0.50 INCH OR MORE:   9
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   3

[HDD (BASE 65) ]
TOTAL THIS MO.   672    CLEAR  (SCALE 0-3)   1
```

```
 DPTR FM NORMAL    78    PTCLDY (SCALE 4-7)   9
 TOTAL FM JUL 1  3205    CLOUDY (SCALE 8-10) 18
 DPTR FM NORMAL   147

 [CDD (BASE 65) ]
 TOTAL THIS MO.     0
 DPTR FM NORMAL     0    [PRESSURE DATA]
 TOTAL FM JAN 1     0    HIGHEST SLP 30.54 ON 11
 DPTR FM NORMAL     0    LOWEST  SLP 29.22 ON  5

 [REMARKS]
 #FINAL-02-17#
```

Explanation of the Preliminary Monthly Climate Data (F6) Product

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

WFO Monthly/Daily Climate Data

```
624
CXUS56 KPQR 011200
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

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

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

 1  51  40  46   0  19   0    T  0.0    0  9.6 17 200   M    M  10          21 200
 2  51  36  44  -2  21   0 0.06  0.0    0  8.8 17 200   M    M   9          20 190
 3  53  43  48   2  17   0 0.11  0.0    0 12.7 24 200   M    M  10 1        32 170
 4  47  35  41  -5  24   0 0.14  0.0    0  7.6 23 200   M    M   9 1        27 210
 5  47  36  42  -4  23   0 0.09  0.0    0 14.2 26 200   M    M   8 1        35 220
 6  46  34  40  -6  25   0 0.11    T    0 11.1 21 230   M    M   8 13       26 210
 7  50  40  45  -2  20   0 0.49  0.0    0 11.3 20 200   M    M   9 1        26 200
 8  47  41  44  -3  21   0 0.43  0.0    0  2.9  8 280   M    M  10 1        11 290
 9  58  41  50   3  15   0 0.53  0.0    0  7.3 23 200   M    M  10 1        31 210
10  60  44  52   5  13   0    T  0.0    0  8.4 23 220   M    M   7 1        29 240
11  58  39  49   2  16   0 0.30  0.0    0  8.0 21 230   M    M   9 1        26 220
12  61  46  54   6  11   0 0.00  0.0    0  6.4 15 120   M    M   8          18 120
13  53  47  50   2  15   0 0.73  0.0    0  8.7 21 120   M    M  10 1        24 120
14  57  49  53   5  12   0 0.62  0.0    0 10.7 22 120   M    M   8 1        26 120
15  57  45  51   3  14   0 0.51  0.0    0 12.8 31 200   M    M  10 1        40 210
16  55  37  46  -2  19   0 0.00  0.0    0  3.9 10 300   M    M   5          13 300
17  48  37  43  -5  22   0 0.35    M    0  8.2 24 120   M    M   9 1        29 120
18  55  36  46  -3  19   0 0.36    M    0  8.2 21 120   M    M   8 1        27 120
19  57  32  45  -4  20   0 0.00  0.0    0  4.1 13 310   M    M   6          16 300
```

```
20  55  38  47  -2  18   0 0.11  0.0    0 11.5 25 100   M    M   8        32 100
21  57  44  51   2  14   0 0.23  0.0    0 12.8 30 110   M    M   9 13     35 100
22  55  42  49   0  16   0 0.08  0.0    0 10.2 22 230   M    M   7 58     28 190
23  58  41  50   1  15   0 0.32  0.0    0  9.0 16 120   M    M   9 1      21 120
24  53  46  50   1  15   0 0.77    M    0 10.8 20 210   M    M   9 1      25 200
25  55  41  48  -2  17   0    T    M    0  6.5 14 230   M    M   8        18 200
26  50  44  47  -3  18   0 0.66    M    0  9.1 18 110   M    M  10 1      23 120
27  55  45  50   0  15   0 0.01    M    0  9.8 22 220   M    M   9        27 220
28  59  46  53   3  12   0 0.06    M    0  9.2 20 240   M    M  10        27 220
29  58  46  52   2  13   0 0.19    M    0 10.4 22 180   M    M   9 1      28 180
30  57  43  50   0  15   0    T    M    0  9.0 18 300   M    M   8        22 300
31  58  39  49  -1  16   0 0.00  0.0    0  3.3 12 110   M    M   7        13 110
================================================================================
SM 1681 1273       530   0  7.26    T    276.5          M      266
================================================================================
AV 54.2 41.1                               8.9 FASTST   M    M   9    MAX(MPH)
                                 MISC ---->  # 31 200               # 40  210
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

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

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

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

AVERAGE MONTHLY: 47.7   TOTAL FOR MONTH:   7.26    1 = FOG OR MIST
DPTR FM NORMAL:  -0.6   DPTR FM NORMAL:    3.58    2 = FOG REDUCING VISIBILITY
HIGHEST:    61 ON 12    GRTST 24HR  0.77 ON 24-24      TO 1/4 MILE OR LESS
LOWEST:     32 ON 19                               3 = THUNDER
                        SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                        TOTAL MONTH:    T          5 = HAIL
                        GRTST 24HR    T  ON  6- 6  6 = FREEZING RAIN OR DRIZZLE
                        GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                                       VSBY 1/2 MILE OR LESS
                                                   8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                   X = TORNADO

MAX 32 OR BELOW:   0    0.01 INCH OR MORE:  23
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:  18
MIN 32 OR BELOW:   1    0.50 INCH OR MORE:   6
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0
```

```
[HDD (BASE 65) ]
TOTAL THIS MO.   530    CLEAR  (SCALE 0-3)   0
DPTR FM NORMAL     8    PTCLDY (SCALE 4-7)  10
TOTAL FM JUL 1  3735    CLOUDY (SCALE 8-10) 21
DPTR FM NORMAL   155

[CDD (BASE 65) ]
TOTAL THIS MO.     0
DPTR FM NORMAL     0    [PRESSURE DATA]
TOTAL FM JAN 1     0    HIGHEST SLP 30.50 ON  1
DPTR FM NORMAL     0    LOWEST  SLP 29.55 ON  4

[REMARKS]
#FINAL-03-17#
```

WETS Table

WETS Station: PORTLAND KGW TV, OR

Requested years: 1971 - 2000

Month	Avg Max Temp	Avg Min Temp	Avg Mean Temp	Avg Precip	30% chance precip less than	30% chance precip more than	Avg number days precip 0.10 or more	Avg Snowfall
Jan	46.2	36.4	41.3	6.05	3.77	7.31	12	1.2
Feb	50.6	38.5	44.5	5.29	3.57	6.32	12	0.9
Mar	56.2	40.7	48.5	4.44	3.39	5.17	12	0.1
Apr	61.4	43.9	52.6	3.13	2.18	3.71	9	0.0
May	67.3	48.6	57.9	2.58	1.59	3.12	8	0.0
Jun	73.2	53.1	63.2	1.59	0.85	1.94	4	0.0
Jul	79.1	57.0	68.1	0.78	0.35	0.93	2	0.0
Aug	79.5	57.4	68.5	1.02	0.32	1.17	2	0.0
Sep	74.9	54.1	64.5	1.75	0.82	2.06	4	0.0
Oct	63.4	47.5	55.5	3.39	1.85	4.14	7	0.0
Nov	52.2	41.4	46.8	6.59	4.40	7.90	14	0.4
Dec	46.1	36.8	41.4	6.46	4.43	7.71	13	0.9
Annual:					38.24	48.02		
Average	62.5	46.3	54.4	-	-	-	-	-
Total	-	-	-	43.07			100	3.5

GROWING SEASON DATES

Years with missing data:	24 deg = 6	28 deg = 6	32 deg = 6
Years with no occurrence:	24 deg = 15	28 deg = 4	32 deg = 0
Data years used:	24 deg = 24	28 deg = 24	32 deg = 24
Probability	24 F or higher	28 F or higher	32 F or higher
50 percent *	No occurrence	1/30 to 12/24: 328 days	2/20 to 11/29: 282 days
70 percent *	No occurrence	1/19 to 1/4: 350 days	2/12 to 12/8: 299 days

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

STATS TABLE - total precipitation (inches)

Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
1973								1.66	3.76	3.81	13.46	9.88	32.57
1974	9.07	4.85	6.43	2.64	2.17	0.86	2.27	0.14	0.15	2.22	7.13	6.93	44.86
1975	8.83	6.03	5.02	2.48	1.97	1.22	0.41	2.84	T	5.67	4.71	6.74	45.92
1976	6.07	5.41	3.41	2.63	1.74	0.92	0.75	2.50	0.93	1.73	1.13	1.36	28.58
1977	1.26	2.71	4.10	0.63	4.39	0.99	1.05	3.57	4.69	3.51	5.87		32.77
1978	5.93	3.81	1.73	3.53	3.70	1.41	1.17	2.36	3.58	0.48	4.08	2.85	34.63
1979	3.04	7.00	2.58	2.83	2.18	0.39	0.25				4.58	7.35	30.20
1980	8.88	4.51	4.45	3.11	2.16	2.77	0.18	0.21	2.06	1.25	7.09	10.27	46.94

1981	1.67	3.84	2.74	3.11	1.81	4.03	0.21	0.04	2.76	4.57	5.99	10.34	41.11
1982	8.76	7.10	3.61	4.89	0.59	0.99	0.83	1.92	3.33	4.96	3.84	9.40	50.22
1983	7.71	9.05	7.31	2.44	2.38	2.04	2.94	2.01	0.47	1.92	10.73	5.78	54.78
1984	2.38	4.05	4.32	4.38	4.09	4.48	0.00	0.08	1.99	4.60	10.69	3.38	44.44
1985	0.27		4.06	1.14	0.88	2.28	0.12	0.99	2.71	3.05		2.20	17.70
1986	5.87	7.15	2.78	1.32	2.33	0.32	1.86	0.04	2.96	2.09	6.36	4.23	37.31
1987	7.33	2.99	6.50	2.45	1.88	0.20	1.56	0.46	0.36	0.28	1.97	9.19	35.17
1988	6.31	1.38	4.08	5.08	2.97	2.20	0.26	0.11	1.66	0.33	8.34	3.04	35.76
1989	4.43	2.64	8.74	1.63	3.53	0.97	1.01	1.11	1.13	1.68	4.46	3.82	35.15
1990	8.51	5.44	2.68	3.01		1.89	1.10	1.04	0.52	5.87	4.88	3.74	38.68
1991	3.66	4.92	4.52	4.02	4.13	2.43	0.12	0.93	0.10	2.17	7.44	4.88	39.32
1992	5.04	4.58	1.78	5.06	0.13	0.56	0.45	0.25	1.33	3.17	5.45	6.84	34.64
1993	3.60	0.96	5.20	6.31	4.02	1.94	1.42	0.18	T	1.44	1.79	6.86	33.72
1994	4.95	6.11	2.72	2.31	1.23	1.10	0.07	0.14	1.63	9.02	7.49	6.53	43.30
1995	7.44	5.22	5.02	4.19	1.13	2.29	0.98	1.69	2.14	M4.35	11.71	7.84	54.00
1996	8.56	12.43	4.46	5.95	4.84	0.09	M0.49	0.50	3.22	6.17	9.72	16.28	72.71
1997	8.86	2.14	8.24	3.78	2.46	1.62	0.64	1.55	2.84	7.58	5.19	4.01	48.91
1998	M7.76	6.80	4.21	1.49	5.18	1.61	0.34	T	1.02	3.57	13.36	M9.21	54.55
1999	8.97	11.39	5.67	M1.61	M2.59	M2.45	0.38	M1.12	0.19	2.89	7.67	7.67	52.60
2000	8.08	4.96	3.62	2.39	2.51	M0.90	M0.25	0.15	1.76	3.19	M2.91	M3.85	34.57
2001	1.99	1.79	3.73	3.09	1.12	1.40	0.46	0.87	0.66	4.37	M7.44	M7.83	34.75
2002	8.03	4.92	5.40	3.60	M1.57	2.19	M0.19	0.01	1.31	0.32	2.49	10.48	40.51
2003	9.14	3.17	M5.16	7.03	1.60	M0.11	T	0.06	M1.50	2.30	5.38	10.43	45.88
2004	M5.02	4.86	2.01	2.16	1.17	1.03	T	3.20	1.76	3.27	2.46	4.58	31.52
2005	M2.02	M0.99	4.73	4.44	5.06	M2.03	M0.39	0.22	1.37	4.26	6.54	M10.20	42.25
2006	12.05	2.38	3.63	2.52	M0.48	1.12	0.19	0.07	1.12	1.83	15.56	M3.80	44.75
2007	M1.88	M3.19	M1.58	M0.42	M1.06	M0.87	M0.54	M0.51	M0.41	M1.15	M3.80	M7.52	22.93
2008	M5.81	M2.41	M3.65	M2.07	M1.22	M1.00	MT	M1.17	M0.30	M0.58	M4.14	M2.45	24.80
2009	M5.03	M1.42	M1.91	M1.19	M3.03	M1.05	M0.22	M0.77	M1.63	3.54	7.21	4.99	31.99
2010	6.68	3.96	5.62	3.99	4.63	4.79	0.30	MT	M2.94	5.16	7.39	10.23	55.69
2011	5.13	5.79	7.59	5.37	3.25	0.87	1.36	0.10	0.70	2.64	8.32	3.37	44.49
2012	M8.74	3.71	9.95	3.85	3.21	2.78	0.51	T	0.01	6.59	8.53	9.14	57.02
2013	3.11	1.51	2.37	2.59	5.26	M1.43	0.00	0.63	6.85	0.93	3.52	1.77	29.97
2014	3.34	5.95	7.58	4.51	2.79	1.84	0.92	0.13	1.05	7.26	3.58	6.78	45.73

2015	3.69	4.11	5.12	2.61	0.64	0.44	0.60	0.78	0.87	4.39	5.61	18.61	47.47
2016	8.93	4.87	5.71	2.46	1.30	M1.11	0.75	0.16	1.26	10.11	8.74	M6.12	51.52
2017	5.65	12.18	8.40	4.61									30.84
Notes: Data missing in any month have an "M" flag. A "T" indicates a trace of precipitation.													
Data missing for all days in a month or year is blank.													
Creation date: 2016-07-22													

Appendix D: Wetland Determination Data Forms

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

Project/Site: Tax Lot 800, 802, an d803 City/County: West Linn/Clackamas Sampling Date: 3/27/2017

Applicant/Owner: Malibar Group LLC Retierment Plan State: OR Sampling Point: **1**

Investigator(s): Stacey Reed and Haley Smith Section, Township, Range: Section 2AC, T.3., R.1E.

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

Subregion (LRR): A, Northwest Forests and Coast Lat: 45.342061 Long: -122.647551 Datum: ______

Soil Map Unit Name: (Unit 84) Wapato silty clay loam NWI classification: ______

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

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

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

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

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

Precipitation:
According to the NWS Portland station, 0.01 inches of rainfall was received on the day of the site visit and 6.92 inches within the two weeks prior. Climatic conditions are considered wetter than normal for the three months prior.

Remarks:
Plot is located in a fenced, horse-grazed area.

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot Size: 30' r or ______)			
1. *Populus balsamifera*	40%	Yes	FAC
2. *Salix lucida*	10%	Yes	FACW
3.			
4.			
	50% = Total Cover		
Sapling/Shrub Stratum (Plot Size: 10' r or ______)			
1. *Rubus armeniacus*	5%	Yes	FAC
2.			
3.			
4.			
5.			
	5% = Total Cover		
Herb Stratum (Plot Size: 5' r or ______)			
1. *Schedonorus arundinaceus*	75%	Yes	FAC
2. *Taraxacum officinale*	10%	No	FACU
3. *Geranium molle*	10%	No	NOL
4. *Dactylis glomerata*	5%	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100% = Total Cover		
Woody Vine Stratum (Plot Size: 10' r or ______)			
1.			
2.			
	0% = Total Cover		

% Bare Ground in Herb Stratum 0%

Dominance Test worksheet:

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

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

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	120	x 3 =	360
FACU species	15	x 4 =	60
UPL species	10	x 5 =	50
Column Totals:	155	(A)	490 (B)

Prevalence Index = B/A = 3.16

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: 1

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12+	10YR 3/3	100					gr SiL	Angular gravels

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (except MLRA 1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (LRR A)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Remarks:
Soils are moist. No ponding in the area despite heavy rains the day before.

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

Project/Site: Tax Lot 800, 802, an d803　City/County: West Linn/Clackamas　Sampling Date: 3/27/2017
Applicant/Owner: Malibar Group LLC Retierment Plan　State: OR　Sampling Point: 2
Investigator(s): Stacey Reed and Haley Smith　Section, Township, Range: Section 2AC, T.3., R.1E.
Landform (hillslope, terrace, etc.): Toeslope　Local relief (concave, convex, none): Concave　Slope (%): <3%
Subregion (LRR): A, Northwest Forests and Coast　Lat: 45.341576　Long: -122.648238　Datum: ______
Soil Map Unit Name: (Unit 19) Cloquato silt loam　NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No X (If no, explain in Remarks)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed?　Are "Normal Circumstances" present? Yes X No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic?　(If needed, explain any answers in Remarks.)

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

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

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

Precipitation:
According to the NWS Portland station, 0.01 inches of rainfall was received on the day of the site visit and 6.92 inches within the two weeks prior. Climatic conditions are considered wetter than normal for the three months prior.

Remarks:
Plot is located on the edge of the pond. Water in the pond is greater than 3' deep.

VEGETATION

Tree Stratum (Plot Size: 30' r or ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus balsamifera*	30%	Yes	FAC
2. *Alnus rubra*	5%	No	FAC
3.			
4.			
	35% = Total Cover		
Sapling/Shrub Stratum (Plot Size: 10' r or ______)			
1. *Physocarpus capitatus*	10%	Yes	FACW
2.			
3.			
4.			
5.			
	10% = Total Cover		
Herb Stratum (Plot Size: 5' r or ______)			
1. *Phalaris arundinacea*	30%	Yes	FACW
2. *Lysichiton americanus*	5%	No	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	35% = Total Cover		
Woody Vine Stratum (Plot Size: 10' r or ______)			
1.			
2.			
	0% = Total Cover		
% Open water 65%			

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	40	x 2 =	80
FAC species	35	x 3 =	105
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	80 (A)		190 (B)

Prevalence Index = B/A = 2.38

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

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

Hydrophytic Vegetation Present? Yes X No ______

Remarks:

SOIL

Sampling Point: 2

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/1	100					SiCL	
8-16+	10YR 4/1	95	7.5YR 3/4	5	C	M/PL	SiC	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (except MLRA 1)
___ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

___ Surface Water (A1)
X High Water Table (A2)
X Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (LRR A)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): 6"
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): Surface

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

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

Remarks:
1' of ponding present within 0.5' of the plot.

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

Project/Site: Tax Lot 800, 802, an d803 City/County: West Linn/Clackamas Sampling Date: 3/27/2017
Applicant/Owner: Malibar Group LLC Retierment Plan State: OR Sampling Point: 3
Investigator(s): Stacey Reed and Haley Smith Section, Township, Range: Section 2AC, T.3., R.1E.
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): <3%
Subregion (LRR): A, Northwest Forests and Coast Lat: 45.341609 Long: -122.648244 Datum:
Soil Map Unit Name: (Unit 19) Cloquato silt loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are “Normal Circumstances” present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Precipitation:
According to the NWS Portland station, 0.01 inches of rainfall was received on the day of the site visit and 6.92 inches within the two weeks prior. Climatic conditions are considered wetter than normal for the three months prior.

Remarks:
Plot located approximately 10' from Plot 2 and is half a foot higher in elevation.

VEGETATION

Tree Stratum (Plot Size: 30' r or ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus balsamifera*	45%	Yes	FAC
2. *Salix species*	15%	Yes	FAC*
3.			
4.			
	60% = Total Cover		
Sapling/Shrub Stratum (Plot Size: 10' r or ______)			
1. *Prunus species*	30%	Yes	FAC*
2. *Rubus armeniacus*	15%	Yes	FAC
3.			
4.			
5.			
	45% = Total Cover		
Herb Stratum (Plot Size: 5' r or ______)			
1. *Phalaris arundinacea*	2%	No	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	2% = Total Cover		
Woody Vine Stratum (Plot Size: 10' r or ______)			
1. *Hedera helix*	60%	Yes	FACU
2.			
	60% = Total Cover		
% Bare Ground in Herb Stratum 98%			

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	2	x 2 = 4
FAC species	105	x 3 = 315
FACU species	60	x 4 = 240
UPL species	0	x 5 = 0
Column Totals:	167 (A)	559 (B)

Prevalence Index = B/A = 3.35

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

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

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

Remarks:
*Assumed as FAC.

SOIL

Sampling Point: 3

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14+	10YR 3/2	100					SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ______ No X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present?	Yes		No	X	Depth (inches):	
Water Table Present?	Yes	X	No		Depth (inches):	9"
Saturation Present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

Wetland Hydrology Present? Yes X No ______

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

Remarks:
Above average rainfall within the past two weeks and three months prior.

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

Project/Site: Tax Lot 800, 802, an d803 City/County: West Linn/Clackamas Sampling Date: 3/27/2017
Applicant/Owner: Malibar Group LLC Retierment Plan State: OR Sampling Point: **4**
Investigator(s): Stacey Reed and Haley Smith Section, Township, Range: Section 2AC, T.3., R.1E.
Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): Concave Slope (%): <3%
Subregion (LRR): A, Northwest Forests and Coast Lat: 45.341239 Long: -122.647649 Datum: ____
Soil Map Unit Name: (Unit 84) Wapato silty clay loam NWI classification: ____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Precipitation:
According to the NWS Portland station, 0.01 inches of rainfall was received on the day of the site visit and 6.92 inches within the two weeks prior. Climatic conditions are considered wetter than normal for the three months prior.

Remarks:

VEGETATION

Tree Stratum (Plot Size: 30' r or ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0% = Total Cover		
Sapling/Shrub Stratum (Plot Size: 10' r or ____)			
1.			
2.			
3.			
4.			
5.			
	0% = Total Cover		
Herb Stratum (Plot Size: 5' r or ____)			
1. *Alopecurus pratensis*	50%	Yes	FAC
2. *Ranunculus repens*	40%	Yes	FAC
3. *Poa species*	10%	No	FAC*
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100% = Total Cover		
Woody Vine Stratum (Plot Size: 10' r or ____)			
1.			
2.			
	0% = Total Cover		
% Bare Ground in Herb Stratum 0%			

Dominance Test worksheet:

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	100	x 3 =	300
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		300 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:
*Assumed as FAC.

SOIL

Sampling Point: 4

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2	95	7.5YR 3/4	5	C	M/PL	SiL	
6-12+	10YR 2/2	90	7.5YR 3/4	10	C	PL	SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes X No ______ Depth (inches): 1/4"
Water Table Present? Yes X No ______ Depth (inches): Surface
Saturation Present? (includes capillary fringe) Yes X No ______ Depth (inches): Surface

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

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

Remarks:
Scattered ponding present.

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

Project/Site: Tax Lot 800, 802, an d803 City/County: West Linn/Clackamas Sampling Date: 3/27/2017
Applicant/Owner: Malibar Group LLC Retierment Plan State: OR Sampling Point: **5**
Investigator(s): Stacey Reed and Haley Smith Section, Township, Range: Section 2AC, T.3., R.1E.
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): <3%
Subregion (LRR): A, Northwest Forests and Coast Lat: 45.341184 Long: -122.647580 Datum: ______
Soil Map Unit Name: (Unit 84) Wapato silty clay loam NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No X (If no, explain in Remarks)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are "Normal Circumstances" present? Yes X No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Precipitation:
According to the NWS Portland station, 0.01 inches of rainfall was received on the day of the site visit and 6.92 inches within the two weeks prior. Climatic conditions are considered wetter than normal for the three months prior.

Remarks:
Plot is approximately half a foot higher in elevation than Plot 4. No ponding present.

VEGETATION

Tree Stratum (Plot Size: 30' r or ______)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0% = Total Cover		
Sapling/Shrub Stratum (Plot Size: 10' r or ______)			
1.			
2.			
3.			
4.			
5.			
	0% = Total Cover		
Herb Stratum (Plot Size: 5' r or ______)			
1. *Poa species*	80%	Yes	FAC*
2. *Taraxacum officinale*	10%	No	FACU
3. *Ranunculus repens*	10%	No	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100% = Total Cover		
Woody Vine Stratum (Plot Size: 10' r or ______)			
1.			
2.			
	0% = Total Cover		

% Bare Ground in Herb Stratum 0%

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	90	x 3 =	270
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	100 (A)		310 (B)

Prevalence Index = B/A = 3.10

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

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

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

Remarks:
*Assumed as FAC.

SOIL

Sampling Point: 5

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR 3/3	100					SiL	
11-16+	10YR 4/3	100					SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (except MLRA 1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

___ Surface Water (A1)
X High Water Table (A2)
X Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (LRR A)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ______ No X Depth (inches): ______
Water Table Present? Yes X No ______ Depth (inches): 10"
Saturation Present? (includes capillary fringe) Yes X No ______ Depth (inches): 7"

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

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

Remarks:

Appendix E: Site Photographs

Photo A. View south of upland Plot 1 (yellow flag).

Photo B. View south of electric fence and angular gravel and large rock fill.

Photo C. View facing west of PFO/PEM Wetland A.

Photo D. View south of paired Plots 2 and 3 (yellow flags) and Wetland A boundary (orange flag).

Photos taken by Haley Smith March 27, 2017

Photo E. View facing the east of Wetland A boundary.

Photo F. View facing north of paired Plots 4 and 5 (yellow flags) and Wetland A boundary (orange flag).

Photo G. View facing southwest of flooded Wetland A.

Photo H. 18-inch concrete culvert under 9th Street.

Photos taken by Haley Smith March 27, 2017

Exhibit F: Site Assessment Report

Exhibit F: Site Assessment Report

Tax Lots 800 & 802
West Linn, Oregon
Site Assessment Report

Date: December 2019

Prepared for:
Malibar Group, LLC
615 NW Territorial Road
Canby, OR 97013

Prepared by:
AKS Engineering & Forestry, LLC
Haley Teach, MS, Natural Resource Specialist
(503) 563-6151 | teachh@aks-eng.com

Site Information:
South of 1220 9th Street
West Linn, Clackamas County, Oregon
Clackamas County Assessor’s Map 3 1E 2AC
Tax Lots 800, 802

AKS Job Number: 5926

AKS ENGINEERING & FORESTRY

12965 SW Herman Road, Suite 100
Tualatin, OR 97062
(503) 563-6151

Table of Contents

Figures

Appendices

Introduction

This report was prepared by AKS Engineering & Forestry, LLC (AKS) to conduct a natural resource site assessment for Tax Lots 800, 802, and 803 of Clackamas County Assessor's Map 3 1E 2AC, which is located south of 1220 9th Street in West Linn, Clackamas County, Oregon (Figures 1-2).

This report describes the results of the on-site portions of a previous delineation of one palustrine forested/palustrine emergent (PFO/PEM) wetland (referred to as Wetland A) and associated 65-foot Water Resource Area (WRA) buffer within the Willamette River watershed. In addition, a Metro Title 13 Moderate Value Habitat Conservation Area (HCA) is mapped extending through the entire site.

The study area boundary assessed by AKS includes Tax Lots 800, 802, and 803 to determine the extent of water resources within the project area. The project area is only Tax Lots 800 and 802. The project proposes to create a Property Line Adjustment (PLA) of Tax Lots 800 and 802 and a request for approval to construct a home on adjusted Tax Lot 802. The construction of the home will require unavoidable encroachment into the WRA and HCA, requiring mitigation in accordance with West Linn Community Development Code (CDC) Section 32.09. The WRA and HCA provisions of the CDC prevent reasonable use of the site. Therefore, the applicant is applying for a Hardship Variance in accordance with Sections 32.110 and 28.110 of the West Linn CDC. On-site enhancement mitigation will mitigate for the unavoidable WRA/HCA encroachment, which will meet the required 1:1 mitigation ratio.

This report has been prepared to meet City of West Linn Community Development Code Chapter 28, *Willamette and Tualatin River Protection*, and Chapter 32 *Water Resource Area Protection*.

Existing Site Conditions

The study area consists of an undeveloped field with a forested riparian area in the north surrounding a pond. The site and much of the surrounding land is located within the Federal Emergency Management Agency (FEMA) 100-year floodplain. An electric fence runs east-west in the northern portion of the study area. The wetland is located in the southern portion of the site and is dominant in reed canary grass (*Phalaris arundinacea*, FACW), yellow-skunk-cabbage (*Lysichiton americanus*, OBL), field meadow foxtail (*Alopecurus pratensis*, FAC), and creeping buttercup (*Ranunculus repens*, FAC). The forested portion of the wetland is dominant in balsam poplar (*Populus balsamifera,* FAC), pacific ninebark (*Physocarpus capitatus*, FACW), tall false rye grass (*Schedonorus arundinaceus*, FAC), and reed canary grass (FACW). Topography on the site is generally flat (less than 5% slope), with a gradual slope to the south towards the wetland.

According to the Natural Resources Conservation Service (NRCS) Clackamas County Area Soil Survey Map, the following soil units are mapped within the study area, (Figure 3 in Appendix A):

- (Unit 19) Cloquato silt loam-Non-hydric; with 2% hydric Wapato and 1% hydric Aquolls in flood plains
- (Unit 84) Wapato silty clay loam-Hydric; with 6% hydric Cove and 4% hydric Humaquepts in flood plains

According to the City of West Linn's Local Wetland Inventory (LWI) map, a wetland, pond, and drainage is mapped in the study area (Figure 4). Our study determined the mapped wetland and pond to be in the approximate location of Wetland A. A drainage was not observed on site under our study. The City also maintains a WRA map that illustrated the approximate boundary of a wetland in the vicinity of the LWI and field-verified wetland (Figure 5). Lastly, the City-maintained HCA map shows Moderate Value HCA mapped on the entire project site (Figure 6).

Existing Protected Water Features

A site visit was conducted on March 27, 2017 by AKS Senior Wetland Scientist, Stacey Reed, PWS, and Natural Resource Specialist, Haley Teach, to determine whether potentially jurisdictional wetland and waters were present on-site. AKS submitted a wetland delineation report to the Oregon Department of State Lands (DSL) for the on-site portions of the wetland. The delineation report is currently under review at the DSL per DSL File WD#2019-0614.

Wetland A is a PFO/PEM wetland located through the central portion of the study area and extends off site to the south, west, and east. Wetland A belongs to the Slope Hydrogeomorphic (HGM) sub-classification. The PFO portion of the wetland was dominated by balsam poplar (FAC), pacific ninebark (FACW), reed canary grass (FACW), and yellow-skunk-cabbage (OBL). The PEM portion of the wetland was dominated by field meadow foxtail (FAC) and creeping buttercup (FAC). The location of the wetland boundary is shown on Figure 7. The wetland delineation report is included as Appendix A.

Extent of Water Resource Area (WRA)

According to Table 32-2, *Required Width of WRA,* of Section 32.060 in the City's CDC, the width of the WRA varies depending on the type of feature (wetland, water, type of water, and riparian corridor) and slope adjacent to the Protected WRA Resource. Based on the City's criteria, the full WRA buffer width for Wetland A is 65 feet. Slopes adjacent to the wetland are not steep (less than 25%). The setback extends from the edge of the delineated wetland boundary. The total area of the on-site WRA is shown on the attached Site Plan (Figure 7).

Existing Condition of the WRA

The existing condition of the on-site WRA was determined based on the presence of native vegetation, water features, and slope, consistent with CDC Section 32.050.F. The existing condition of the on-site WRA is described by one vegetation community, documented at Vegetated Corridor (VECO) Plot A. The data sheet for VECO Plot A is included in Appendix B, and the plot location is shown on Figure 7. The edge of tree canopy cover within the project area of the WRA is shown on Figure 7. Representative photos documenting the existing conditions of the site are included in Appendix C.

The vegetation community documented at VECO Plot A represents the vegetation along the north side of Wetland A within the project area. The dominant vegetation includes balsam poplar, a willow species (*Salix* species), and non-native tall false rye grass. The vegetation community associated with VECO Plot A is determined to be in marginal condition because the area is dominated by a non-native understory, although the canopy cover is comprised of native vegetation species. The condition of the WRA as a whole is in marginal condition as the tree canopy is not continuous and the herbaceous layer is dominated by non-native vegetation species.

Project

The project involves a PLA and a request for approval to construct a home on adjusted Tax Lot 802. This application does not include a request to physically construct the home but anticipates that a detached single-family residence will be built on Tax Lot 802 once this request is approved. Due to the extent of the on-site WRA and HCA, unavoidable permanent impacts are necessary to accommodate the home footprint, associated amenities, and utilities. The purpose of the PLA is to minimize impacts to the mapped

WRA/HCA area on-site. The project follows hardship provisions in CDC Sections 28.110 and 32.110 to allow construction of up to 5,000 square feet of maximum disturbed area (MDA). The project will not result in any wetland impact. The Site Plan is included as Figure 7.

Best management erosion and sediment control practices will be implemented to ensure no wetland impact. Erosion control details are shown in the land use submittal construction documents.

Impact Evaluation

WRA Impact Analysis

The project will result in unavoidable MDA into on-site WRA for the required grading and site preparation activities to facilitate future construction of the single-family dwelling. The PLA of Tax Lots 800 and 802 will not result in any impacts to the WRA. The project will avoid wetland impacts. The existing condition of the WRA is in marginal condition, dominant in non-native vegetation with native canopy cover. No tree canopy within the WRA is anticipated to be impacted by the project. The impacted canopy consists of balsam poplar that will be mitigated for through the WRA/HCA Mitigation Enhancement Planting Specification (Appendix D). Due to the percentage of invasive and non-native species cover in the shrub and herbaceous stratum, the existing WRA provides low-quality buffer function to the wetland. WRA impacts for the eventual construction of a home are expected to have a minimal effect on the adjacent wetland. All MDA and non-MDA items are consistent with Table 32-5, MDA Calculation Summary, of the City's CDC.

Hardship Provisions

WRA

According to Section 32.110 Hardship Provisions, of the CDC, if a property is located on a lot of record and is partially or completely within WRA, development is permitted consistent with Section 32.110 requirements. The project meets all the hardship provisions listed in Section 32.110. The total on-site MDA within WRA is no more than 5,000 square feet. The footprint of the home site will be at least 15 feet away from the wetland boundary. The home cannot be located farther away from the wetland boundary due to the proximity of the wetland boundary to the northern property line.

HCA

The entire tax lot is within City/Metro-mapped Moderate/Medium HCA (not "Non-HCA" or "Habitat and Impact Areas Not Designated as HCA"). According to Section 28.110, Approval Criteria, of the City's CDC, when only HCA land is available to build upon, the project must meet all requirements under this Section. The total impervious surface of this project will be less than 5,000 square feet, meeting the minimum impervious surface disturbance area requirement listed under Section 28.110.B.2. The proposed home site and additional MDA surfaces are no closer than 15 feet from the wetland boundary.

Mitigation

WRA Enhancement Mitigation

To mitigate for the unavoidable permanent WRA/HCA impacts, the Site Plan incorporates enhancement mitigation located within the remaining project area on adjusted Tax Lot 802. This includes the remaining on-site 15-foot buffer. According to Section 32.090.C, Amount of Mitigation, the amount of mitigation required is based on the square footage of the permanent disturbance area, where 1 square foot of created, enhanced, or restored area on-site is required for every square foot disturbed. To mitigate the encroachments, the enhancement area will be densely planted with native woody vegetation per the attached planting plan (Appendix D). The location of the proposed mitigation area is shown on attached Figure 7.

The mitigation is expected to improve the ecological functions described in Table 32-4, *Ecological Functions of WRA*, of the City's CDC, for the site. The study area's WRA is currently in marginal condition and is generally dominated by non-native species. The native tree and shrub plantings will provide a significant increase in native cover and wildlife habitat; increasing the sites ecological functions and values. The plant species and quantities are included in the WRA/HCA Mitigation Enhancement Planting Specifications (Appendix D), which is consistent with Section 32.100, Re-Vegetation Plan Requirements, of the City's CDC.

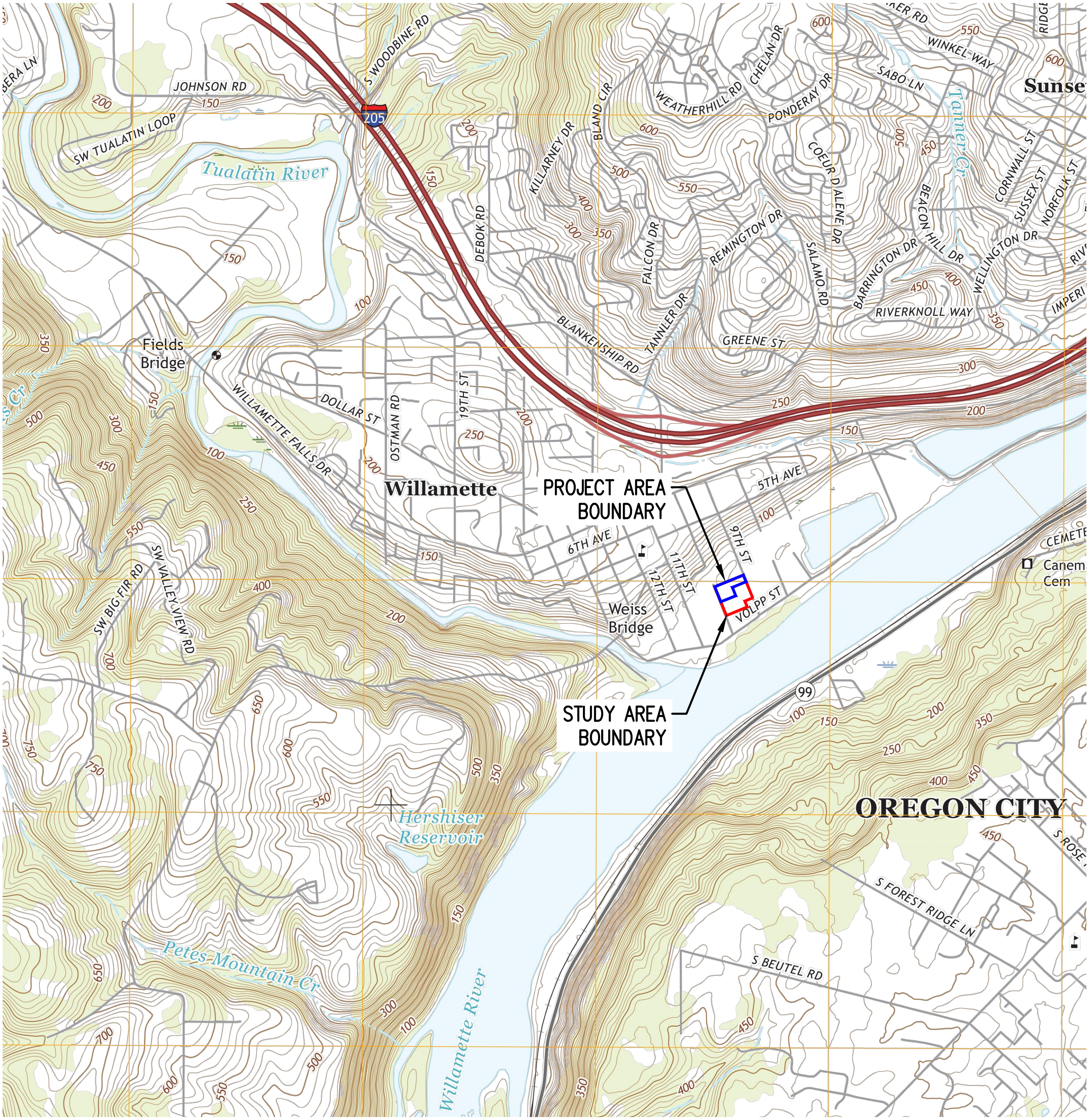
Summary of Results and Conclusions

The project consists of a PLA of Tax Lots 800 and 802 and the request for approval to site one single-family home on adjusted Tax Lot 802. The project will require impacts within WRA and Moderate Value HCA. The WRA buffer on site is currently in marginal condition. To mitigate for the WRA/HCA impacts, the project includes on-site enhancement mitigation, including a stormwater swale to provide a water quality benefit. The on-site enhancement mitigation meets the City's 1:1 mitigation ratio requirement. Hardship provisions are required due to the extent of WRA and HCA on the project site. All construction plans have carefully considered the City's criteria for development within such areas.

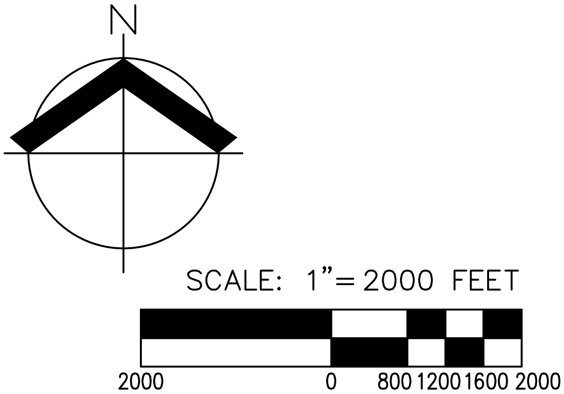
List of Preparers

Haley Teach

Haley Teach, MS
Natural Resource Specialist
Fieldwork and Report Preparation



USGS 7.5' TOPOGRAPHIC SERIES
QUADRANGLE: CANBY, OR (2017)



SCALE: 1"= 2000 FEET

DATE: 12/23/2019

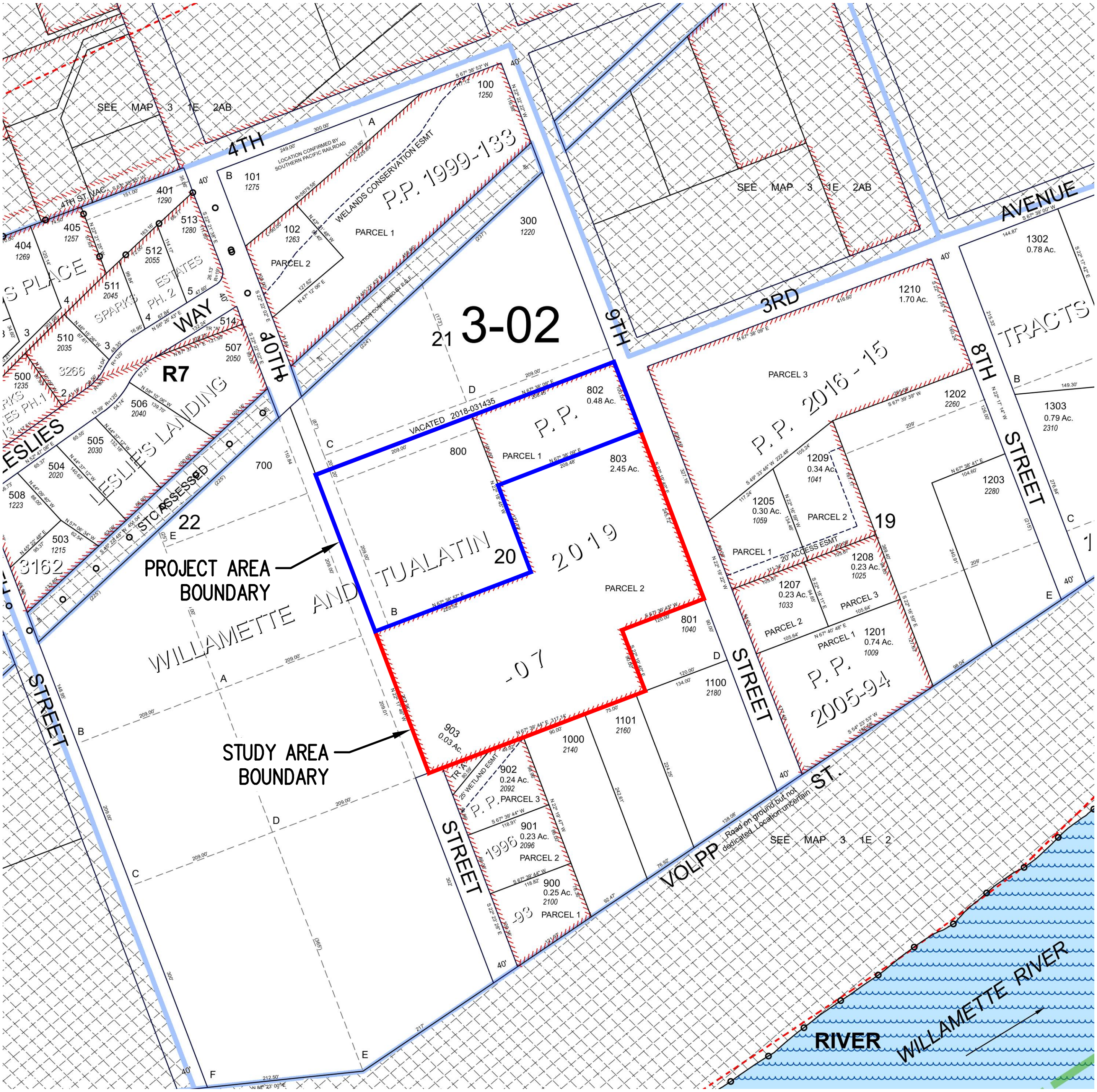
USGS VICINITY MAP
TAX LOTS 800 & 802 SITE ASSESSMENT REPORT

FIGURE
1

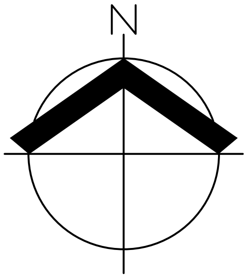
AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

DRWN: JRI
CHKD: SAR
AKS JOB:
5926

DWG: 5926 NR FIGURES | FIGURE 1



CLACKAMAS COUNTY
TAX LOTS 800, 802, & 803
TAX MAP 3 1E 2AC



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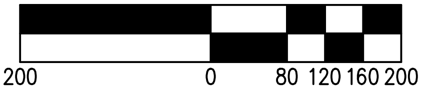

DATE: 12/23/2019

TAX MAP (MAP 3 1E 2AC)
TAX LOTS 800 & 802 SITE ASSESSMENT REPORT

FIGURE
2

AKS ENGINEERING & FORESTRY, LLC
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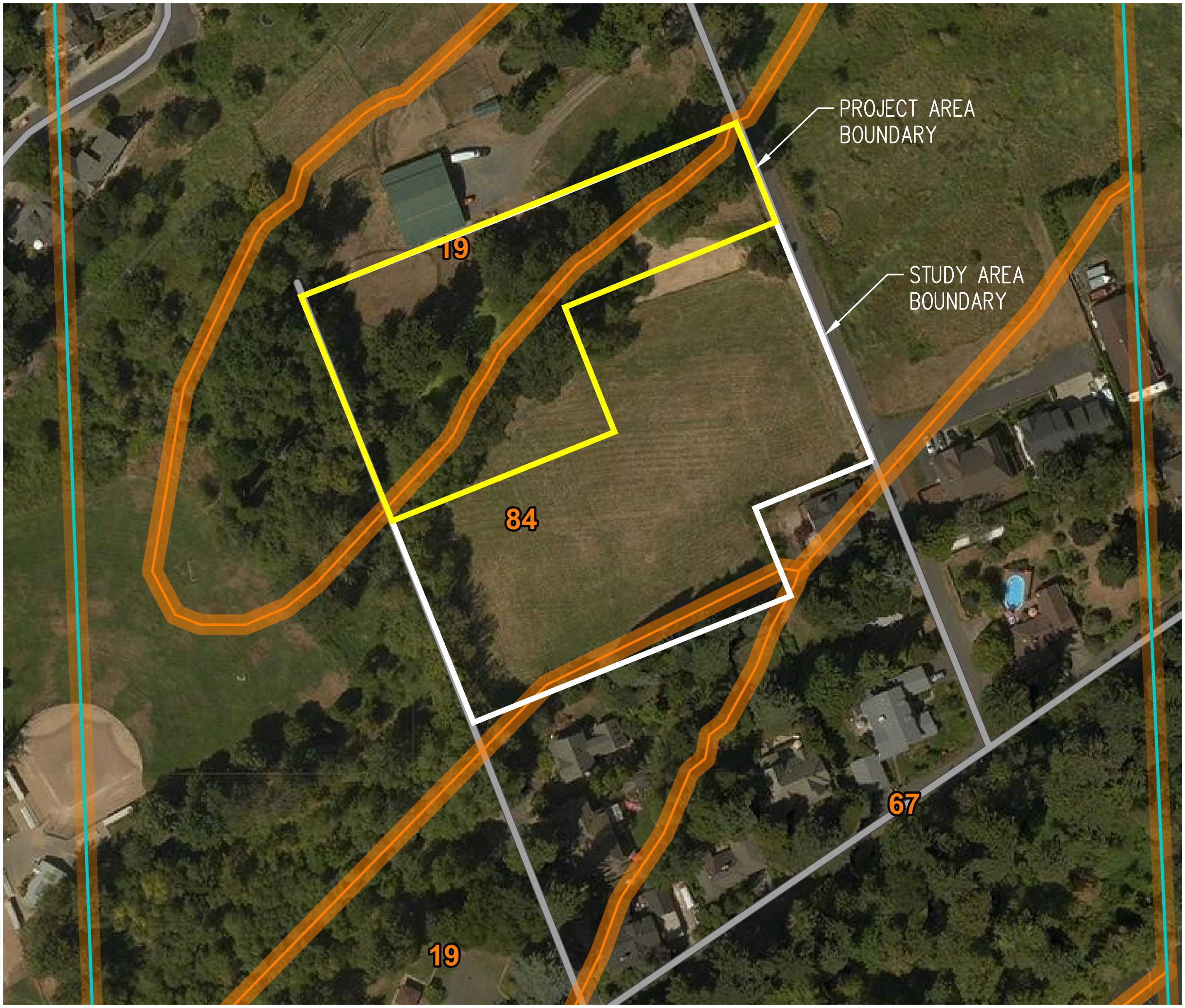
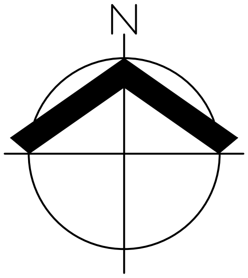
5926

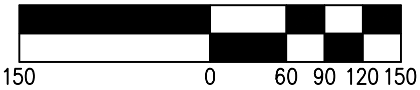


MAP UNIT SYMBOL	MAP UNIT NAME
19	CLOQUATO SILT LOAM; NON-HYDRIC
84	WAPATO SILTY CLAY LOAM; HYDRIC

NRCS WEB SOIL SURVEY FOR
CLACKAMAS COUNTY



SCALE: 1"=150 FEET



DATE: 12/23/2019

NRCS SOIL SURVEY MAP
TAX LOTS 800 & 802 SITE ASSESSMENT REPORT

FIGURE
3

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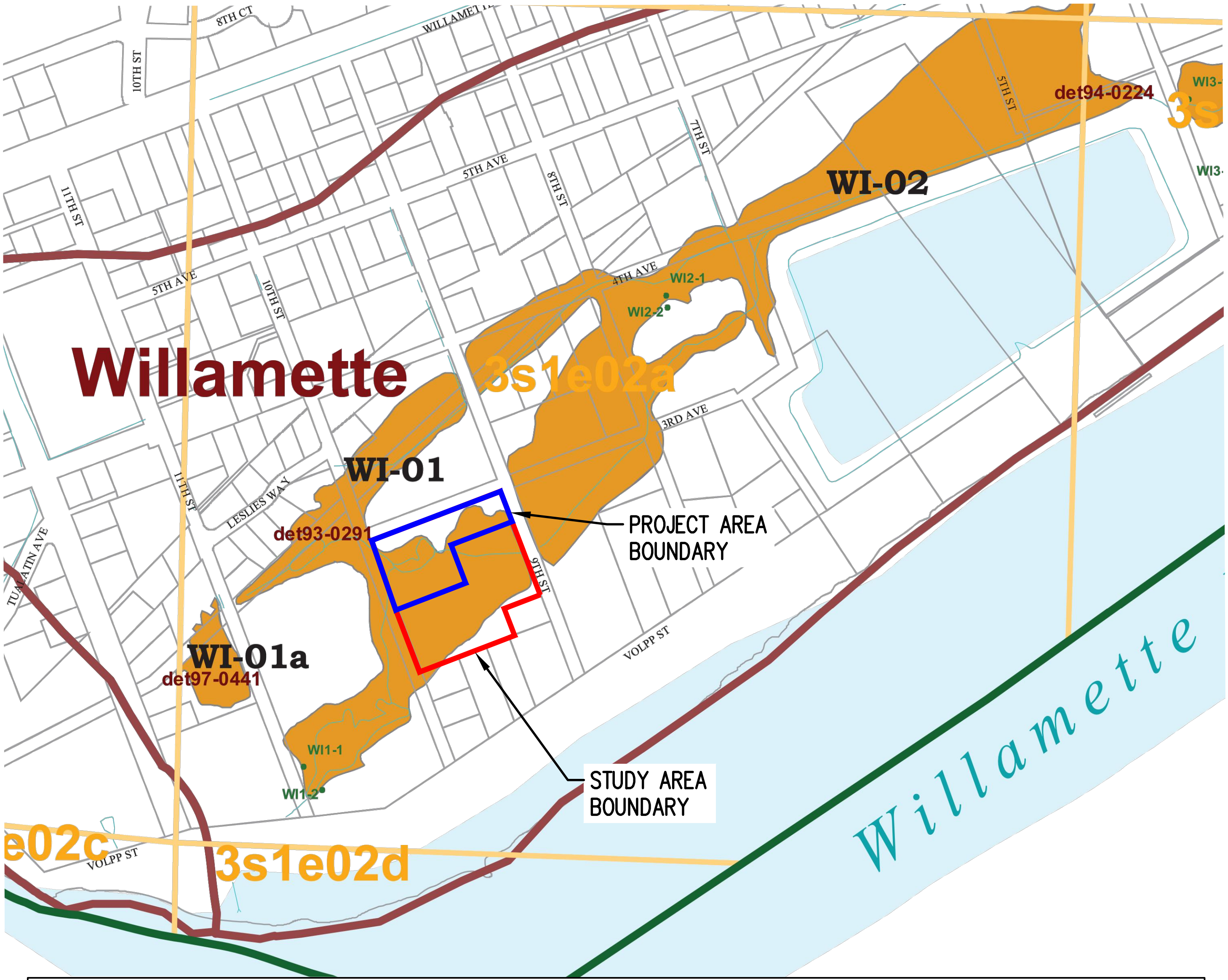
DRWN: JRI
CHKD: SAR
AKS JOB:
5926

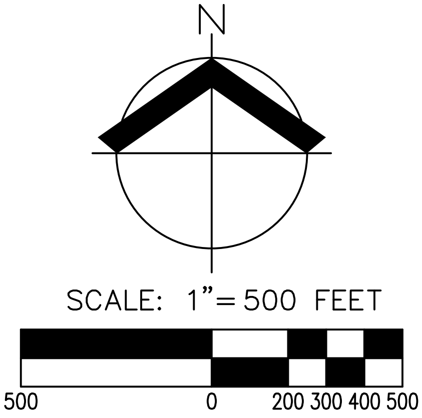
DWG: 5926 NR FIGURES | FIGURE 3



Legend

🟥 Wetlands, Winterbrook Planning 2002	Potential Jurisdictional Drainages, West Linn GIS 2002
🟧 Field Verified Wetlands, Winterbrook Planning 2002	☐ Potential Jurisdictional Waters, West Linn GIS 2002
● Possible Wetlands, Winterbrook Planning 2002	☐ Taxlot COGO, West Linn GIS 2002
• Wetland Sample Plots, Winterbrook Planning 2002	☐ Basin Boundaries, Winterbrook Planning 2002

CITY OF WEST LINN
LOCAL WETLAND INVENTORY (2004)



DATE: 12/23/2019

LOCAL WETLAND INVENTORY MAP
TAX LOTS 800 & 802 SITE ASSESSMENT REPORT

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
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FIGURE
4

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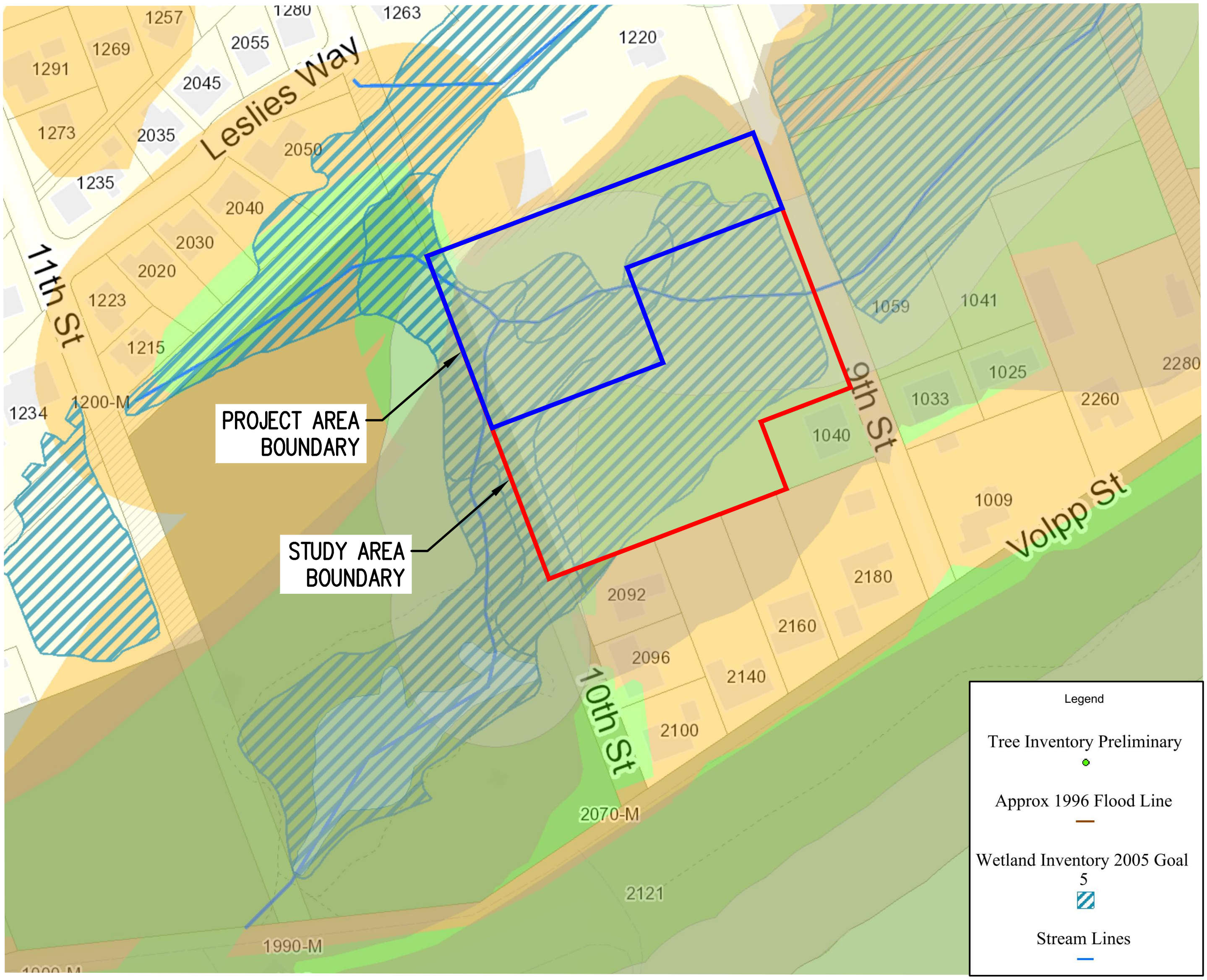
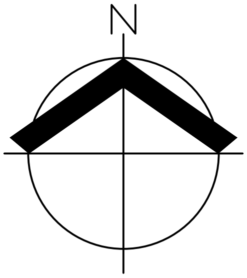
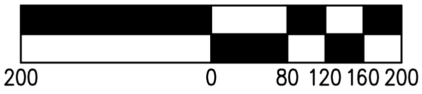
AKS JOB:
5926



WEST LINN GIS
WATER RESOURCE AREA (WRA) MAP



SCALE: 1"= 200 FEET



DATE: 12/23/2019

CITY OF WEST LINN WRA MAP
TAX LOTS 800 & 802 SITE ASSESSMENT REPORT

FIGURE
5

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DRWN: JRI
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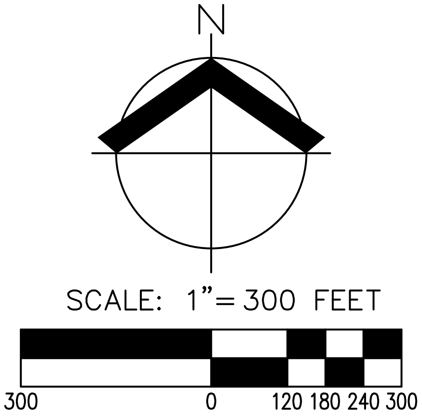
AKS JOB:
5926

WEST LINN GIS
HABITAT CONSERVATION AREA (HCA) MAP



DATE: 12/23/2019

CITY OF WEST LINN HCA MAP
TAX LOTS 800 & 802 SITE ASSESSMENT REPORT

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
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AKS

FIGURE	6
DRWN:	JRI
CHKD:	SAR
AKS JOB:	5926

LEGEND:

☐	WETLAND A AREA TO REMAIN WITHIN STUDY AREA: 116,431 SF± (2.67 ACRES±)
▨	APPROXIMATE POND AREA WITHIN WETLAND A TO REMAIN: 6,368 SF± (0.15 ACRES±)

TOTAL WETLAND A AREA INCLUDING POND: 122,799 SF± (2.82 ACRES±)

🟥	WATER RESOURCE AREA (WRA) PERMANENT IMPACTS: 3,791 SF± (0.09 ACRES±)
🟫	NATIVE PLANTING MITIGATION AREA: 4,999 SF± (0.12 ACRES±)
🟩	WRA TO REMAIN WITHIN PROJECT AREA: 24,652 SF± (0.57 ACRES±)

TOTAL WRA IN PROJECT AREA (EXCLUDING PROPOSED RIGHT-OF-WAY EXTENSION AREA): 33,442 SF± (0.77 ACRES±)

🟪	HCA IMPACTS BEYOND WRA: 1,208 SF± (0.03 ACRES±)
☁	EXISTING EDGE OF CANOPY COVER PER MAY 2019 GOOGLE EARTH AERIAL IMPACTED TREE CANOPY AREA: 3,358 SF± (0.08 ACRES±)

WETLAND BOUNDARY SHOWN WAS DELINEATED BY AKS ENGINEERING & FORESTRY, LLC. ON MARCH 27, 2017, AND WAS PROFESSIONALLY SURVEYED BY AKS ON MAY 16-17, 2017.

1-FOOT INTERVAL GROUND CONTOURS DERIVED FROM LAND SURVEY.

SITE PLAN SHOWN IS PRELIMINARY ONLY AND SUBJECT TO CHANGE.

TREES WITH DIAMETER OF 6" AND GREATER ARE SHOWN. TREE DIAMETERS WERE MEASURED UTILIZING A DIAMETER TAPE AT BREAST HEIGHT. TREE INFORMATION IS SUBJECT TO CHANGE UPON ARBORIST INSPECTION.

N

DATE: 12/26/2019

SITE PLAN OVERVIEW

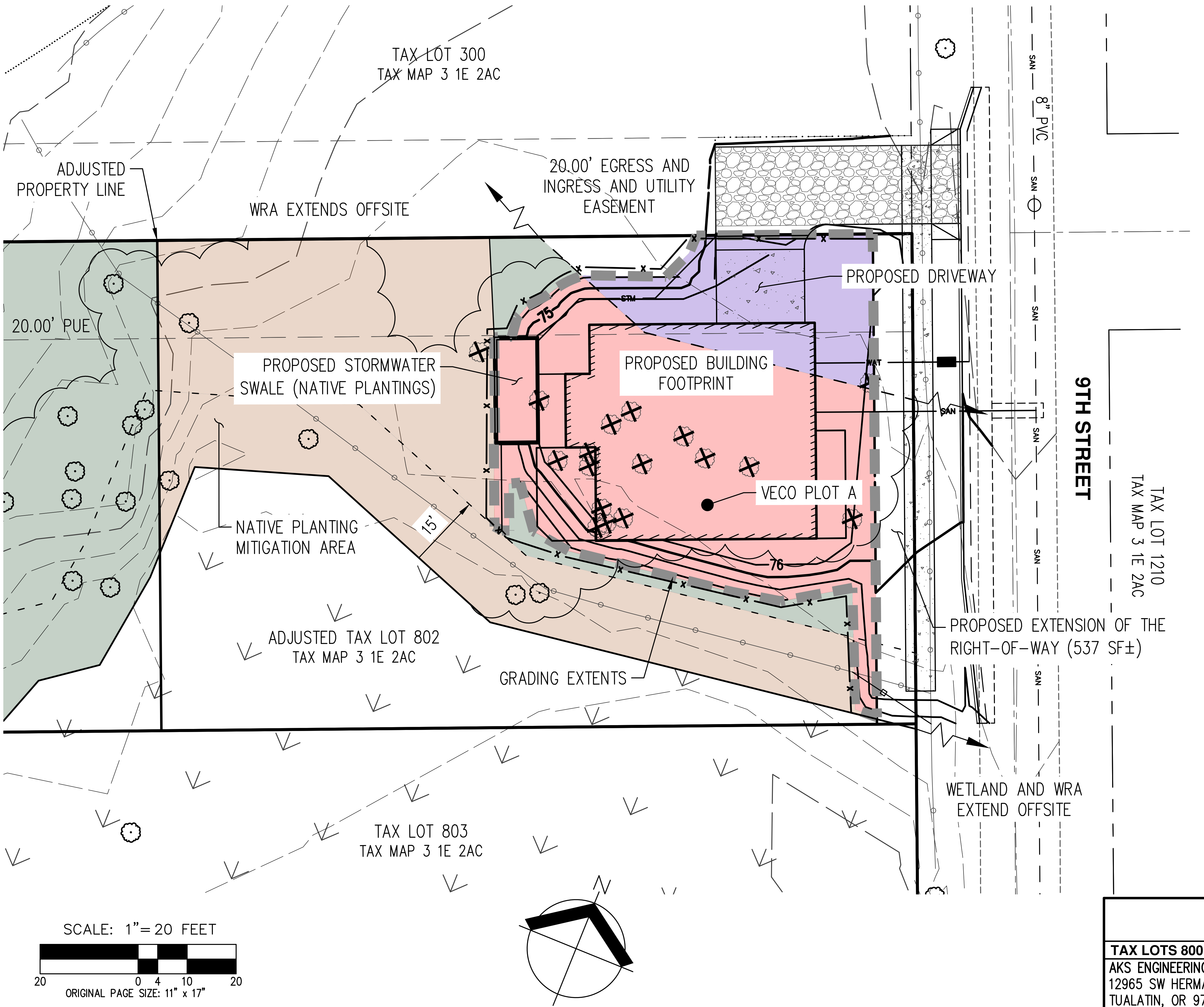
TAX LOTS 800 & 802 SITE ASSESSMENT REPORT

FIGURE 7

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

DRWN: JRI
CHKD: SAR
AKS JOB: 5926

DWG: 5926 NRA SITE PLAN | FIGURE 7



LEGEND:

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NATIVE PLANTING MITIGATION AREA: 4,999 SF± (0.12 ACRES±)

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TOTAL WRA IN PROJECT AREA (EXCLUDING PROPOSED RIGHT-OF-WAY EXTENSION AREA): 33,442 SF± (0.77 ACRES±)

🟪 HCA IMPACTS BEYOND WRA: 1,208 SF± (0.03 ACRES±)

⊗ TREE TO BE REMOVED

EXISTING EDGE OF CANOPY COVER PER MAY 2019 GOOGLE EARTH AERIAL

IMPACTED TREE CANOPY AREA: 3,358 SF± (0.08 ACRES±)

WETLAND BOUNDARY SHOWN WAS DELINEATED BY AKS ENGINEERING & FORESTRY, LLC. ON MARCH 27, 2017, AND WAS PROFESSIONALLY SURVEYED BY AKS ON MAY 16–17, 2017.

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SITE PLAN SHOWN IS PRELIMINARY ONLY AND SUBJECT TO CHANGE.

TREES WITH DIAMETER OF 6" AND GREATER ARE SHOWN. TREE DIAMETERS WERE MEASURED UTILIZING A DIAMETER TAPE AT BREAST HEIGHT. TREE INFORMATION IS SUBJECT TO CHANGE UPON ARBORIST INSPECTION.

DATE: 12/26/2019

SITE PLAN

TAX LOTS 800 & 802 SITE ASSESSMENT REPORT

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

FIGURE
7A

DRWN: JRI
CHKD: SAR
AKS JOB:
5926

DWG: 5926 NRA SITE PLAN | FIGURE 7A

Appendix A: WD#2019-0614

WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

Fully completed and signed report cover forms and applicable fees are required before report review timelines are initiated by the Department of State Lands. Make checks payable to the Oregon Department of State Lands. To pay fees by credit card, go online at: https://apps.oregon.gov/DSL/EPS/program?key=4.

Attach this completed and signed form to the front of an unbound report or include a hard copy with a digital version (single PDF file of the report cover form and report, minimum 300 dpi resolution) and submit to: **Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279.** A single PDF of the completed cover from and report may be e-mailed to: **Wetland_Delineation@dsl.state.or.us**. For submittal of PDF files larger than 10 MB, e-mail DSL instructions on how to access the file from your ftp or other file sharing website.

Contact and Authorization Information

☒ Applicant ☒ Owner Name, Firm and Address:
Malibar Group, LLC
Attn: Roy Marvin
615 NW Territorial Road
Canby, OR 97013

Business phone #
Mobile phone # (optional)
E-mail: marvinfamily@aol.com

☐ Authorized Legal Agent, Name and Address (if different):

Business phone #
Mobile phone # (optional)
E-mail:

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

Typed/Printed Name: Roy marvin **Signature:**
Date: 11/05/2019 Special instructions regarding site access: ____

Project and Site Information

Project Name: Tax Lots 800, 802, and 803

Latitude: 45.341461 Longitude: -122.647849
decimal degree - centroid of site or start & end points of linear project

Proposed Use:
Residential

Tax Map # 3S 1E 2AC
Tax Lot(s) 800, 802, 803
Tax Map #
Tax Lot(s)

Project Street Address (or other descriptive location):
West of 9th Street and north of 1040 9th Street.

Township 3S Range 1E Section 2 QQ AC
Use separate sheet for additional tax and location information

City: West Linn County: Clackamas

Waterway: NA River Mile: NA

Wetland Delineation Information

Wetland Consultant Name, Firm and Address:
AKS Engineering & Forestry, LLC
Stacey Reed, PWS
12965 SW Herman Road, Suite 100
Tualatin, OR 97062

Phone # (503) 563-6151
Mobile phone # (if applicable)
E-mail: staceyr@aks-eng.com

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

Consultant Signature: Stacey Reed | Date: 11/14/2019

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

Wetland/Waters Present? ☒ Yes ☐ No Study Area size: 4.16 Total Wetland Acreage: 2.8200

Check Applicable Boxes Below

☐ R-F permit application submitted
☐ Mitigation bank site
☐ Industrial Land Certification Program Site
☐ Wetland restoration/enhancement project (not mitigation)
☐ Previous delineation/application on parcel
If known, previous DSL # ____

☒ Fee payment submitted $ 454
☐ Fee ($100) for resubmittal of rejected report
☐ Request for Reissuance. See eligibility criteria. (no fee)
DSL # ____ Expiration date ____
☒ LWI shows wetlands or waters on parcel
Wetland ID code WI-01

For Office Use Only

DSL Reviewer: ____ Fee Paid Date: ___/___/___ DSL WD # ____

Date Delineation Received: ___/___/___ Scanned: ☐ Electronic: ☐ DSL App.# ____

Tax Lots 800, 802, and 803 West Linn, Oregon Wetland Delineation Report

Date: October 8, 2019

Prepared for:
Malibar Group, LLC
Attn: Roy Marvin
615 NW Territorial Road
Canby, OR 97013

Prepared By:
AKS Engineering & Forestry, LLC
Haley Teach, MS, Natural Resource Specialist

Site Information:
Tax Lots 800, 802, and 803
T3S, R1W, Section 2AC
Clackamas County
West Linn, Oregon

AKS Project: #5926

AKS Engineering & Forestry
12965 SW Herman Road, Suite 100
Tualatin, OR 97062
(503) 563-6151

Table of Contents

Tables

Appendices

Introduction

This report was prepared by AKS Engineering & Forestry, LLC (AKS) in accordance with Oregon Administrative Rules (OAR) 141-090-0030 and OAR 141-090-0035 (1-17). The report describes the results of a wetland delineation conducted on Tax Lots 800, 802, and 803 of Clackamas County Assessor's Tax Map 3 1E 2AC, which is located near 1220 9th Street in West Linn, Clackamas County, Oregon (Figures 1-2 in Appendix A). The study area for the wetland delineation is ±4.16 acres and is shown in Figures 1-5 in Appendix A.

The on-site boundary of one palustrine forested/emergent (PFO/PEM) wetland (referred to as Wetland A) was delineated within the study area. Wetland A extends off-site to the west and to the east within the 9th Street right-of-way.

A. Landscape Setting and Land Use

The study area consists of an undeveloped field with a forested riparian area in the north. The site is mapped within the FEMA 100-year floodplain. The tax lot to the north (Tax lot 300) also contains a corral and fenced area, as it is currently used for horses. The wetland on-site features a dominant vegetative community of reed canary grass (*Phalaris arundinacea*, FACW), yellow-skunk-cabbage (*Lysichiton americanus*, OBL), field meadow-foxtail (*Alopecurus pratensis*, FAC), and creeping buttercup (*Ranunculus repens*, FAC). The forested portion of the study area is dominated by balsam poplar (*Populus balsamifera,* FAC), Pacific ninebark (*Physocarpus capitatus*, FACW), tall false rye grass (*Schedonorus arundinaceus*, FAC), and reed canary grass (FACW). A subtle depression (i.e. pond) is present in the northern portion of the delineated wetland. The pond was shallow (less than 5 feet deep) and lacked vegetation during the March 2017 site visit. Topography on-site consists of a slight, south-facing hillslope (less than 25% slope).

According to the Natural Resources Conservation Service (NRCS) Clackamas County Area Soil Survey Map, the following soil units are mapped within the study area, (Figure 3 in Appendix A):

- (Unit 19) Cloquato silt loam - Non-hydric; with 2% hydric Wapato inclusions and 1% hydric Aquolls inclusions in flood plains
- (Unit 84) Wapato silty clay loam - Hydric; with 6% hydric Cove inclusions and 4% hydric Humaquepts inclusions in flood plains

B. Site Alterations

Historical aerial images dating from 1994 to 2018 were obtained from Google Earth and are included in Appendix B. According to historical imagery, the study area has been undeveloped since as early as 1994. The pond appears to be present in the 1994 aerial and it does not seem to have changed the extent of the wetland on-site. Additionally, the pond appears to contain surface water year-round. No recent site alterations appear to have taken place since our March 27, 2017 site visit.

C. Precipitation Data and Analysis

Observed precipitation data were obtained from the National Weather Service (NWS) Portland station. The closest WETS (wetlands climate analysis) station to the project site is the Portland KGW-TV station.

According to the NWS Portland station, 0.01 inches of rainfall was received the day of the March 27, 2017 site visit and 4.08 inches were received for the two weeks prior. Observed water year-to-date (starting October 1, 2016) was 41.24 inches, which was 15.33 inches above normal. Table 1 shows antecedent rainfall according to the NWS Portland station for the three months prior to the March 27, 2017 site visit (raw data included in Appendix C).

Table 1. Precipitation Data – Monthly Averages Based on the Climate Period 1971-2000 (Inches)

Prior Months	Observed Precipitation (Inches)	Average	30% Chance Will Have		Condition Dry, Wet, Normal	Condition Value (1=dry, 2=normal, 3=wet)	Month Weight	Multiply Previous Two Columns
			Less Than	More Than				
March 1-27, 2017	7.01	4.44	3.39	5.17	Wet	3	3	9
February 2017	10.36	5.29	3.57	6.32	Wet	3	2	6
January 2017	4.13	6.05	3.77	7.31	Normal	2	1	2
							Sum	17
								Wetter
Rainfall of prior period was: **drier** than normal (sum is 6-9), **normal** (sum is 10-14), **wetter** than normal (sum is 15-18)								

According to the WETS table, monthly observed precipitation for the area was wetter than normal for the three months preceding the site visit. Rainfall was above average in February and March 2017. According to the Portland WETS table, the growing season is defined as January 30 to December 24. The March 27, 2017 site visit was conducted within the growing season.

D. Methods

The methodology used to determine the presence of wetlands followed the U.S. Army Corps of Engineers (USACE) *Wetland Delineation Manual* (Environmental Laboratory, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0). The National Wetland Plant List 2016* (Lichvar, 2016) was used to assign wetland indicator status for the appropriate region.

Field work was conducted on March 27, 2017 by AKS Senior Wetland Scientist, Stacey Reed, PWS, and Natural Resource Specialist, Haley Teach, MS. Soils, vegetation, and indicators of hydrology were recorded at five sample plot locations on standardized wetland determination data forms (Appendix D) to document site conditions.

Representative ground-level site photographs are included in Appendix E. References cited and literature used are listed at the end of this report.

F. Description of Wetland

Wetland A

Wetland A is a mostly a palustrine emergent (PEM) wetland, with a portion that is forested. An 18-inch concrete culvert under 9th Street connects hydrology associated with the wetland located east of 9th Street. A pond is present in the northwestern corner of Wetland A and is located entirely within the wetland boundary. The approximate location of the pond is shown on Figure 5. Scattered ponding was observed throughout the wetland during the March 27, 2017 site visit.

The PFO portion of the wetland was dominated by balsam poplar (FAC), Pacific ninebark (FACW), reed canary grass (FACW), and yellow-skunk-cabbage (OBL). The PEM portion of the wetland was dominated by field meadow-foxtail (FAC), reed canary grass (FACW) and creeping buttercup (FAC). Soils in the wetland met hydric soil indicators F3 Depleted Matrix and F6 Redox Dark Surface. Wetland plots (Plots 2 and 4) documented a groundwater table within the surface 12 inches during the March 2017 site visit. Plot 4 had ¼-inch of surface water present.

The wetland boundary was defined by a change in landform from a low-elevation concave wetland to a slightly higher elevation and convex landform north of the wetland. The change in landform coincided with a change in vegetation from hydrophytic species such as reed canary grass (FACW) and yellow-skunk-cabbage (OBL) in the wetland to tall false rye grass (FAC) and a blue grass (*Poa species*, FAC) in the upland. The upland north and south of Wetland A lacked hydric soil indicators. Upland plots (Plot 3 and Plot 5) contained a high groundwater table due to the above-average rainfall within the two weeks prior to the site visit.

F. Deviation from LWI

According to the City of West Linn's Local Wetland Inventory (LWI) map, a field-verified wetland and drainage are mapped on-site (Figure 4). Our study determined the mapped wetland and pond to be in the approximate location of Wetland A. A drainage was not observed on site.

G. Mapping Method

The locations for Plots 1-5 and the Wetland A boundary were flagged in the field and professionally land surveyed by AKS. Wetland A and Plots 1-5 are shown on Figure 5 Wetland Delineation Map in Appendix A.

H. Additional Information

Wetland A would likely be determined jurisdictional to DSL. The wetland continues off-site to the southwest and drains to the Willamette River (Waters of the U.S.); therefore, Wetland A would likely be determined jurisdictional to USACE.

I. Summary of Results and Conclusions

Table 2 below provides a summary of the on-site sizes of the features, hydrologic connections to other nearby waters, the Cowardin and HGM classifications for the wetlands, latitude and longitude of center of each feature, and our prediction of whether each feature would likely be determined jurisdictional by DSL or the USACE.

Table 2. Summary of Study Results and Conclusions

Potentially Jurisdictional Feature	Size (acres)	Cowardin Class	HGM Subclass / Flow Regime	Connection to Other Waters	DSL/ USACE Predicted Jurisdiction	Latitude and Longitude
Wetland A	2.82	PFO/PEM	Slope	Willamette River	DSL & USACE	45.341489 -122.647822

J. Required Disclaimer

This report documents the investigation, best professional judgment, and conclusions of the investigators. It is correct and complete to the best of our knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk, unless it has been reviewed and approved in writing by the Oregon Department of State Lands in accordance with Oregon Administrative Rules (OAR) 141-090-0005 through 141-090-0055.

K. List of Preparers

Haley Teach	Stacey Reed
Haley Teach, MS	Stacey Reed, PWS
Natural Resource Specialist	Senior Wetland Scientist
Fieldwork and Report Preparation	Fieldwork and Report QA/QC

Literature Cited and Referenced

Adams, P.R. 2001. Guidebook for Hydrogeomorphic (HGM)-based Assessment of Oregon Wetland and Riparian Sites: Statewide Classification and Profiles. Available at: http://www.oregon.gov/dsl/WW/Documents/hydro_guide_class.pdf.

Cowardin, L.M. 1979. *Classification of Wetland and Deepwater Habitats of the United States*. Jamestown (ND): Northern Prairie Wildlife Research Center, U.S. Fish and Wildlife Service.

Environmental Laboratory. 1987. Technical Report Y-87-1. In: *Corps of Engineers Wetlands Delineation Manual*. Vicksburg (MS): U.S. Army Engineer Waterways Experiment Station. Available at: http://el.erdc.usace.army.mil/wetlands/pdfs/wlman87.pdf.

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016*. The National Wetland Plant List: 2016 wetland ratings.* Phytoneuron 2016-30: 1-17. Published 28 April 2016. Available at: http://wetland-plants.usace.army.mil/nwpl_static/index.html.

National Weather Service (NWS). 2017. *Portland, OR*. Available at: http://www.weather.gov/climate/index.php?wfo=pqr.

Natural Resources Conservation Service (NRCS). 2006. *Hydric Soils List: Clackamas County, Oregon*. Washington (DC): U.S. Department of Agriculture.

Natural Resources Conservation Service (NRCS). 2014a. *Official soil series descriptions*. Washington (DC): U.S. Department of Agriculture. Available at: http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/soils/home/?cid=nrcs142p2_053587.

Natural Resources Conservation Service (NRCS). 2014b. *Web soil survey*. Washington (DC): U.S. Department of Agriculture. Available at: http://websoilsurvey.nrcs.usda.gov/app/.

Oregon Department of State Lands (DSL). 2014. *Administrative Rules for Wetland Delineation Report Requirements*. Salem (OR): Department of State Lands. Available at: http://arcweb.sos.state.or.us/pages/rules/oars_100/oar_141/141_090.html.

Oregon Map. 2019. *Tax lot map 3 1E 2AC.* Oregon: State of Oregon. Available at: http://www.ormap.net/.

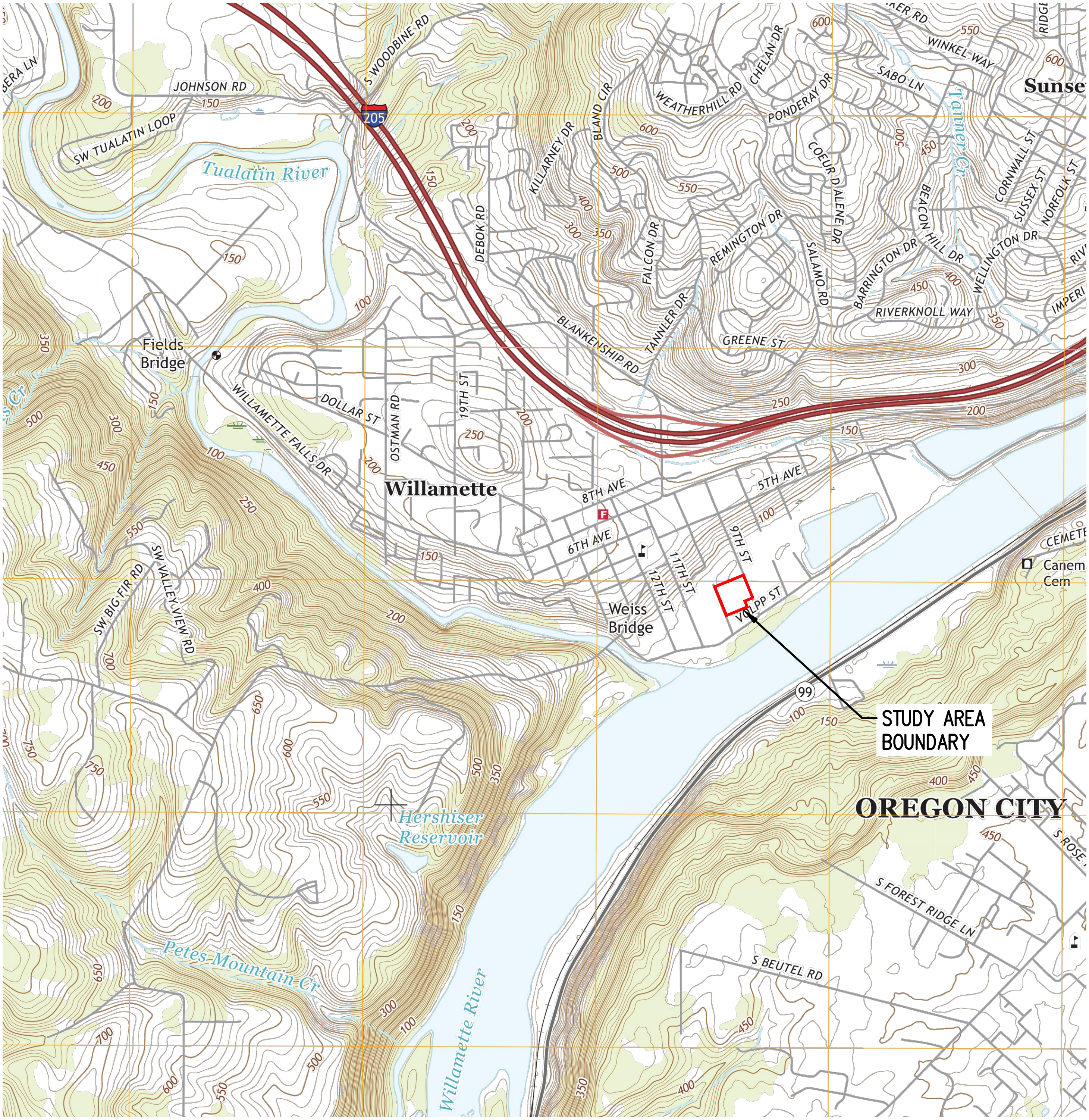
Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and W.D. Broderson, eds. 2002. *Field Book for Describing and Sampling Soils, Version 2.0*. Lincoln (NE): U.S. Department of Agriculture Natural Resources Conservation Service, National Soil Survey Center.

Vasilas, L.M., G.W. Hurt, and C.V. Noble, eds. 2010. *Field Indicators of Hydric Soils in the United States. A Guide for Identifying and Delineating Hydric Soils, Version 7.0, 2010.* Washington (DC): U.S. Department of Agriculture Natural Resources Conservation Service. Available at: http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1046970.pdf.

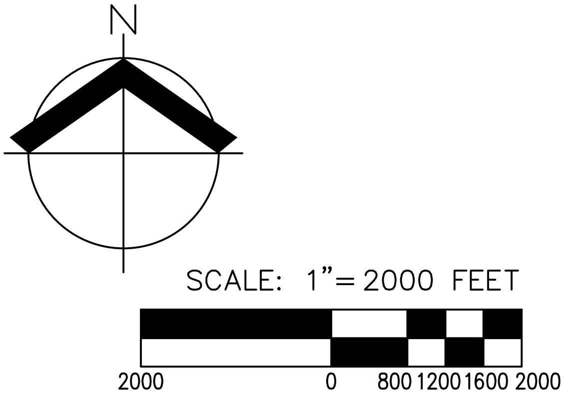
Wakeley, J.S., R.W. Lichvar, and C.V. Noble, eds. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0).* ERDC/EL TR-10-3. Vicksburg (MS): U.S. Army Engineer Research and Development Center, U.S. Army Corps of Engineers.

X-Rite. 2000. *Year 2000 revised washable edition, Munsell soil color charts*. Grand Rapids (MI): X-Rite.

Appendix A: Maps



USGS 7.5' TOPOGRAPHIC SERIES
QUADRANGLE: CANBY, OR (2017)



DATE: 08/28/2019

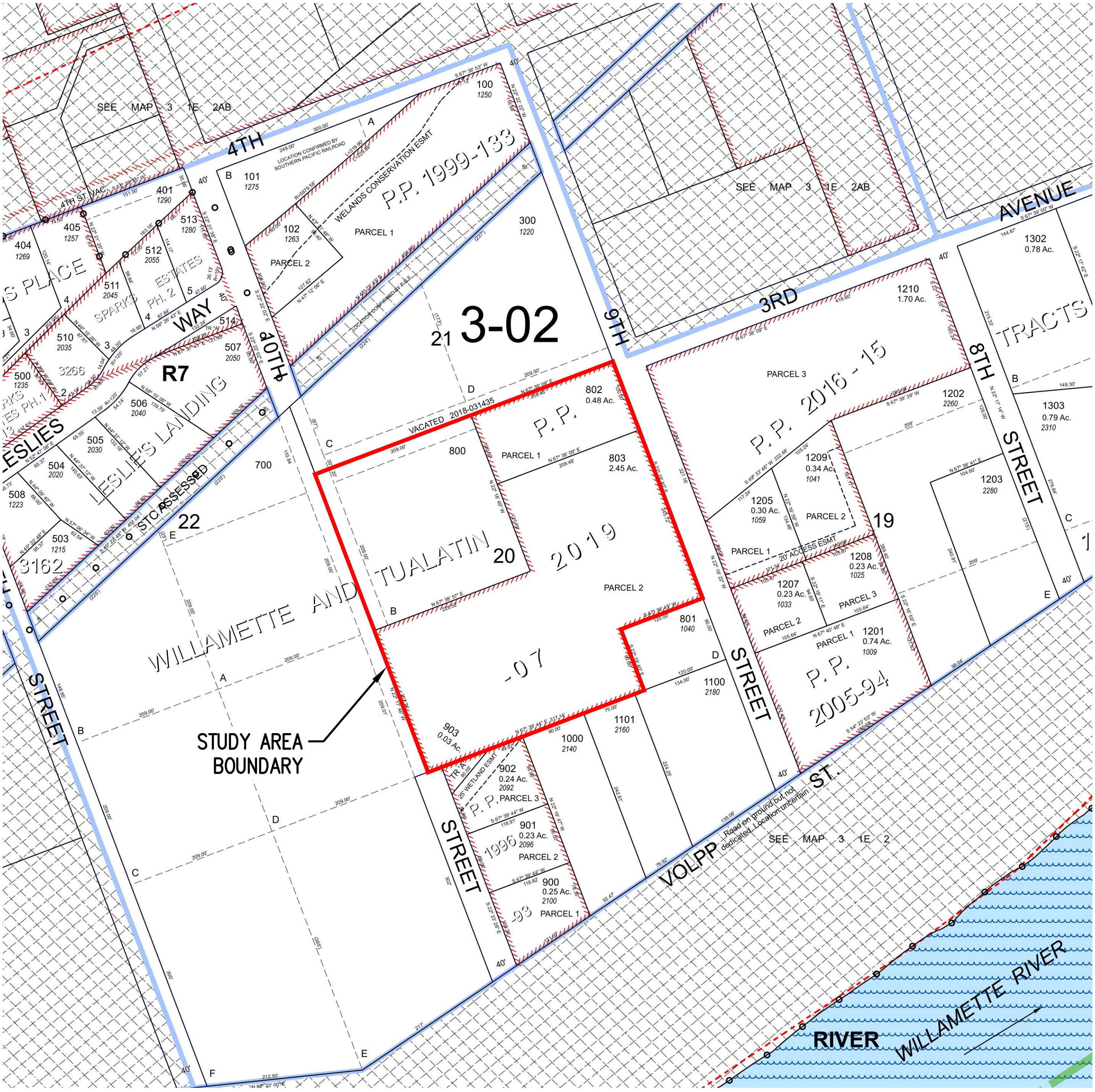
USGS VICINITY MAP
9TH STREET WEST LINN WETLAND DELINEATION REPORT

FIGURE
1

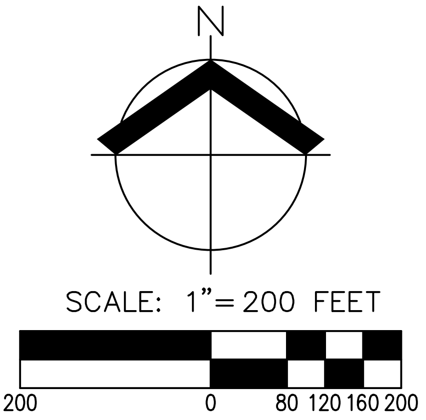
AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

DRWN: SAS
CHKD: SAR
AKS JOB:
5926

DWG: 5926 NR FIGURES | FIGURE 1



CLACKAMAS COUNTY
TAX LOTS 800, 802, & 803
TAX MAP 3 1E 2AC



DATE: 10/08/2019

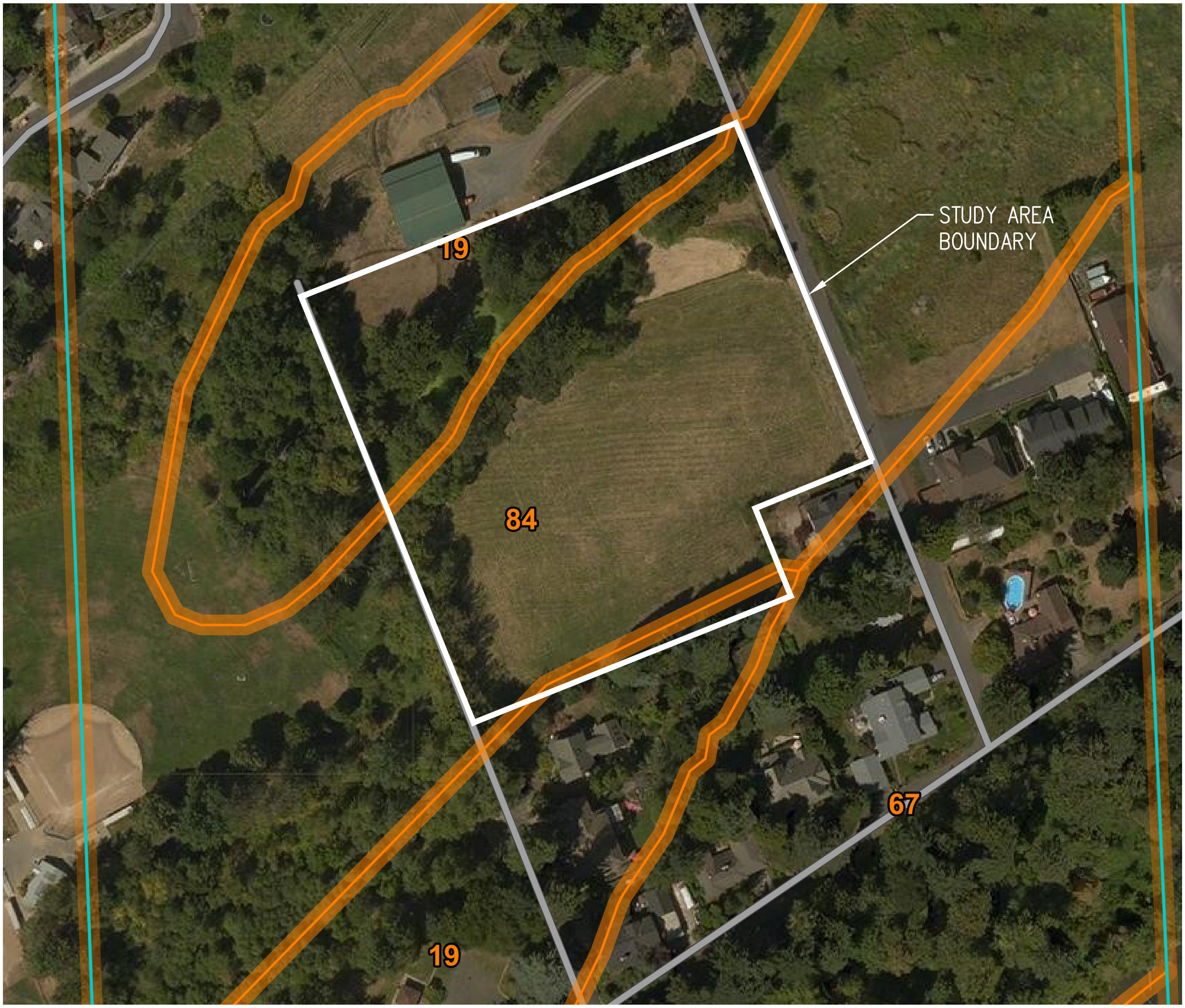
CLACKAMAS COUNTY ASSESSOR'S TAX MAP
9TH STREET WEST LINN WETLAND DELINEATION REPORT

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

FIGURE
2

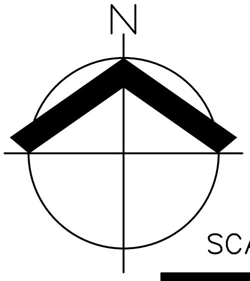
DRWN: SAS
CHKD: SAR
AKS JOB:
5926

DWG: 5926 NR FIGURES | FIGURE 2

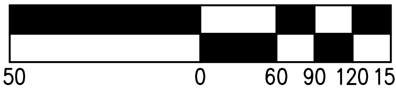


MAP UNIT SYMBOL	MAP UNIT NAME
19	CLOQUATO SILT LOAM; NON-HYDRIC
84	WAPATO SILTY CLAY LOAM; HYDRIC

NRCS WEB SOIL SURVEY FOR
CLACKAMAS COUNTY



SCALE: 1"=150 FEET



DATE: 08/28/2019

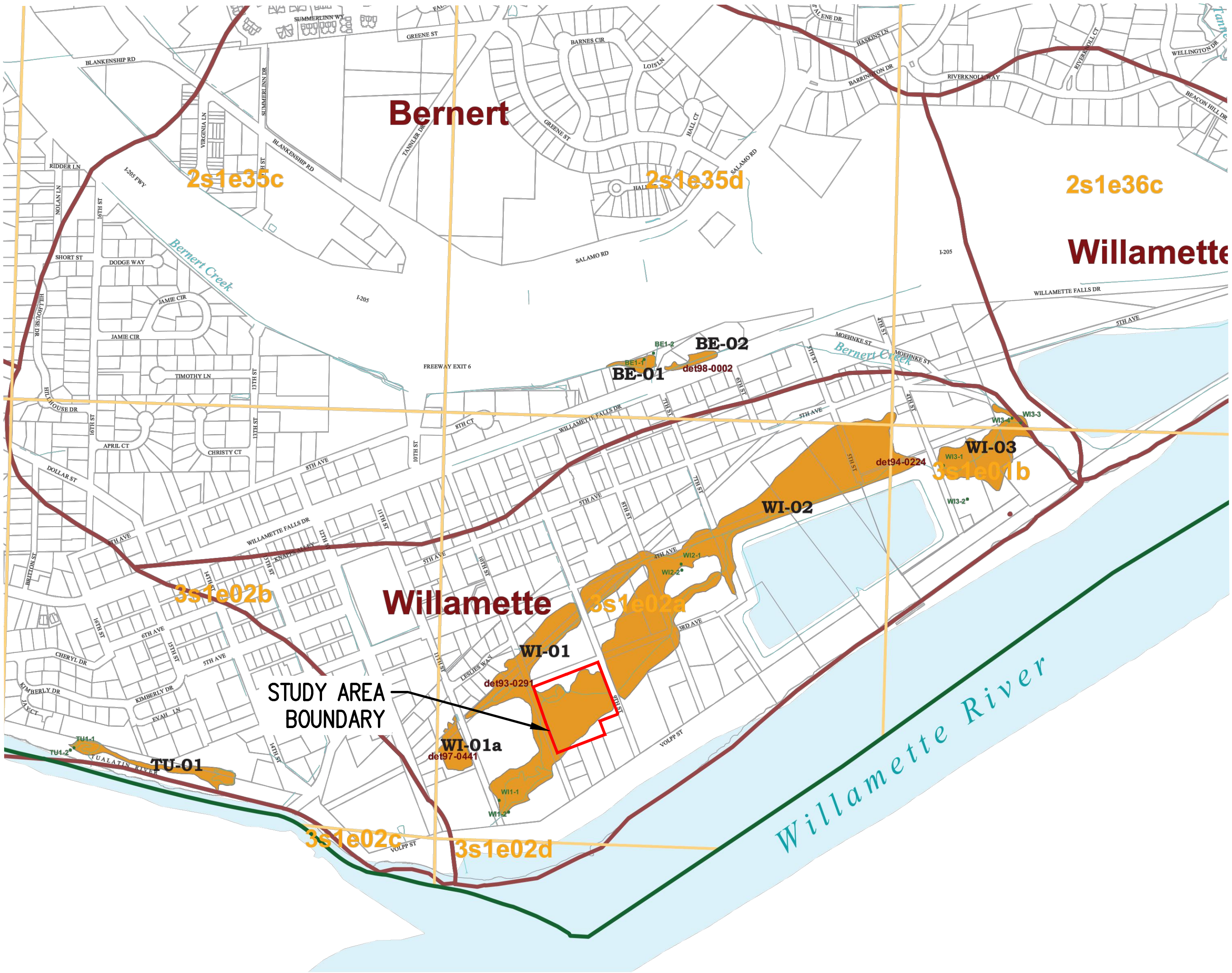
NRCS SOIL SURVEY MAP
9TH STREET WEST LINN WETLAND DELINEATION REPORT

FIGURE
3

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

DRWN: SAS
CHKD: SAR
AKS JOB:
5926

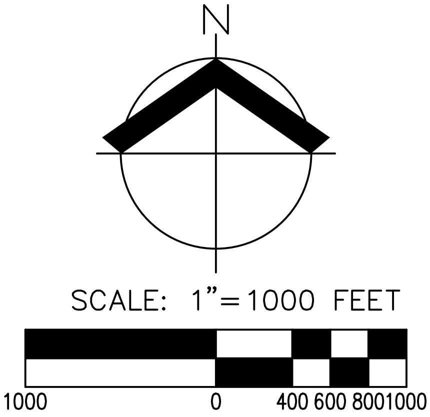
DWG: 5926 NR FIGURES | FIGURE 3



Legend

- 🟥 Wetlands, Winterbrook Planning 2002
- 🟧 Field Verified Wetlands, Winterbrook Planning 2002
- ● Possible Wetlands, Winterbrook Planning 2002
- • Wetland Sample Plots, Winterbrook Planning 2002
- ∧ Potential Jurisdictional Drainages, West Linn GIS 2002
- ☐ Potential Jurisdictional Waters, West Linn GIS 2002
- ☐ Taxlot COGO, West Linn GIS 2002
- ☐ Basin Boundaries, Winterbrook Planning 2002

CITY OF WEST LINN
LOCAL WETLAND INVENTORY (2004)



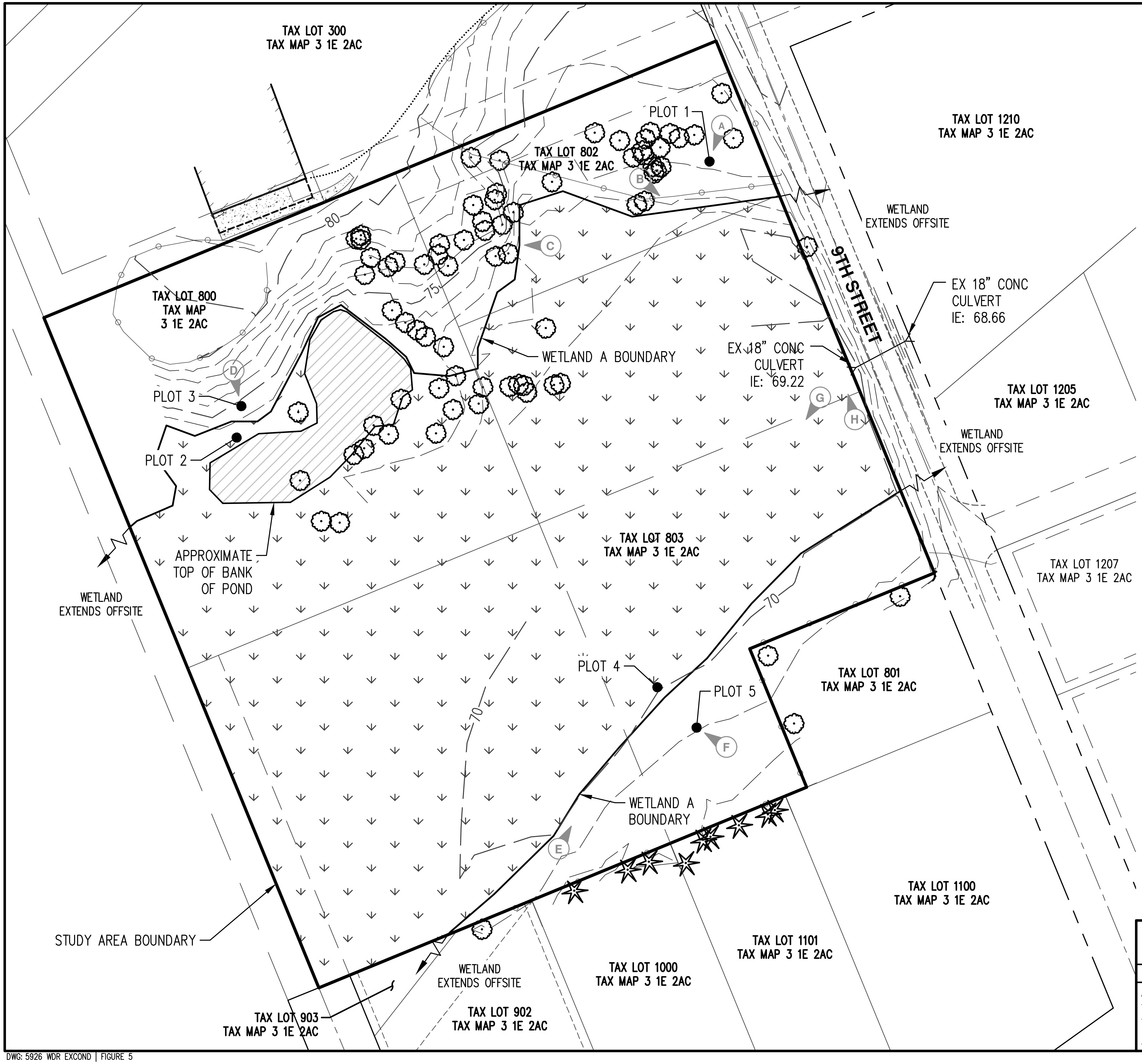
DATE: 08/28/2019

LOCAL WETLAND INVENTORY MAP
9TH STREET WEST LINN WETLAND DELINEATION REPORT

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS-ENG.COM

FIGURE
4

DRWN: SAS
CHKD: SAR
AKS JOB:
5926



LEGEND:

▭ ON–SITE WETLAND A AREA: 116,431 SF± (2.67 ACRES±)

▨ APPROXIMATE ON–SITE POND AREA WITHIN WETLAND A: 6,368 SF± (0.15 ACRES±)

TOTAL WETLAND A AREA INCLUDING POND: 122,799 SF± (2.82 ACRES±)

Ⓐ ▶ PHOTO POINT LOCATIONS

WETLAND BOUNDARY SHOWN WAS DELINEATED BY AKS ENGINEERING & FORESTRY, LLC. ON MARCH 27, 2017, AND WAS PROFESSIONALLY SURVEYED BY AKS ON MAY 16–17, 2017.

1–FOOT INTERVAL GROUND CONTOURS DERIVED FROM LAND SURVEY.

TREES WITH DIAMETER OF 6" AND GREATER ARE SHOWN. TREE DIAMETERS WERE MEASURED UTILIZING A DIAMETER TAPE AT BREAST HEIGHT. TREE INFORMATION IS SUBJECT TO CHANGE UPON ARBORIST INSPECTION.

N

SCALE: 1"=60 FEET

60 0 12 30 60

ORIGINAL PAGE SIZE: 11" x 17"

DATE: 10/08/2019

WETLAND DELINEATION MAP

9TH STREET WEST LINN WETLAND DELINEATION REPORT

FIGURE
5

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151 WWW.AKS–ENG.COM

DRWN: JRI
CHKD: SAR
AKS JOB:
5926

DWG: 5926 WDR EXCOND | FIGURE 5

Appendix B: Historical Aerial Photographs

AKS Job #5926

June 1994

AKS Job #5926

May 2002

AKS Job #5926

March 2005

AKS Job #5926

May 2010

AKS Job #5926

December 2013

AKS Job #5926

May 2017


AKS Job #5926
July 2018
Legend
1220 9th St
9th St
Volpp St
Google Earth
© 2018 Google
200 ft
N

Appendix C: Precipitation Data

Explanation of the Preliminary Monthly Climate Data (F6) Product

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

WFO Monthly/Daily Climate Data

```
532
CXUS56 KPQR 090229
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

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

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

 1  40  32  36  -4  29   0 0.05    T    0  7.8 17 210   M    M   8 1      22 210
 2  35  29  32  -8  33   0 0.00  0.0    0 19.4 28  90   M    M   8        36  90
 3  34  27  31  -9  34   0 0.00  0.0    0 23.1 35  90   M    M   1        45  80
 4  33  27  30 -10  35   0 0.00  0.0    0 21.2 33  80   M    M   5        48  70
 5  35  17  26 -14  39   0 0.00  0.0    0  7.1 15 120   M    M   0        18 130
 6  34  17  26 -14  39   0 0.00  0.0    0 12.7 20 110   M    M   1        24 130
 7  30  24  27 -13  38   0 0.02  0.4    T 17.6 36 100   M    M  10 16     44 100
 8  34  28  31 -10  34   0 0.53  0.0    0 15.2 32 100   M    M  10 16     42 100
 9  41  30  36  -5  29   0 0.28  0.0    0  9.8 17 190   M    M  10 16     23 180
10  38  31  35  -6  30   0 0.65  6.5    0 13.3 28 100   M    M  10 1      35 100
11  32  26  29 -12  36   0 0.07  1.5    7 12.2 24  90   M    M  10 1      29  90
12  33  18  26 -15  39   0 0.00  0.0    6  5.0 13 130   M    M   4        15 130
13  29  11  20 -21  45   0 0.00  0.0    5  6.8 17 120   M    M   7 1      21 130
14  29  19  24 -17  41   0 0.00  0.0    5 14.2 23 120   M    M   2        29 110
15  28  19  24 -17  41   0 0.00  0.0    4 10.9 23 140   M    M   4        25 140
16  29  22  26 -16  39   0 0.00  0.0    4 14.2 22 130   M    M   8        26 130
17  34  24  29 -13  36   0 0.70  0.0    3 18.2 32 120   M    M   9 16     36 110
18  47  33  40  -2  25   0 1.06  0.0    3 15.0 30 110   M    M  10 1      35 110
19  52  35  44   2  21   0    T  0.0    T 11.9 23 200   M    M   8        28 210
```

```
20  42  37  40  -2  25   0 0.26  0.0    0 11.4 20 120   M    M  10 1      23 120
21  47  36  42   0  23   0 0.33  0.0    0 11.6 22 110   M    M   8 1      25 120
22  46  36  41  -1  24   0 0.15  0.0    0  9.9 23  80   M    M   9 1      26  70
23  50  32  41  -1  24   0    T  0.0    0  5.8 15  80   M    M   7        18  90
24  41  26  34  -8  31   0    T  0.0    0  2.7  8 290   M    M   6 1      10 290
25  45  35  40  -2  25   0 0.01    M    0  2.7  9 100   M    M  10 1      10 100
26  48  35  42   0  23   0    T  0.0    0  4.2 10 110   M    M   8 1      11 110
27  48  29  39  -3  26   0 0.00  0.0    0  6.7 16 120   M    M   5 12     20 110
28  44  31  38  -4  27   0 0.00  0.0    0  8.0 17 120   M    M   7        20 110
29  46  33  40  -2  25   0 0.01  0.0    0  7.5 17 110   M    M   9 1      21 120
30  44  35  40  -3  25   0    T  0.0    0  4.0 12 110   M    M  10 1      13 120
31  41  33  37  -6  28   0 0.01  0.0    0  7.9 16  80   M    M   8 1      21  70
================================================================================
SM 1209  867       969   0  4.13     8.4 338.0          M      222
================================================================================
AV 39.0 28.0                              10.9 FASTST   M    M   7    MAX(MPH)
                                 MISC ---->  # 36 100              # 48   70
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

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

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

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

AVERAGE MONTHLY: 33.5   TOTAL FOR MONTH:   4.13    1 = FOG OR MIST
DPTR FM NORMAL:  -7.9   DPTR FM NORMAL:   -0.75    2 = FOG REDUCING VISIBILITY
HIGHEST:    52 ON 19    GRTST 24HR  1.06 ON 18-18      TO 1/4 MILE OR LESS
LOWEST:     11 ON 13                               3 = THUNDER
                        SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                        TOTAL MONTH:   8.4 INCHES  5 = HAIL
                        GRTST 24HR   6.5 ON 10-10  6 = FREEZING RAIN OR DRIZZLE
                        GRTST DEPTH:   7 ON 11     7 = DUSTSTORM OR SANDSTORM:
                                                       VSBY 1/2 MILE OR LESS
                                                   8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                   X = TORNADO
MAX 32 OR BELOW:   6    0.01 INCH OR MORE:  14
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:   8
MIN 32 OR BELOW:  21    0.50 INCH OR MORE:   4
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   1
```

```
[HDD (BASE 65) ]
TOTAL THIS MO.   969    CLEAR  (SCALE 0-3)   4
DPTR FM NORMAL   237    PTCLDY (SCALE 4-7)  13
TOTAL FM JUL 1  2533    CLOUDY (SCALE 8-10) 14
DPTR FM NORMAL    69

[CDD (BASE 65) ]
TOTAL THIS MO.     0
DPTR FM NORMAL     0    [PRESSURE DATA]
TOTAL FM JAN 1     0    HIGHEST SLP M ON M
DPTR FM NORMAL     0    LOWEST  SLP 29.09 ON 20

[REMARKS]
#FINAL-01-17#
```

Explanation of the Preliminary Monthly Climate Data (F6) Product

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

WFO Monthly/Daily Climate Data

```
039
CXUS56 KPQR 011200
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

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

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

 1  41  35  38  -5  27   0 0.00  0.0    0 27.9 38 100   M    M   7        50  80
 2  39  32  36  -7  29   0    T    T    0 29.5 40  90   M    M   9        51  90
 3  34  31  33 -10  32   0 0.55  0.0    0 14.5 24 100   M    M  10 146    30 110
 4  52  33  43   0  22   0 0.59  0.0    0 13.6 21 200   M    M  10 1      26 200
 5  46  34  40  -3  25   0 2.19    T    0  5.5 16 230   M    M  10 1      21 230
 6  44  33  39  -4  26   0 0.04  0.0    0  8.1 22 200   M    M   8 1      28 190
 7  39  32  36  -7  29   0 0.08    T    0  6.0 14 120   M    M  10 12     15 120
 8  37  35  36  -7  29   0 1.01  0.0    0 12.6 26 110   M    M  10 1      31 120
 9  59  37  48   5  17   0 0.96  0.0    0 14.8 26 220   M    M   8 13     35 210
10  51  36  44   1  21   0 0.09  0.0    0  9.5 22 240   M    M   8        29 240
11  53  35  44   1  21   0    T  0.0    0  1.5  7 120   M    M   7         8 130
12  51  31  41  -2  24   0 0.00  0.0    0  3.4 10 290   M    M   8 12     13 280
13  53  29  41  -3  24   0 0.00  0.0    0 10.0 21 120   M    M   1 1      25 120
14  50  33  42  -2  23   0 0.01  0.0    0 10.8 28 110   M    M   6        33 120
15  43  38  41  -3  24   0 0.98  0.0    0 17.2 25 120   M    M  10 1      32 120
16  49  41  45   1  20   0 1.70  0.0    0 10.1 22 110   M    M  10 1      30 250
17  57  40  49   5  16   0    T  0.0    0  3.5 13  90   M    M   8 12     16  70
18  46  40  43  -1  22   0 0.25  0.0    0  6.0 13 110   M    M  10 1      16 110
19  51  40  46   2  19   0 0.27  0.0    0 10.5 24 180   M    M   9 1      38 180
```

```
20  50  40  45   1  20   0 0.81  0.0    0  6.5 18 210   M    M  10 1      23 210
21  48  36  42  -2  23   0 0.52  0.0    0  3.7 17 190   M    M   9 1      21 190
22  45  31  38  -6  27   0    T  0.0    0  2.4 13 300   M    M   9 12     16 300
23  44  32  38  -7  27   0    T    T    0  3.6 10 300   M    M   8 18     13 300
24  41  32  37  -8  28   0 0.07  0.0    0  6.1 14 110   M    M   9 1      17 100
25  48  31  40  -5  25   0 0.05  0.0    0  3.0  9 160   M    M   8 1      11 310
26  43  35  39  -6  26   0 0.14  0.0    0  8.8 17 180   M    M  10 1      23 180
27  45  36  41  -4  24   0 0.03  0.0    0  7.7 18 210   M    M  10        23 210
28  50  36  43  -3  22   0 0.02  0.0    0  5.3 15 240   M    M   8        20 240
================================================================================
SM 1309  974       672   0 10.36    T    262.1          M      240
================================================================================
AV 46.8 34.8                               9.4 FASTST   M    M   9    MAX(MPH)
                                 MISC ---->  # 40  90               # 51   90
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

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

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

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

AVERAGE MONTHLY: 40.8   TOTAL FOR MONTH:  10.36    1 = FOG OR MIST
DPTR FM NORMAL:  -3.0   DPTR FM NORMAL:    6.70    2 = FOG REDUCING VISIBILITY
HIGHEST:    59 ON  9    GRTST 24HR  2.19 ON  5- 5      TO 1/4 MILE OR LESS
LOWEST:     29 ON 13                               3 = THUNDER
                        SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                        TOTAL MONTH:    T          5 = HAIL
                        GRTST 24HR    T  ON 23-23  6 = FREEZING RAIN OR DRIZZLE
                        GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                                       VSBY 1/2 MILE OR LESS
                                                   8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                   X = TORNADO
MAX 32 OR BELOW:   0    0.01 INCH OR MORE:  20
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:  12
MIN 32 OR BELOW:   9    0.50 INCH OR MORE:   9
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   3

[HDD (BASE 65) ]
TOTAL THIS MO.   672    CLEAR  (SCALE 0-3)   1
```

```
DPTR FM NORMAL    78    PTCLDY (SCALE 4-7)   9
TOTAL FM JUL 1  3205    CLOUDY (SCALE 8-10) 18
DPTR FM NORMAL   147

[CDD (BASE 65) ]
TOTAL THIS MO.     0
DPTR FM NORMAL     0    [PRESSURE DATA]
TOTAL FM JAN 1     0    HIGHEST SLP 30.54 ON 11
DPTR FM NORMAL     0    LOWEST  SLP 29.22 ON  5

[REMARKS]
#FINAL-02-17#
```

Explanation of the Preliminary Monthly Climate Data (F6) Product

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

WFO Monthly/Daily Climate Data

```
624
CXUS56 KPQR 011200
CF6PDX
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

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

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

 1  51  40  46   0  19   0    T  0.0    0  9.6 17 200   M    M  10        21 200
 2  51  36  44  -2  21   0 0.06  0.0    0  8.8 17 200   M    M   9        20 190
 3  53  43  48   2  17   0 0.11  0.0    0 12.7 24 200   M    M  10 1      32 170
 4  47  35  41  -5  24   0 0.14  0.0    0  7.6 23 200   M    M   9 1      27 210
 5  47  36  42  -4  23   0 0.09  0.0    0 14.2 26 200   M    M   8 1      35 220
 6  46  34  40  -6  25   0 0.11    T    0 11.1 21 230   M    M   8 13     26 210
 7  50  40  45  -2  20   0 0.49  0.0    0 11.3 20 200   M    M   9 1      26 200
 8  47  41  44  -3  21   0 0.43  0.0    0  2.9  8 280   M    M  10 1      11 290
 9  58  41  50   3  15   0 0.53  0.0    0  7.3 23 200   M    M  10 1      31 210
10  60  44  52   5  13   0    T  0.0    0  8.4 23 220   M    M   7 1      29 240
11  58  39  49   2  16   0 0.30  0.0    0  8.0 21 230   M    M   9 1      26 220
12  61  46  54   6  11   0 0.00  0.0    0  6.4 15 120   M    M   8        18 120
13  53  47  50   2  15   0 0.73  0.0    0  8.7 21 120   M    M  10 1      24 120
14  57  49  53   5  12   0 0.62  0.0    0 10.7 22 120   M    M   8 1      26 120
15  57  45  51   3  14   0 0.51  0.0    0 12.8 31 200   M    M  10 1      40 210
16  55  37  46  -2  19   0 0.00  0.0    0  3.9 10 300   M    M   5        13 300
17  48  37  43  -5  22   0 0.35    M    0  8.2 24 120   M    M   9 1      29 120
18  55  36  46  -3  19   0 0.36    M    0  8.2 21 120   M    M   8 1      27 120
19  57  32  45  -4  20   0 0.00  0.0    0  4.1 13 310   M    M   6        16 300
```

```
20  55  38  47  -2  18   0 0.11  0.0    0 11.5 25 100   M    M   8        32 100
21  57  44  51   2  14   0 0.23  0.0    0 12.8 30 110   M    M   9 13     35 100
22  55  42  49   0  16   0 0.08  0.0    0 10.2 22 230   M    M   7 58     28 190
23  58  41  50   1  15   0 0.32  0.0    0  9.0 16 120   M    M   9 1      21 120
24  53  46  50   1  15   0 0.77    M    0 10.8 20 210   M    M   9 1      25 200
25  55  41  48  -2  17   0    T    M    0  6.5 14 230   M    M   8        18 200
26  50  44  47  -3  18   0 0.66    M    0  9.1 18 110   M    M  10 1      23 120
27  55  45  50   0  15   0 0.01    M    0  9.8 22 220   M    M   9        27 220
28  59  46  53   3  12   0 0.06    M    0  9.2 20 240   M    M  10        27 220
29  58  46  52   2  13   0 0.19    M    0 10.4 22 180   M    M   9 1      28 180
30  57  43  50   0  15   0    T    M    0  9.0 18 300   M    M   8        22 300
31  58  39  49  -1  16   0 0.00  0.0    0  3.3 12 110   M    M   7        13 110
================================================================================
SM 1681 1273       530   0  7.26    T    276.5          M      266
================================================================================
AV 54.2 41.1                               8.9 FASTST   M    M   9    MAX(MPH)
                                 MISC ---->  # 31 200               # 40  210
================================================================================
NOTES:
# LAST OF SEVERAL OCCURRENCES

COLUMN 17 PEAK WIND IN M.P.H.

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

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

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

AVERAGE MONTHLY: 47.7   TOTAL FOR MONTH:   7.26    1 = FOG OR MIST
DPTR FM NORMAL:  -0.6   DPTR FM NORMAL:    3.58    2 = FOG REDUCING VISIBILITY
HIGHEST:    61 ON 12    GRTST 24HR  0.77 ON 24-24      TO 1/4 MILE OR LESS
LOWEST:     32 ON 19                               3 = THUNDER
                        SNOW, ICE PELLETS, HAIL    4 = ICE PELLETS
                        TOTAL MONTH:    T          5 = HAIL
                        GRTST 24HR    T  ON  6- 6  6 = FREEZING RAIN OR DRIZZLE
                        GRTST DEPTH:   0           7 = DUSTSTORM OR SANDSTORM:
                                                       VSBY 1/2 MILE OR LESS
                                                   8 = SMOKE OR HAZE
[NO. OF DAYS WITH]      [WEATHER - DAYS WITH]      9 = BLOWING SNOW
                                                   X = TORNADO

MAX 32 OR BELOW:   0    0.01 INCH OR MORE:  23
MAX 90 OR ABOVE:   0    0.10 INCH OR MORE:  18
MIN 32 OR BELOW:   1    0.50 INCH OR MORE:   6
MIN  0 OR BELOW:   0    1.00 INCH OR MORE:   0
```

```
[HDD (BASE 65) ]
TOTAL THIS MO.   530    CLEAR  (SCALE 0-3)   0
DPTR FM NORMAL     8    PTCLDY (SCALE 4-7)  10
TOTAL FM JUL 1  3735    CLOUDY (SCALE 8-10) 21
DPTR FM NORMAL   155

[CDD (BASE 65) ]
TOTAL THIS MO.     0
DPTR FM NORMAL     0    [PRESSURE DATA]
TOTAL FM JAN 1     0    HIGHEST SLP 30.50 ON  1
DPTR FM NORMAL     0    LOWEST  SLP 29.55 ON  4

[REMARKS]
#FINAL-03-17#
```

WETS Table

WETS Station: PORTLAND KGW TV, OR

Requested years: 1971 - 2000

Month	Avg Max Temp	Avg Min Temp	Avg Mean Temp	Avg Precip	30% chance precip less than	30% chance precip more than	Avg number days precip 0.10 or more	Avg Snowfall
Jan	46.2	36.4	41.3	6.05	3.77	7.31	12	1.2
Feb	50.6	38.5	44.5	5.29	3.57	6.32	12	0.9
Mar	56.2	40.7	48.5	4.44	3.39	5.17	12	0.1
Apr	61.4	43.9	52.6	3.13	2.18	3.71	9	0.0
May	67.3	48.6	57.9	2.58	1.59	3.12	8	0.0
Jun	73.2	53.1	63.2	1.59	0.85	1.94	4	0.0
Jul	79.1	57.0	68.1	0.78	0.35	0.93	2	0.0
Aug	79.5	57.4	68.5	1.02	0.32	1.17	2	0.0
Sep	74.9	54.1	64.5	1.75	0.82	2.06	4	0.0
Oct	63.4	47.5	55.5	3.39	1.85	4.14	7	0.0
Nov	52.2	41.4	46.8	6.59	4.40	7.90	14	0.4
Dec	46.1	36.8	41.4	6.46	4.43	7.71	13	0.9
Annual:					38.24	48.02		
Average	62.5	46.3	54.4	-	-	-	-	-
Total	-	-	-	43.07			100	3.5

GROWING SEASON DATES

Years with missing data:	24 deg = 6	28 deg = 6	32 deg = 6
Years with no occurrence:	24 deg = 15	28 deg = 4	32 deg = 0
Data years used:	24 deg = 24	28 deg = 24	32 deg = 24
Probability	24 F or higher	28 F or higher	32 F or higher
50 percent *	No occurrence	1/30 to 12/24: 328 days	2/20 to 11/29: 282 days
70 percent *	No occurrence	1/19 to 1/4: 350 days	2/12 to 12/8: 299 days

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

STATS TABLE - total precipitation (inches)

Yr	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annl
1973								1.66	3.76	3.81	13.46	9.88	32.57
1974	9.07	4.85	6.43	2.64	2.17	0.86	2.27	0.14	0.15	2.22	7.13	6.93	44.86
1975	8.83	6.03	5.02	2.48	1.97	1.22	0.41	2.84	T	5.67	4.71	6.74	45.92
1976	6.07	5.41	3.41	2.63	1.74	0.92	0.75	2.50	0.93	1.73	1.13	1.36	28.58
1977	1.26	2.71	4.10	0.63	4.39	0.99	1.05	3.57	4.69	3.51	5.87		32.77
1978	5.93	3.81	1.73	3.53	3.70	1.41	1.17	2.36	3.58	0.48	4.08	2.85	34.63
1979	3.04	7.00	2.58	2.83	2.18	0.39	0.25				4.58	7.35	30.20
1980	8.88	4.51	4.45	3.11	2.16	2.77	0.18	0.21	2.06	1.25	7.09	10.27	46.94

1981	1.67	3.84	2.74	3.11	1.81	4.03	0.21	0.04	2.76	4.57	5.99	10.34	41.11
1982	8.76	7.10	3.61	4.89	0.59	0.99	0.83	1.92	3.33	4.96	3.84	9.40	50.22
1983	7.71	9.05	7.31	2.44	2.38	2.04	2.94	2.01	0.47	1.92	10.73	5.78	54.78
1984	2.38	4.05	4.32	4.38	4.09	4.48	0.00	0.08	1.99	4.60	10.69	3.38	44.44
1985	0.27		4.06	1.14	0.88	2.28	0.12	0.99	2.71	3.05		2.20	17.70
1986	5.87	7.15	2.78	1.32	2.33	0.32	1.86	0.04	2.96	2.09	6.36	4.23	37.31
1987	7.33	2.99	6.50	2.45	1.88	0.20	1.56	0.46	0.36	0.28	1.97	9.19	35.17
1988	6.31	1.38	4.08	5.08	2.97	2.20	0.26	0.11	1.66	0.33	8.34	3.04	35.76
1989	4.43	2.64	8.74	1.63	3.53	0.97	1.01	1.11	1.13	1.68	4.46	3.82	35.15
1990	8.51	5.44	2.68	3.01		1.89	1.10	1.04	0.52	5.87	4.88	3.74	38.68
1991	3.66	4.92	4.52	4.02	4.13	2.43	0.12	0.93	0.10	2.17	7.44	4.88	39.32
1992	5.04	4.58	1.78	5.06	0.13	0.56	0.45	0.25	1.33	3.17	5.45	6.84	34.64
1993	3.60	0.96	5.20	6.31	4.02	1.94	1.42	0.18	T	1.44	1.79	6.86	33.72
1994	4.95	6.11	2.72	2.31	1.23	1.10	0.07	0.14	1.63	9.02	7.49	6.53	43.30
1995	7.44	5.22	5.02	4.19	1.13	2.29	0.98	1.69	2.14	M4.35	11.71	7.84	54.00
1996	8.56	12.43	4.46	5.95	4.84	0.09	M0.49	0.50	3.22	6.17	9.72	16.28	72.71
1997	8.86	2.14	8.24	3.78	2.46	1.62	0.64	1.55	2.84	7.58	5.19	4.01	48.91
1998	M7.76	6.80	4.21	1.49	5.18	1.61	0.34	T	1.02	3.57	13.36	M9.21	54.55
1999	8.97	11.39	5.67	M1.61	M2.59	M2.45	0.38	M1.12	0.19	2.89	7.67	7.67	52.60
2000	8.08	4.96	3.62	2.39	2.51	M0.90	M0.25	0.15	1.76	3.19	M2.91	M3.85	34.57
2001	1.99	1.79	3.73	3.09	1.12	1.40	0.46	0.87	0.66	4.37	M7.44	M7.83	34.75
2002	8.03	4.92	5.40	3.60	M1.57	2.19	M0.19	0.01	1.31	0.32	2.49	10.48	40.51
2003	9.14	3.17	M5.16	7.03	1.60	M0.11	T	0.06	M1.50	2.30	5.38	10.43	45.88
2004	M5.02	4.86	2.01	2.16	1.17	1.03	T	3.20	1.76	3.27	2.46	4.58	31.52
2005	M2.02	M0.99	4.73	4.44	5.06	M2.03	M0.39	0.22	1.37	4.26	6.54	M10.20	42.25
2006	12.05	2.38	3.63	2.52	M0.48	1.12	0.19	0.07	1.12	1.83	15.56	M3.80	44.75
2007	M1.88	M3.19	M1.58	M0.42	M1.06	M0.87	M0.54	M0.51	M0.41	M1.15	M3.80	M7.52	22.93
2008	M5.81	M2.41	M3.65	M2.07	M1.22	M1.00	MT	M1.17	M0.30	M0.58	M4.14	M2.45	24.80
2009	M5.03	M1.42	M1.91	M1.19	M3.03	M1.05	M0.22	M0.77	M1.63	3.54	7.21	4.99	31.99
2010	6.68	3.96	5.62	3.99	4.63	4.79	0.30	MT	M2.94	5.16	7.39	10.23	55.69
2011	5.13	5.79	7.59	5.37	3.25	0.87	1.36	0.10	0.70	2.64	8.32	3.37	44.49
2012	M8.74	3.71	9.95	3.85	3.21	2.78	0.51	T	0.01	6.59	8.53	9.14	57.02
2013	3.11	1.51	2.37	2.59	5.26	M1.43	0.00	0.63	6.85	0.93	3.52	1.77	29.97
2014	3.34	5.95	7.58	4.51	2.79	1.84	0.92	0.13	1.05	7.26	3.58	6.78	45.73

2015	3.69	4.11	5.12	2.61	0.64	0.44	0.60	0.78	0.87	4.39	5.61	18.61	47.47
2016	8.93	4.87	5.71	2.46	1.30	M1.11	0.75	0.16	1.26	10.11	8.74	M6.12	51.52
2017	5.65	12.18	8.40	4.61									30.84
Notes: Data missing in any month have an "M" flag. A "T" indicates a trace of precipitation.													
Data missing for all days in a month or year is blank.													
Creation date: 2016-07-22													

Appendix D: Wetland Determination Data Forms

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

Project/Site: Tax Lot 800, 802, and 803 City/County: West Linn/Clackamas Sampling Date: 3/27/2017
Applicant/Owner: Malibar Group LLC Retierment Plan State: OR Sampling Point: **1**
Investigator(s): Stacey Reed and Haley Teach Section, Township, Range: Section 2AC, T.3., R.1E.
Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): None Slope (%): <3%
Subregion (LRR): A, Northwest Forests and Coast Lat: 45.342061 Long: -122.647551 Datum: ____
Soil Map Unit Name: (Unit 84) Wapato silty clay loam NWI classification: ____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are “Normal Circumstances” present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Precipitation:
According to the NWS Portland station, 0.01 inches of rainfall was received on the day of the site visit and 6.92 inches within the two weeks prior. Climatic conditions are considered wetter than normal for the three months prior.

Remarks:
Plot is located in a fenced, horse-grazed area.

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot Size: 30' r or ______)			
1. *Populus balsamifera*	40%	Yes	FAC
2. *Salix lucida*	10%	Yes	FACW
3.			
4.			
	50% = Total Cover		
Sapling/Shrub Stratum (Plot Size: 10' r or ______)			
1. *Rubus armeniacus*	5%	Yes	FAC
2.			
3.			
4.			
5.			
	5% = Total Cover		
Herb Stratum (Plot Size: 5' r or ______)			
1. *Schedonorus arundinaceus*	75%	Yes	FAC
2. *Taraxacum officinale*	10%	No	FACU
3. *Geranium molle*	10%	No	NOL
4. *Dactylis glomerata*	5%	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100% = Total Cover		
Woody Vine Stratum (Plot Size: 10' r or ______)			
1.			
2.			
	0% = Total Cover		

% Bare Ground in Herb Stratum 0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	120	x 3 =	360
FACU species	15	x 4 =	60
UPL species	10	x 5 =	50
Column Totals:	155	(A)	490 (B)

Prevalence Index = B/A = 3.16

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: 1

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12+	10YR 3/3	100					gr SiL	Angular gravels

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Remarks:

Soils are moist. No ponding in the area despite heavy rains the day before.

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

Project/Site: Tax Lot 800, 802, and 803 City/County: West Linn/Clackamas Sampling Date: 3/27/2017
Applicant/Owner: Malibar Group LLC Retierment Plan State: OR Sampling Point: **2**
Investigator(s): Stacey Reed and Haley Teach Section, Township, Range: Section 2AC, T.3., R.1E.
Landform (hillslope, terrace, etc.): Toeslope Local relief (concave, convex, none): Concave Slope (%): <3%
Subregion (LRR): A, Northwest Forests and Coast Lat: 45.341576 Long: -122.648238 Datum: ____
Soil Map Unit Name: (Unit 19) Cloquato silt loam NWI classification: ____
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Precipitation:
According to the NWS Portland station, 0.01 inches of rainfall was received on the day of the site visit and 6.92 inches within the two weeks prior. Climatic conditions are considered wetter than normal for the three months prior.

Remarks:
Plot is located on the edge of the pond. Water in the pond is greater than 3' deep.

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot Size: 30' r or ____)			
1. *Populus balsamifera*	30%	Yes	FAC
2. *Alnus rubra*	5%	No	FAC
3.			
4.			
	35% = Total Cover		
Sapling/Shrub Stratum (Plot Size: 10' r or ____)			
1. *Physocarpus capitatus*	10%	Yes	FACW
2.			
3.			
4.			
5.			
	10% = Total Cover		
Herb Stratum (Plot Size: 5' r or ____)			
1. *Phalaris arundinacea*	30%	Yes	FACW
2. *Lysichiton americanus*	5%	No	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	35% = Total Cover		
Woody Vine Stratum (Plot Size: 10' r or ____)			
1.			
2.			
	0% = Total Cover		
% Open water 65%			

Dominance Test worksheet:

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	40	x 2 =	80
FAC species	35	x 3 =	105
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	80	(A)	190 (B)

Prevalence Index = B/A = 2.38

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:

SOIL

Sampling Point: 2

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/1	100					SiCL	
8-16+	10YR 4/1	95	7.5YR 3/4	5	C	M/PL	SiC	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

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

Hydric Soil Present? Yes X No

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): 6"
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): Surface

Wetland Hydrology Present? Yes X No

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

Remarks:
1' of ponding present within 0.5' of the plot.

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

Project/Site: Tax Lot 800, 802, and 803 City/County: West Linn/Clackamas Sampling Date: 3/27/2017
Applicant/Owner: Malibar Group LLC Retierment Plan State: OR Sampling Point: **3**
Investigator(s): Stacey Reed and Haley Teach Section, Township, Range: Section 2AC, T.3., R.1E.
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): <3%
Subregion (LRR): A, Northwest Forests and Coast Lat: 45.341609 Long: -122.648244 Datum: ______
Soil Map Unit Name: (Unit 19) Cloquato silt loam NWI classification: ______
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ______ No X (If no, explain in Remarks)
Are Vegetation ______, Soil ______, or Hydrology ______ significantly disturbed? Are “Normal Circumstances” present? Yes X No ______
Are Vegetation ______, Soil ______, or Hydrology ______ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Precipitation:
According to the NWS Portland station, 0.01 inches of rainfall was received on the day of the site visit and 6.92 inches within the two weeks prior. Climatic conditions are considered wetter than normal for the three months prior.

Remarks:
Plot located approximately 10' from Plot 2 and is half a foot higher in elevation.

VEGETATION

Tree Stratum (Plot Size: 30' r or ______)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus balsamifera*	45%	Yes	FAC
2. *Salix species*	15%	Yes	FAC*
3.			
4.			
	60% = Total Cover		
Sapling/Shrub Stratum (Plot Size: 10' r or ______)			
1. *Prunus species*	30%	Yes	FAC*
2. *Rubus armeniacus*	15%	Yes	FAC
3.			
4.			
5.			
	45% = Total Cover		
Herb Stratum (Plot Size: 5' r or ______)			
1. *Phalaris arundinacea*	2%	No	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	2% = Total Cover		
Woody Vine Stratum (Plot Size: 10' r or ______)			
1. *Hedera helix*	60%	Yes	FACU
2.			
	60% = Total Cover		
% Bare Ground in Herb Stratum 98%			

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 80% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	2	x 2 =	4
FAC species	105	x 3 =	315
FACU species	60	x 4 =	240
UPL species	0	x 5 =	0
Column Totals:	167 (A)		559 (B)

Prevalence Index = B/A = 3.35

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

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

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

Remarks:
*Assumed as FAC.

SOIL

Sampling Point: 3

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-14+	10YR 3/2	100					SiL	

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

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ______
Depth (inches): ______

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present?	Yes		No	X	Depth (inches):	
Water Table Present?	Yes	X	No		Depth (inches):	9"
Saturation Present? (includes capillary fringe)	Yes	X	No		Depth (inches):	Surface

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

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

Remarks:
Above average rainfall within the past two weeks and three months prior.

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

Project/Site: Tax Lot 800, 802, and 803 City/County: West Linn/Clackamas Sampling Date: 3/27/2017

Applicant/Owner: Malibar Group LLC Retierment Plan State: OR Sampling Point: **4**

Investigator(s): Stacey Reed and Haley Teach Section, Township, Range: Section 2AC, T.3., R.1E.

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

Subregion (LRR): A, Northwest Forests and Coast Lat: 45.341239 Long: -122.647649 Datum: ____

Soil Map Unit Name: (Unit 84) Wapato silty clay loam NWI classification: ____

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

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

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

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

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

Precipitation:
According to the NWS Portland station, 0.01 inches of rainfall was received on the day of the site visit and 6.92 inches within the two weeks prior. Climatic conditions are considered wetter than normal for the three months prior.

Remarks:

VEGETATION

Tree Stratum (Plot Size: 30' r or ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
= Total Cover	0%		
Sapling/Shrub Stratum (Plot Size: 10' r or ____)			
1.			
2.			
3.			
4.			
5.			
= Total Cover	0%		
Herb Stratum (Plot Size: 5' r or ____)			
1. *Alopecurus pratensis*	50%	Yes	FAC
2. *Ranunculus repens*	40%	Yes	FAC
3. *Poa species*	10%	No	FAC*
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
= Total Cover	100%		
Woody Vine Stratum (Plot Size: 10' r or ____)			
1.			
2.			
= Total Cover	0%		
% Bare Ground in Herb Stratum	0%		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 2 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	100	x 3 =	300
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		300 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:
*Assumed as FAC.

SOIL

Sampling Point: 4

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2	95	7.5YR 3/4	5	C	M/PL	SiL	
6-12+	10YR 2/2	90	7.5YR 3/4	10	C	PL	SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

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

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

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 1/4"
Water Table Present? Yes X No ___ Depth (inches): Surface
Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): Surface

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

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

Remarks:
Scattered ponding present.

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

Project/Site: Tax Lot 800, 802, and 803 City/County: West Linn/Clackamas Sampling Date: 3/27/2017
Applicant/Owner: Malibar Group LLC Retierment Plan State: OR Sampling Point: **5**
Investigator(s): Stacey Reed and Haley Teach Section, Township, Range: Section 2AC, T.3., R.1E.
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Convex Slope (%): <3%
Subregion (LRR): A, Northwest Forests and Coast Lat: 45.341184 Long: -122.647580 Datum:
Soil Map Unit Name: (Unit 84) Wapato silty clay loam NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No X (If no, explain in Remarks)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

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

Precipitation:
According to the NWS Portland station, 0.01 inches of rainfall was received on the day of the site visit and 6.92 inches within the two weeks prior. Climatic conditions are considered wetter than normal for the three months prior.

Remarks:
Plot is approximately half a foot higher in elevation than Plot 4. No ponding present.

VEGETATION

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot Size: 30' r or ______)			
1.			
2.			
3.			
4.			
	0% = Total Cover		
Sapling/Shrub Stratum (Plot Size: 10' r or ______)			
1.			
2.			
3.			
4.			
5.			
	0% = Total Cover		
Herb Stratum (Plot Size: 5' r or ______)			
1. *Poa species*	80%	Yes	FAC*
2. *Taraxacum officinale*	10%	No	FACU
3. *Ranunculus repens*	10%	No	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100% = Total Cover		
Woody Vine Stratum (Plot Size: 10' r or ______)			
1.			
2.			
	0% = Total Cover		

% Bare Ground in Herb Stratum 0%

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	90	x 3 =	270
FACU species	10	x 4 =	40
UPL species	0	x 5 =	0
Column Totals:	100 (A)		310 (B)

Prevalence Index = B/A = 3.10

Hydrophytic Vegetation Indicators:

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

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

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

Remarks:
*Assumed as FAC.

SOIL

Sampling Point: 5

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR 3/3	100					SiL	
11-16+	10YR 4/3	100					SiL	

[1] Type: C=Concentration, D=Depletion, RM=Reduced Matrix CS=Covered or Coated Sand Grains.

[2] Location: PL=Pore Lining, M=Matrix.

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)

___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (except MLRA 1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

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

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

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

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

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

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

___ Surface Water (A1)
X High Water Table (A2)
X Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)

___ Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)
___ Salt Crust (B11)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Stunted or Stressed Plants (D1) (LRR A)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ______ No X Depth (inches): ______
Water Table Present? Yes X No ______ Depth (inches): 10"
Saturation Present? (includes capillary fringe) Yes X No ______ Depth (inches): 7"

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

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

Remarks:

Appendix E: Site Photographs

Photo A. View south of upland Plot 1 (yellow flag).

Photo B. View south of electric fence and angular gravel and large rock fill.

Photo C. View facing west of PFO/PEM Wetland A.

Photo D. View south of paired Plots 2 and 3 (yellow flags) and Wetland A boundary (orange flag).

Photos taken by Haley Smith March 27, 2017

Photo E. View facing the east of Wetland A boundary.

Photo F. View facing north of paired Plots 4 and 5 (yellow flags) and Wetland A boundary (orange flag).

Photo G. View facing southwest of flooded Wetland A.

Photo H. 18-inch concrete culvert under 9th Street.

Photos taken by Haley Smith March 27, 2017

Appendix B: VECO Data Sheet (VECO Plot A)

WRA Condition Assessment for City of West Linn Natural Resource Assessment

Site: Tax Lots 800 & 802
Job Number: 5926
Investigators: Stacey Reed & Haley Teach
Date: March 27, 2017

Community: Cottonwood canopy
Location: Tax Lot 802
Plot ID: VECO Plot A

Tree species, % Cover, Native, Invasive - 30 foot radius, >5% cover: 50%

*	*Populus balsamifera*	balsam poplar	*native*	40%
*	*Salix species*	willow	*native*	10%

Shrub species, % Cover, Native, Invasive - 30 foot radius, >5% cover: 5%

*	*Rubus armeniacus*	Himalayan blackberry	*invasive*	5%

Herb Species, % Cover, Native, Invasive - 10 foot radius, >5% cover: 100%

Schedonorus arundinaceus	tall false rye grass	*non-native*	75%
Taraxacum officinale	common dandelion	*non-native*	10%
Geranium molle	dovefoot geranium	*non-native*	10%
Dactylis glomerata	orchard grass	*non-native*	5%

* Dominant

Total Cover 155%

	Absolute areal cover
% Tree canopy:	**50%**
% Cover by natives:	50%
% Invasive:	5%
% Non-native:	100%
	155%

Corridor Condition: *Marginal*

Appendix C: Representative Photographs

Photo A. View south of VECO Plot A (yellow flag) and existing electric fence.

Photo B. View west of VECO Plot A and cottonwood stand.

Photo C. View facing south of the project area.

Photo D. View facing east of the project area.

Photos taken by Haley Teach March 27, 2017

Photo E. View west of Wetland A.

Photo F. View facing south of Wetland A and the pond within the wetland boundary.

Photo G. View facing southwest of flooded Wetland A.

Photo H. View facing north of the project area standing from within Wetland A.

Photos taken by Haley Teach March 27, 2017

Appendix D: WRA/HCA Mitigation Enhancement Planting Specifications

Tax Lots 800 & 802 West Linn –
WRA/HCA Mitigation Enhancement Planting Specifications

Planting specifications for the enhancement of 4,999 square feet of enhancement area.

Scientific Name	Common Name	Size*	Spacing/Seeding Rate	Quantity
Trees (total 43)				
Alnus rubra	red alder	1 gallon	8-12 feet on center	20
Populus balsamifera	Balsam poplar	1 gallon	8-12 feet on center	20
Salix sitchensis	Sika willow	1 gallon	8-12 feet on center	10
Shrubs (total 250)				
Athyrium filix-femina	lady fern	1 gallon	4-5 feet on center	50
Cornus alba	red-osier dogwood	1 gallon	4-5 feet on center	50
Pysocarpus capitatus	Pacific ninebark	1 gallon	4-5 feet on center	50
Rosa pisocarpa	swamp rose	1 gallon	4-5 feet on center	50
Rubus spectabilis	salmonberry	1 gallon	4-5 feet on center	50
Seed Mix				
Agrostis exarata	spike bent grass	seed	1 lb pls/acre	As needed for bare-soil areas >25 square feet
Glyceria elata	tall manna-grass	seed	2 lbs pls/acre	

**Bare-root plants may be substituted for container plants based on availability. If bare-root plants are used, they must be planted during the late winter/early spring dormancy period.*

Planting Notes (per City of West Linn Community Development Code (CDC) Chapter 32, Water Resource Area Protection, Section 32.100, Re-Vegetation Plan Requirements):

1) Plantings should preferably be installed between December 1 and February 28 for bare roots and seeds and between October 15 and April 30 for containers.

2) Tree plantings must be at least 0.5 inches in caliper measured at 6 inches above the ground level or soil line. Shrub plantings must be in at least a 1-gallon container, or the equivalent in ball and burlap, and must be at least 12 inches in height. All plantings must be selected from the Portland Plant List.

3) All non-native, invasive, or noxious vegetation shall be removed from mitigation planting area prior to installing native enhancement plantings. Invasive species control shall continue throughout the maintenance period.

4) Irrigation may be necessary for the survival of the enhancement plantings. Irrigation or other water practices (i.e., polymer plus watering) are recommended during the three-year monitoring period following planting. Watering shall be provided at a rate of at least 1 inch per week between June 15 and October 15.

5) Plantings shall be mulched a minimum of 3 inches in depth and 18 inches in diameter to retain moisture and discourage weed growth around newly installed plant material.

6) When weather or other conditions prohibit planting according to schedule, the applicant will ensure that disturbed areas are correctly protected with erosion control measures and provide

the City with funds in the amount of 125% of a bid from a recognized landscaper or nursery to cover the cost of the plant materials, installation, and any follow-up maintenance. Once the planting conditions are favorable, the applicant will proceed with the plantings and receive the funds back from the City upon completion, or the City will complete the plantings using those funds.

Maintenance and Monitoring Plan

1) **Monitoring and Reporting:** The City requires a three-year maintenance period for the WRA mitigation enhancement area. Monitoring of the mitigation site is the ongoing responsibility of the property owner. Plants that die must be replaced in kind.

2) **Plant Survival:** The City's success criterion for WRA enhancement is 80% survival of tree and shrub plantings expected by the third anniversary of the date the mitigation planting was installed. If any mortality is noted on the site, the factor likely to have caused mortality of the plantings is to be determined and corrected if possible. If survival falls below 80% at any time during the three-year maintenance period, the plantings shall be replaced and other corrective measures, such as mulching or irrigation, may need to be implemented.

Exhibit G: Geotechnical Report

GeoPacific
Engineering, Inc.
Real-World Geotechnical Solutions
Investigation • Design • Construction Support

Geotechnical Engineering Report

9th Street
Clackamas County Tax Map 3 1E 02AC Lot 800 and 802
West Linn, Oregon

GeoPacific Engineering, Inc. Project No. 19-5350
November 26, 2019

14835 SW 72nd Avenue
Portland, Oregon 97224
Tel (503) 598-8445
Fax (503) 941-9281

TABLE OF CONTENTS

List of Appendices

List of Figures

Real-World Geotechnical Solutions
Investigation • Design • Construction Support

November 26, 2019
Project No. 19-5350

Mr. Roy Marvin
Malibar Group Retirement Plan FBO
615 W Territorial Road
Canby, Oregon 97013
Cellular Phone: 541-621-2109

CC: Zach Pelz, AKS Engineering & Forestry, LLC.
Email: pelzz@aks-eng.com

SUBJECT: GEOTECHNICAL ENGINEERING REPORT
9TH STREET
CLACKAMAS COUNTY TAX LOTS 3 1E 02AC 800 & 802
WEST LINN, OREGON 97068

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 geotechnical recommendations for site development. This geotechnical study was performed in accordance with GeoPacific Proposal No. P-7124, dated October 8, 2019, and your subsequent authorization of our proposal and *General Conditions for Geotechnical Services*.

SITE AND PROJECT DESCRIPTION

The subject property is composed of two parcels, identified as 31E02AC 0800 and 0802 and located on the southwest side of 9th Street in the City of West Linn, Clackamas County, Oregon. The combined parcels are approximately 1.80 acres in size and slope gently to the east at grades of less than 10 percent, in the direction of the Willamette River. The site is bordered by 9th Street to the northeast, by a wooded area and baseball fields to the southwest, by grass fields of a designated wetland to the south east, and by residential properties to the northwest. Ground elevations range from 70 to 80 feet above mean sea level. The site is currently unimproved, however; several flattened areas are present in the western portion of the site, adjacent to a neighboring stable. There is also an existing pond near the center of the western parcel. Vegetation consists of numerous dense trees to the southeast and grass lawns to the northwest.

It is our understanding that proposed development will include construction of two building lots for single family homes, construction of a private drive, improvements to the south bound lane of 9th Street, and associated underground utilities. A grading plan was not provided for our review; however, we anticipate cuts and fill will be less than 4 feet.

REGIONAL GEOLOGIC SETTING

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.

The southern portions of the site are underlain by alluvium, consisting of silt and clay with trace sand. The soils were deposited in a flood plain of the modern Willamette River, near the mouth of a tributary, the Tualatin River (Gannet and Caldwell, 1998, Beeson et all, 1989).

The alluvium and northern portion of the site are underlain by the Quaternary age (last 2.6 million years) Willamette Formation, a catastrophic flood deposit associated with repeated glacial outburst flooding of the Willamette Valley (Yeats et al., 1996). The last of these outburst floods occurred about 10,000 years ago. These deposits typically consist of horizontally layered, micaceous, silt to coarse sand forming poorly-defined to distinct beds less than 3 feet thick.

The Willamette Formation is underlain by the Columbia River Basalt Formation (Madin, 1990). The Miocene aged (about 14.5 to 16.5 million years ago) Columbia River Basalts are a thick sequence of lava flows which form the crystalline basement of the Tualatin Valley. The basalts are composed of dense, finely crystalline rock that is commonly fractured along blocky and columnar vertical joints. Individual basalt flow units typically range from 25 to 125 feet thick and interflow zones are typically vesicular, scoriaceous, brecciated, and sometimes include sedimentary rocks.

REGIONAL SEISMIC SETTING

At least three major fault zones capable of generating damaging earthquakes are thought to exist in the vicinity of the subject site. These include the Cascadia Subduction Zone, the Portland Hills Fault Zone, and the Bolton Fault Zone.

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 roughly along the Oregon coast at depths of between 20 and 40 miles.

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 3.5 and 5.0 miles. The combined three faults 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 about 5 miles northeast of the site. The Oatfield Fault occurs along the western side of the Portland Hills and is about 4 miles east of the site. The Oatfield Fault is considered to be potentially seismogenic (Wong, et al., 2000). Madin and Mabey (1993) indicate the Portland Hills Fault Zone has experienced Late Quaternary (last 780,000 years) fault movement; however, movement has not been detected in the last 20,000 years. The East Bank Fault occurs along the eastern margin of the Willamette River, and is located approximately 12 miles north of the site. The accuracy of the fault mapping is stated to be within 500 meters (Wong, et al., 2000).

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).

Bolton Fault Zone

The Bolton Fault Zone is a NW-trending fault that lies about 2 miles northeast of the subject site (DOGAMI: HazVu, 2019). The USGS: Earthquake Hazards Program and geologic mapping of the area (Beeson et al, 1989) indicate that a large northeast-facing cliff of Miocene Columbia River Basalt is caused by offset of approximately 200 meters in the fault, which is likely a southwest-dipping reverse fault. This cliff face roughly parallels the existing Highway 43 in the City of West Linn. Unambiguous evidence of Quaternary (last 2.6 million years) displacement has not been presented to date, but the fault is considered potentially active due to the bedrock escarpment along the alignment of the fault (Unruh et al., 1994).

FIELD EXPLORATION AND SUBSURFACE CONDITIONS

On November 13, 2019, GeoPacific explored subsurface conditions at the site by excavating four exploratory test pits to depths of 9 to 11 feet with an extendable back-hoe, operated by Dan Fischer Excavating. The approximate test pit locations are shown on Figure 2. It should be noted that test pit 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.

A GeoPacific geologist continuously monitored the field exploration program and logged the test pit explorations. Soils observed in the explorations were classified in general accordance with the Unified Soil Classification System. Rock hardness was classified in accordance with Table 1, modified from the ODOT Rock Hardness Classification Chart. During exploration, our geologist also noted geotechnical conditions such as soil consistency, moisture and groundwater conditions. Logs of test pits are attached to this report. The following report sections are based on the exploration program and summarize subsurface conditions encountered at the site.

Table 1. Rock Hardness Classification Chart

ODOT Rock Hardness Rating	Field Criteria	Unconfined Compressive Strength	Typical Equipment Needed for Excavation
Extremely Soft (R0)	Indented by thumbnail	<100 psi	Small excavator
Very Soft (R1)	Scratched by thumbnail, crumbled by rock hammer	100-1,000 psi	Small excavator
Soft (R2)	Not scratched by thumbnail, indented by rock hammer	1,000-4,000 psi	Medium excavator (slow digging with small excavator)
Medium Hard (R3)	Scratched or fractured by rock hammer	4,000-8,000 psi	Medium to large excavator (slow to very slow digging), typically requires chipping with hydraulic hammer or mass excavation)
Hard (R4)	Scratched or fractured w/ difficulty	8,000-16,000 psi	Slow chipping with hydraulic hammer and/or blasting
Very Hard (R5)	Not scratched or fractured after many blows, hammer rebounds	>16,000 psi	Blasting

Summary test pit logs are attached. The stratigraphic contacts shown on the individual logs represent the approximate boundaries between soil types. The actual transitions may be more gradual. The soil and groundwater conditions depicted are only for the specific dates and locations reported, and therefore, are not necessarily representative of other locations and times. Soil and groundwater conditions encountered in the explorations are summarized below.

At the completion of exploration, the test pits were backfilled with the excavated spoils and tamped with the backhoe bucket. This backfill should not be expected to behave as compacted structural fill and some minor settling of the ground surface may occur.

Soils

Topsoil Horizon: Directly underlying the ground surface in all test pit explorations was a topsoil horizon consisting of dark brown, highly organic SILT (OL). The topsoil horizon was generally loose, contained fine roots throughout, and extended to depths of 6 to 12 inches.

Undocumented Fill: Beneath the topsoil layer in test pits TP-1, TP-2 and TP-4 was undocumented fill consisting of asphaltic concrete fragments and cobbles to boulders up to several feet in diameter mixed with clayey-silt soils. The undocumented fill extended to 6.5 feet below existing surface grade in test pit TP-1, 7 feet in test pit TP-2 and 3.5 feet in test pit TP-4.

Willamette Formation: Underlying undocumented fill in test pits TP-1, TP-2 and TP-4 and the topsoil horizon in test pit TP-3 were fine-grained soils belonging to the Willamette Formation. Near surface soils in test pit TP-3 were a light brown, moist, clayey SILT (ML) that was stiff to very stiff consistency. Field pocket penetrometer measurements indicate an approximate unconfined compressive strength of 3.0 to 4.5 tons/ft^2 in the upper four feet of test pit TP-3. At depth in test pit TP-3 and beneath the undocumented fill in test pits TP-1, TP-2 and TP-4 was soft to stiff, CLAY (CL) to SILT (ML) with trace fine-grained sand, that ranged in color from light tan with orange and gray mottling to a blue-gray. The Willamette Formation soils ranged from moist to wet and were generally soft in areas of seepage. This material extended beyond the maximum depth of our explorations, approximately 11 feet below the ground surface.

Groundwater and Soil Moisture

On November 13, 2019, groundwater seepage was encountered in all our test pit explorations. Locations and depths of seepage observed are presented below in Table 2. Soil moistures observed were generally considered to be moist to wet. Soils observed at depth, particularly in the southern test pits, TP-1 and TP-4, display a blue-gray color typically observed in anaerobic environments and areas were moisture is present throughout the year.

According to the *Estimated Depth to Groundwater in the Portland, Oregon Area, (United States Geological Survey, 2019)*, groundwater is expected to be present at an approximate depth of 4-10 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.

Table 2- Summary of Groundwater Seepage Encountered

Exploration Designation	Depth (feet)	Soil Type	Visually Estimated Flow Rate
TP-1	4 & 10	Fill & SILT (ML)	¼ Gal/min
TP-2	6 to 7	Organic SILT (OL)	¼ gal/min
TP-3	8 to 11	SILT (ML)	Static
TP-4	2, 4 & 7	Fill & SILT (ML)	½ gal/min

Infiltration Testing

On November 13, 2019, soil infiltration testing was not performed due to groundwater seepage observed at various depths in all of our test pits explorations. It is our opinion that onsite infiltration is not a feasible option for the proposed structures.

CONCLUSIONS AND RECOMMENDATIONS

Our investigation indicates that the proposed development is geotechnically feasible, provided that the recommendations of this report are incorporated into the design and sufficient geotechnical monitoring is incorporated into the construction phases of the project. The primary geotechnical concerns associated with development at the property are:

1) The presence of soft to loose undocumented fill. Undocumented fill consisting of asphaltic concrete fragments, cobbles to boulders and soil was observed in test pits TP-1, TP-2 and TP-4 to depths of 6.5 feet, 7 feet and 3.5 feet, respectfully.

2) The presence of groundwater seepage and low permeability of onsite soils. Onsite infiltration testing could not be performed due to the presence of groundwater seepage at various elevations in all of our test pit explorations (see test pit logs) and the fine-grained native soil types observed in our explorations typically exhibit low permeability.

Site Preparation Recommendations

Areas of proposed buildings, new roadways, and areas to receive fill should be cleared of vegetation and any organic and inorganic debris or fill. Existing buried structures should be demolished and any cavities structurally backfilled. Inorganic debris and organic materials from clearing should be removed from the site.

Existing fill and any organic-rich topsoil should then be stripped from construction areas of the site or where engineered fill is to be placed. The estimated depth necessary for removal of topsoil is approximately 8 to 10 inches – deeper stripping may be necessary to remove large tree roots in isolated areas. Undocumented fill was encountered in test pits TP-1, TP-2 and TP-4 to depths of 6.5 feet, 7 feet and 3.5 feet, respectfully.

The final depth of soil removal will be determined on the basis of a site inspection after the stripping/ excavation has been performed. Stripped topsoil should preferably 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.

Any remaining undocumented fills and subsurface structures (tile drains, basements, driveway and landscaping fill, old utility lines, septic leach fields, etc.) should be removed and the excavations backfilled with engineered fill.

Once stripping of a particular area is approved, the area must be ripped or tilled to a depth of 12 inches, moisture conditioned, root-picked, and compacted in-place prior to the placement of engineered fill or crushed aggregate base for pavement. Exposed subgrade soils should be evaluated by the geotechnical engineer. For large areas, this evaluation is normally performed by proof-rolling the exposed subgrade with a fully loaded scraper or dump truck. For smaller areas where access is restricted, the subgrade should be evaluated by probing the soil with a steel probe. Soft/loose soils identified during subgrade preparation should be compacted to a firm and unyielding condition, over-excavated and replaced with engineered fill (as described below) or stabilized with rock prior to placement of engineered fill. The depth of over-excavation, if required, should be evaluated by the geotechnical engineer at the time of construction.

Engineered Fill

All grading for the proposed development should be performed as engineered grading in accordance with the applicable building code at time of construction with the exceptions and additions noted herein.

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 95% of the maximum dry density determined by ASTM D698 (Standard 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. Rocky fill may need to be evaluated by proofrolling and should be placed wet of optimum moisture content. 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. Earthwork in wet weather would likely require extensive use of cement or lime treatment, or other special measures, at considerable additional cost compared to earthwork performed under dry-weather conditions.

Excavating Conditions and Utility Trench Backfill

All temporary cuts in excess of 4 feet in height should be sloped in accordance with U.S. Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926) or be shored. The existing native soils classify as Type B Soil and temporary excavation side slope inclinations as steep as 1H:1V may be assumed for planning purposes. This cut slope inclination is applicable to excavations above the water table only. 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.

Saturated soils and groundwater may be encountered in utility trenches, particularly during the wet season. We anticipate that dewatering systems consisting of ditches, sumps and pumps would be adequate for control of perched groundwater. Regardless of the dewatering system used, it should be installed and operated such that in-place soils are prevented from being removed along with the groundwater.

Vibrations created by traffic and construction equipment may cause some caving and raveling of excavation walls. In such an event, lateral support for the excavation walls should be provided by the contractor to prevent loss of ground support and possible distress to existing or previously constructed structural improvements.

PVC pipe should be installed in accordance with the procedures specified in ASTM D2321. We recommend that trench backfill be compacted to at least 95% of the maximum dry density obtained by Modified Proctor ASTM D1557 or equivalent. Initial backfill lift thickness for a ¾”-0 crushed aggregate base may need to be as great as 4 feet to reduce the risk of flattening underlying flexible pipe. Subsequent lift thickness should not exceed 1 foot. If imported granular fill material is used, then the lifts for large vibrating plate-compaction equipment (e.g. hoe compactor attachments) may be up to 2 feet, provided that proper compaction is being achieved and each lift is tested. Use of large vibrating compaction equipment should be carefully monitored near existing structures and improvements due to the potential for vibration-induced damage.

Adequate density testing should be performed during construction to verify that the recommended relative compaction is achieved. Typically, one density test is taken for every 4 vertical feet of backfill on each 200-lineal-foot section of trench.

Erosion Control Considerations

During our field exploration program, we did not observe soil types that would be considered highly susceptible to erosion except in areas of moderately sloping topography. 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 wattles and silt fences. If used, these erosion control devices should be in place and 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 are likely to 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 will probably 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 wattles, and fiber rolls should be strategically located to control erosion.

Spread Foundations

The proposed residential structures may be supported on shallow foundations bearing on engineered fill placed and compacted over competent native soils, appropriately designed and constructed as recommended in this report. Foundation design, construction, and setback requirements should conform to the applicable building code at the time of construction. For maximization of bearing strength and protection against frost heave, spread footings should be embedded at a minimum depth of 12 inches below exterior grade. Foundations should be designed by a licensed structural engineer.

The anticipated allowable soil bearing pressure is 1,500 lbs/ft^2 for footings bearing on moisture conditioned and re-compacted native soils and/or structural fill. A maximum chimney and column load of 30 kips is recommended for the site. The recommended maximum allowable bearing pressure may be increased by 1/3 for short-term transient conditions such as wind and seismic loading. For heavier loads, the geotechnical engineer should be consulted. The coefficient of friction between on-site soil and poured-in-place concrete may be taken as 0.42, which includes no factor of safety. The maximum anticipated total and differential footing movements (generally from soil expansion and/or settlement) are 1 inch and ¾ inch over a span of 20 feet, respectively. We anticipate that the majority of the estimated settlement will occur during construction, as loads are applied. Excavations near structural footings should not extend within a 1H:1V plane projected downward from the bottom edge of footings.

Footing excavations should penetrate through topsoil and any loose soil to competent subgrade that is either

1) suitable for bearing support,
2) moisture conditioned and compacted and/or
3) over-excavated and replaced with structural fill.

All footing excavations should be trimmed neat, and all loose or softened soil should be removed from the excavation bottom prior to placing reinforcing steel bars. Due to the moisture sensitivity of on-site native soils, foundations constructed during the wet weather season may require over-excavation of footings and backfill with compacted, crushed aggregate.

Our recommendations are for house construction incorporating raised wood floors and conventional spread footing foundations. If living space of the structures will incorporate basements, a geotechnical engineer should be consulted to make additional recommendations for retaining walls, water-proofing, underslab drainage and wall subdrains. After site development, a Final Soil Engineer's Report should either confirm or modify the above recommendations.

Concrete Slabs-on-Grade

Preparation of areas beneath concrete slab-on-grade floors should be performed as recommended in the *Site Preparation* section. Care should be taken during excavation for foundations and floor slabs, to avoid disturbing subgrade soils. If subgrade soils have been adversely impacted by wet weather or otherwise disturbed, the surficial soils should be scarified to a minimum depth of 8 inches, moisture conditioned to within about 3 percent of optimum moisture content and compacted to engineered fill specifications. Alternatively, disturbed soils may be removed, and the removal zone backfilled with additional crushed rock.

For evaluation of the concrete slab-on-grade floors using the beam on elastic foundation method, a modulus of subgrade reaction of 150 kcf (87 pci) should be assumed for the fine-grained soils anticipated to be present in the upper four feet at the site. This value assumes the concrete slab system is designed and constructed as recommended herein, with a minimum thickness of 8 inches of 1½”-0 crushed aggregate beneath the slab. The total thickness of crushed aggregate will be dependent on the subgrade conditions at the time of construction and should be verified visually by proof-rolling. Under-slab aggregate should be compacted to at least 90 percent of its maximum dry density as determined by ASTM D1557 (Modified Proctor) or equivalent.

In areas where moisture will be detrimental to floor coverings or equipment inside the proposed structure, appropriate vapor barrier and damp-proofing measures should be implemented. A commonly applied vapor barrier system consists of a 10-mil polyethylene vapor barrier placed directly over the capillary break material. Other damp/vapor barrier systems may also be feasible. Appropriate design professionals should be consulted regarding vapor barrier and damp proofing systems, ventilation, building material selection and mold prevention issues, which are outside GeoPacific’s area of expertise.

Permanent Below-Grade Walls

Lateral earth pressures against below-grade retaining walls will depend upon the inclination of any adjacent slopes, type of backfill, degree of wall restraint, method of backfill placement, degree of backfill compaction, drainage provisions, and magnitude and location of any adjacent surcharge loads. At-rest soil pressure is exerted on a retaining wall when it is restrained against rotation. In contrast, active soil pressure will be exerted on a wall if its top is allowed to rotate or yield a distance of roughly 0.001 times its height or greater.

If the subject retaining walls will be free to rotate at the top, they should be designed for an active earth pressure equivalent to that generated by a fluid weighing 35 pcf for level backfill against the wall. For restrained wall, an at-rest equivalent fluid pressure of 55 pcf should be used in design, again assuming level backfill against the wall. These values assume that the recommended drainage provisions are incorporated, and hydrostatic pressures are not allowed to develop against the wall.

During a seismic event, lateral earth pressures acting on below-grade structural walls will increase by an incremental amount that corresponds to the earthquake loading. Based on the Mononobe-Okabe equation and peak horizontal accelerations appropriate for the site location, seismic loading should be modeled using the active or at-rest earth pressures recommended above, plus an incremental rectangular-shaped seismic load of magnitude 6.5H, where H is the total height of the wall.

We assume relatively level ground surface below the base of the walls. As such, we recommend passive earth pressure of 320 pcf for use in design, assuming wall footings are cast against competent native soils or engineered fill. If the ground surface slopes down and away from the base of any of the walls, a lower passive earth pressure should be used and GeoPacific should be contacted for additional recommendations.

A coefficient of friction of 0.42 may be assumed along the interface between the base of the wall footing and subgrade soils. The recommended coefficient of friction and passive earth pressure values do not include a safety factor, and an appropriate safety factor should be included in design. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

The above recommendations for lateral earth pressures assume that the backfill behind the subsurface walls will consist of properly compacted structural fill, and no adjacent surcharge loading. If the walls will be subjected to the influence of surcharge loading within a horizontal distance equal to or less than the height of the wall, the walls should be designed for the additional horizontal pressure. For uniform surcharge pressures, a uniformly distributed lateral pressure of 0.3 times the surcharge pressure should be added. Traffic surcharges may be estimated using an additional vertical load of 250 psf (2 feet of additional fill), in accordance with local practice.

The recommended equivalent fluid densities assume a free-draining condition behind the walls so that hydrostatic pressures do not build-up. This can be accomplished by placing a 12 to 18-inch wide zone of sand and gravel containing less than 5 percent passing the No. 200 sieve against the walls. A 3-inch minimum diameter perforated, plastic drain pipe should be installed at the base of the walls and connected to a suitable discharge point to remove water in this zone of sand and gravel. The drain pipe should be wrapped in filter fabric (Mirafi 140N or other as approved by the geotechnical engineer) to minimize clogging.

Wall drains are recommended to prevent detrimental effects of surface water runoff on foundations – not to dewater groundwater. Drains should not be expected to eliminate all potential sources of water entering a basement or beneath a slab-on-grade. An adequate grade to a low point outlet drain in the crawlspace is required by code. Underslab drains are sometimes added beneath the slab when placed over soils of low permeability and shallow, perched groundwater.

Water collected from the wall drains should be directed into the local storm drain system or other suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. Down spouts and roof drains should not be connected to the wall drains in order to reduce the potential for clogging. The drains should include clean-outs to allow periodic maintenance and inspection. Grades around the proposed structure should be sloped such that surface water drains away from the building.

GeoPacific should be contacted during construction to verify subgrade strength in wall keyway excavations, to verify that backslope soils are in accordance with our assumptions, and to take density tests on the wall backfill materials.

Structures should be located a horizontal distance of at least 1.5H away from the back of the retaining wall, where H is the total height of the wall. GeoPacific should be contacted for additional foundation recommendations where structures are located closer than 1.5H to the top of any wall.

Drainage

The upslope edge of perimeter footings may be provided with a drainage system consisting of 3-inch diameter, slotted, plastic pipe embedded in a minimum of 1 ft^3 per lineal foot of clean, free-draining gravel or uncompacted 3/4”-0 rock. Water collected from the footing drains should be directed into the local storm drain system or another suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. Down spouts and roof drains should not be connected to the foundation drains in order to reduce the potential for clogging. The footing drains should include clean-outs to allow periodic maintenance and inspection. Grades around the proposed structure should be sloped such that surface water drains away from the building. Footing drain recommendations are given to prevent detrimental effects of groundwater on foundations and should not be expected to eliminate all potential sources of water entering a crawlspace. An adequate grade to a low point outlet drain in the crawlspace is required by code.

Flexible Pavement Design: 9th Street Half Street Improvement

We understand that, as part of development, improvements must be made to the existing south bound lane of 9th Street, within the property boundaries. The City of West Linn Public Works Design Standards, Section Five – Street Requirements states an approved section for Local / Neighborhood streets. Table 3 presents the approved Local / Neighborhood street section for the City of West Linn with estimated structural coefficients.

Table 3 – City of West Linn Minimum Dry-Weather Pavement Section for 9th Street

Material Layer	**Section Thickness (in.)**	**Structural Coefficient**	**Compaction Standard**
Asphaltic Concrete (AC)	4	0.42	91%/ 92% of Rice Density AASHTO T-209
Crushed Aggregate Base ¾"-0 (leveling course)	2	0.10	95% of Modified Proctor AASHTO T-180
Crushed Aggregate Base 1½"-0	10	0.10	95% of Modified Proctor AASHTO T-180
Subgrade	12	5,000 PSI	95% of Standard Proctor AASHTO T-99 or equivalent
Calculated Structural Number		1.88	

Road Subgrade Preparation

The subgrade should be ripped or tilled to a depth of 12 inches, moisture conditioned, root-picked, and compacted in-place prior to the placement of crushed aggregate base for pavement. Any pockets of organic debris or loose fill encountered during ripping or tilling should be removed and replaced with engineered fill (see *Site Preparation* section). In order to verify subgrade strength, we recommend proof-rolling directly on subgrade with a loaded dump truck during dry weather and on top of base course in wet weather. Soft areas that pump, rut, or weave should be stabilized prior to paving.

If pavement areas are to be constructed during wet weather, the subgrade and construction plan should be reviewed by the project geotechnical engineer at the time of construction so that condition specific recommendations can be provided. The moisture sensitive subgrade soils make the site a difficult wet weather construction project. General recommendations for wet weather pavement sections are provided below.

During placement of pavement section materials, density testing should be performed to verify compliance with project specifications. Generally, one subgrade, one base course, and one asphalt compaction test is performed for every 100 to 200 linear feet of paving.

Wet Weather Construction Pavement Section

This section presents our recommendations for wet weather pavement section and construction for new pavement sections at the project. These wet weather pavement section recommendations are intended for use in situations where it is not feasible to compact the subgrade soils, due to wet subgrade soil conditions, and/or construction during wet weather.

Based on our site review, we recommend a wet weather section with a minimum subgrade deepening of 6 inches to accommodate a working subbase of additional 1½"-0 crushed rock. Geotextile fabric, Mirafi 500x or equivalent, should be placed on subgrade soils prior to placement of base rock.

In some instances, it may be preferable to use Special Treated Base (STB) in combination with over-excavation and increasing the thickness of the rock section. GeoPacific should be consulted for additional recommendations regarding use of STB in wet weather pavement sections if it is desired to pursue this alternative. Cement treatment of the subgrade may also be considered instead of over-excavation. For planning purposes, we anticipate that treatment of the onsite soils would involve mixing cement powder to approximately 6 percent cement content and a mixing depth on the order of 12 to 18 inches.

With implementation of the above recommendations, it is our opinion that the resulting pavement section will provide equivalent or greater structural strength than the dry weather pavement section currently planned. However, it should be noted that construction in wet weather is risky and the performance of pavement subgrades depend on a number of factors including the weather conditions, the contractor's methods, and the amount of traffic the road is subjected to. There is a potential that soft spots may develop even with implementation of the wet weather provisions recommended in this letter. If soft spots in the subgrade are identified during roadway excavation, or develop prior to paving, the soft spots should be over-excavated and backfilled with additional crushed rock.

During subgrade excavation, care should be taken to avoid disturbing the subgrade soils. Removals should be performed using an excavator with a smooth-bladed bucket. Truck traffic should be limited until an adequate working surface has been established. We suggest that the crushed rock be spread using bulldozer equipment rather than dump trucks, to reduce the amount of traffic and potential disturbance of subgrade soils.

Care should be taken to avoid over-compaction of the base course materials, which could create pumping, unstable subgrade soil conditions. Heavy and/or vibratory compaction efforts should be applied with caution. Following placement and compaction of the crushed rock to project specifications (95 percent of Modified Proctor), a finish proof-roll should be performed before paving.

The above recommendations are subject to field verification. GeoPacific should be on-site during construction to verify subgrade strength and to take density tests on the engineered fill, base rock and asphaltic pavement materials.

Seismic Design

The Oregon Department of Geology and Mineral Industries (Dogami), Oregon HazVu: Statewide GeoHazards Viewer indicates that the site is in an area where *severe* ground shaking is anticipated during an earthquake (Dogami HazVu, 2019). Structures should be designed to resist earthquake loading in accordance with the methodology described in the 2018 International Building Code (IBC) with applicable Oregon Structural Specialty Code (OSSC) revisions (current 2019). We recommend Site Class D be used for design per the OSSC, Table 1613.5.2 and as defined in ASCE 7-16, Chapter 20, Table 20.3-1. Design values determined for the site using the ATC (Applied Technology Council) *ASCE7-10 Hazards by Location online Tool* website are summarized in Table 3.

Table 3 - Recommended Earthquake Ground Motion Factors (ASCE 7-16)

Parameter	Value
Location (Lat, Long), degrees	45.3426, -122.6486
Probabilistic Ground Motion Values, 2% Probability of Exceedance in 50 yrs	
Site Modified Peak Ground Acceleration	0.459 g
Short Period, S_S	0.831 g
1.0 Sec Period, S_1	0.376 g
Soil Factors for Site Class D:	
F_a	1.168
F_v	1.924
$SD_S = 2/3 \times F_a \times S_S$	0.647 g
$SD_1 = 2/3 \times F_v \times S_1$	0.482 g
Seismic Design Category	D

* F_v value reported in the above table is a straight-line interpolation of mapped spectral response acceleration at 1-second period, S_1 per Table 1613.2.3(2) of OSSC 2019 with the assumption that Exception 2 of ASCE 7-16 Chapter 11.4.8 is met per the Structural Engineer. If Exception 2 is not met, and the long-period site coefficient (F_v) is required for design, GeoPacific Engineering can be consulted to provide a site-specific procedure as per ASCE 7-16, Chapter 21.

Soil Liquefaction

Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to ground shaking caused by strong earthquakes. Soil liquefaction is generally limited to loose, sands and granular soils located below the water table. The Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon HazVu: 2019 Statewide GeoHazards Viewer indicates that the site is in an area considered to be at *low* to *high* risk for soil liquefaction during an earthquake (DOGAMI:HazVu, 2019).

An in-depth analysis of seismic hazards is beyond the scope of this study. However, if additional information is desired regarding the potential for soil liquefaction during a seismic event, GeoPacific may be consulted to perform additional subsurface explorations, consisting of soil borings and/or CPT testing, and to perform a quantitative liquefaction analysis.

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.

REGISTERED PROFESSIONAL ENGINEER
14743PE
OREGON
JAN. 23, 1990
JAMES D. IMBRIE
EXPIRES: 06/30/2021

Michael T. Baker, G.I.T.
Geotechnical Staff

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

REFERENCES

Applied Technology Council (ATC), 2019, Hazards by Location Online Tool, https://hazards.atcouncil.org/#/seismic, 2019.

Atwater, B.F., 1992, Geologic evidence for earthquakes during the past 2,000 years along the Copalis River, southern coastal Washington: Journal of Geophysical Research, v. 97, p. 1901-1919.

Beeson, M.H., Tolan, T.L., and Anderson, J.L., 1989, The Columbia River Basalt Group in western Oregon; Geologic structures and other factors that controlled flow emplacement patterns: Geological Society of America Special Paper 239, in Volcanism and tectonicism in the Columbia River flood-basalt province published by the Geological Society of America, p. 223-246.

Carver, G.A., 1992, Late Cenozoic tectonics of coastal northern California: American Association of Petroleum Geologists-SEPM Field Trip Guidebook, May 1992.

Gannett, M.W. and Caldwell, R.R., 1998, Geologic framework of the Willamette Lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-A, 32 pages text, 8 plates.

Geomatrix Consultants, 1995, Seismic Design Mapping, State of Oregon: unpublished report prepared for Oregon Department of Transportation, Personal Services Contract 11688, January 1995.

Goldfinger, C., Kulm, L.D., Yeats, R.S., Appelgate, B, MacKay, M.E., and Cochrane, G.R., 1996, Active strike-slip faulting and folding of the Cascadia Subduction-Zone plate boundary and forearc in central and northern Oregon: in Assessing earthquake hazards and reducing risk in the Pacific Northwest, v. 1: U.S. Geological Survey Professional Paper 1560, P. 223-256.

Mabey, M.A., Madin, I.P., Youd, T.L. and Jones, C.F., 1993, Earthquake hazard maps of the Portland Quadrangle, Multnomah and Washington Counties, Oregon: Oregon Department of Geology and Mineral Industries, GMS-79, map scale 1:24,000.

Mabey, M.A., Black, G.L., Madin, I.P., Meier, D.B., Youd, T.L., Jones, C.F., and Rice, J.B., 1995, Relative earthquake hazard map of the Portland Metro Region, Clackamas, Multnomah and Washington Counties, Oregon: Oregon Department of Geology and Mineral Industries, IMS-032, map scale 1: 62,500 to 1: 216,000.

Madin, I.P., 1990, Earthquake hazard geology maps of the Portland metropolitan area, Oregon: Oregon Department of Geology and Mineral Industries Open-File Report 0-90-2, scale 1: 24,000, 22 p.

Oregon Department of Geology and Mineral Industries, 2018, Oregon HazVu: Statewide Geohazards Viewer (HazVu): http://www.oregongeology.org/hazvu/

Oregon Department of Geology and Mineral Industries, 2018, SLIDO: Statewide Landslide Information Layer of Orgeon: http://gis.dogami.oregon.gov/slido/

Peterson, C.D., Darioenzo, M.E., Burns, S.F., and Burris, W.K., 1993, Field trip guide to Cascadia paleoseismic evidence along the northern California coast: evidence of subduction zone seismicity in the central Cascadia margin: Oregon Geology, v. 55, p. 99-144.

PortlandMaps, 2018, https://www.portlandmaps.com

United States Geologic Survey, 2018, U.S. Estimated Depth to Ground Water in the Portland, Oregon Area, https://or.water.usgs.gov/projs_dir/puz/

Unruh, J.R., Wong, I.G., Bott, J.D., Silva, W.J., and Lettis, W.R., 1994, Seismotectonic evaluation: Scoggins Dam, Tualatin Project, Northwest Oregon: unpublished report by William Lettis and Associates and Woodward Clyde Federal Services, Oakland, CA, for U. S. Bureau of Reclamation, Denver CO (in Geomatrix Consultants, 1995).

Werner, K.S., Nabelek, J., Yeats, R.S., Malone, S., 1992, The Mount Angel fault: implications of seismic-reflection data and the Woodburn, Oregon, earthquake sequence of August 1990: Oregon Geology, v. 54, p. 112-117.

Wong, I. Silva, W., Bott, J., Wright, D., Thomas, P., Gregor, N., Li., S., Mabey, M., Sojourner, A., and Wang, Y., 2000, Earthquake Scenario and Probabilistic Ground Shaking Maps for the Portland, Oregon, Metropolitan Area; State of Oregon Department of Geology and Mineral Industries; Interpretative Map Series IMS-16.

Yeats, R.S., Graven, E.P., Werner, K.S., Goldfinger, C., and Popowski, T., 1996, Tectonics of the Willamette Valley, Oregon: in Assessing earthquake hazards and reducing risk in the Pacific Northwest, v. 1: U.S. Geological Survey Professional Paper 1560, P. 183-222, 5 plates, scale 1: 100,000.

Yelin, T.S., 1992, An earthquake swarm in the north Portland Hills (Oregon): More speculations on the seismotectonics of the Portland Basin: Geological Society of America, Programs with Abstracts, v. 24, no. 5, p. 92.

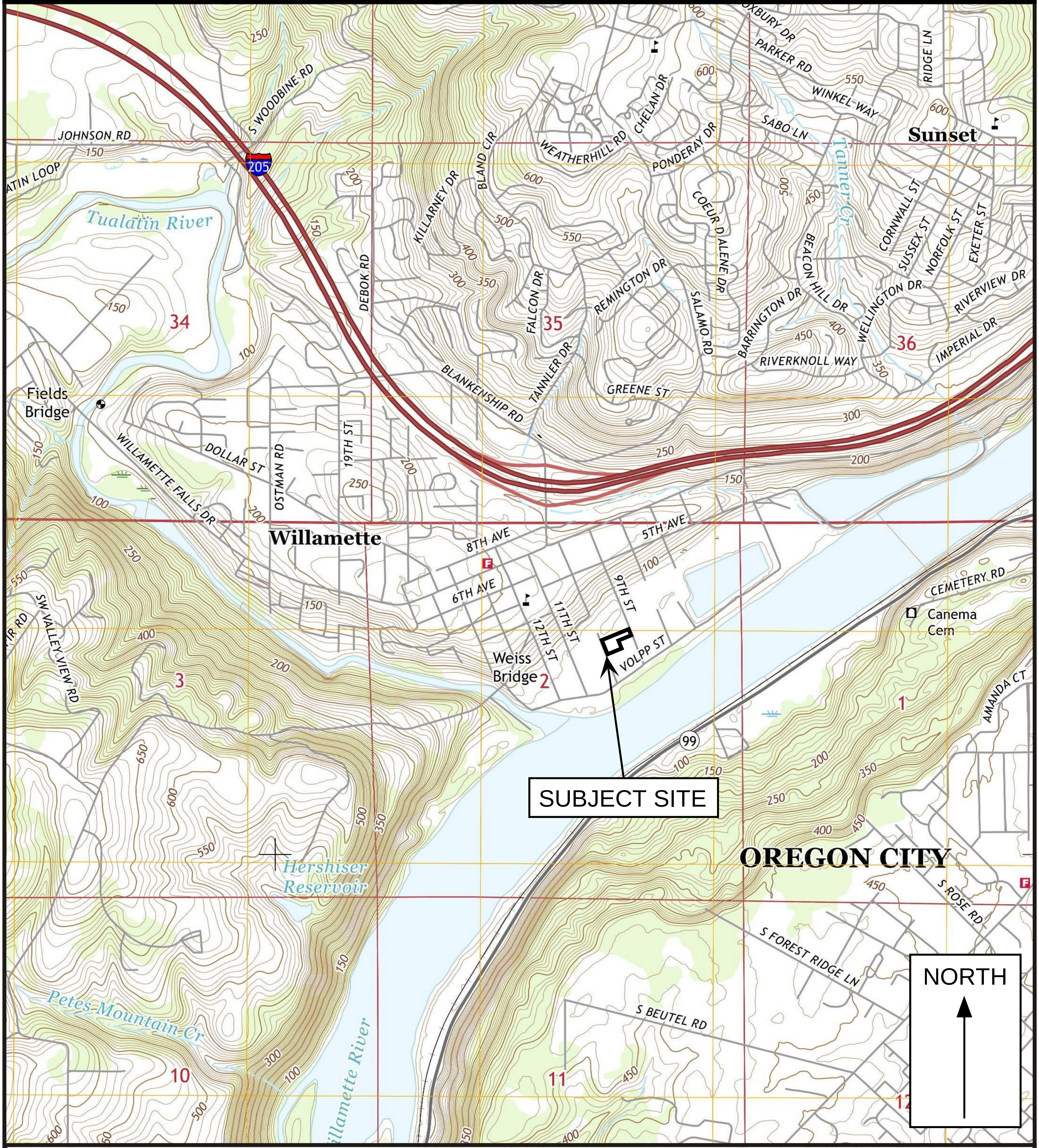
CHECKLIST OF RECOMMENDED GEOTECHNICAL TESTING AND OBSERVATION

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	Footing Subgrade Inspection	Prior to placement of forms	Soil Technician/ Geotechnical Engineer	
9	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

VICINITY MAP



Legend

Approximate Scale 1 in = 2,000 ft

Date: 11.20.2019
Drawn by: MTB

Base maps: U.S. Geological Survey 7.5 minute Topographic Map Series, Canby, Oregon Quadrangle, 2017.

Project:	9th Street West Linn, Oregon	Project No. 19-5350	FIGURE 1A

14835 SW 72nd Avenue
Portland, Oregon 97224
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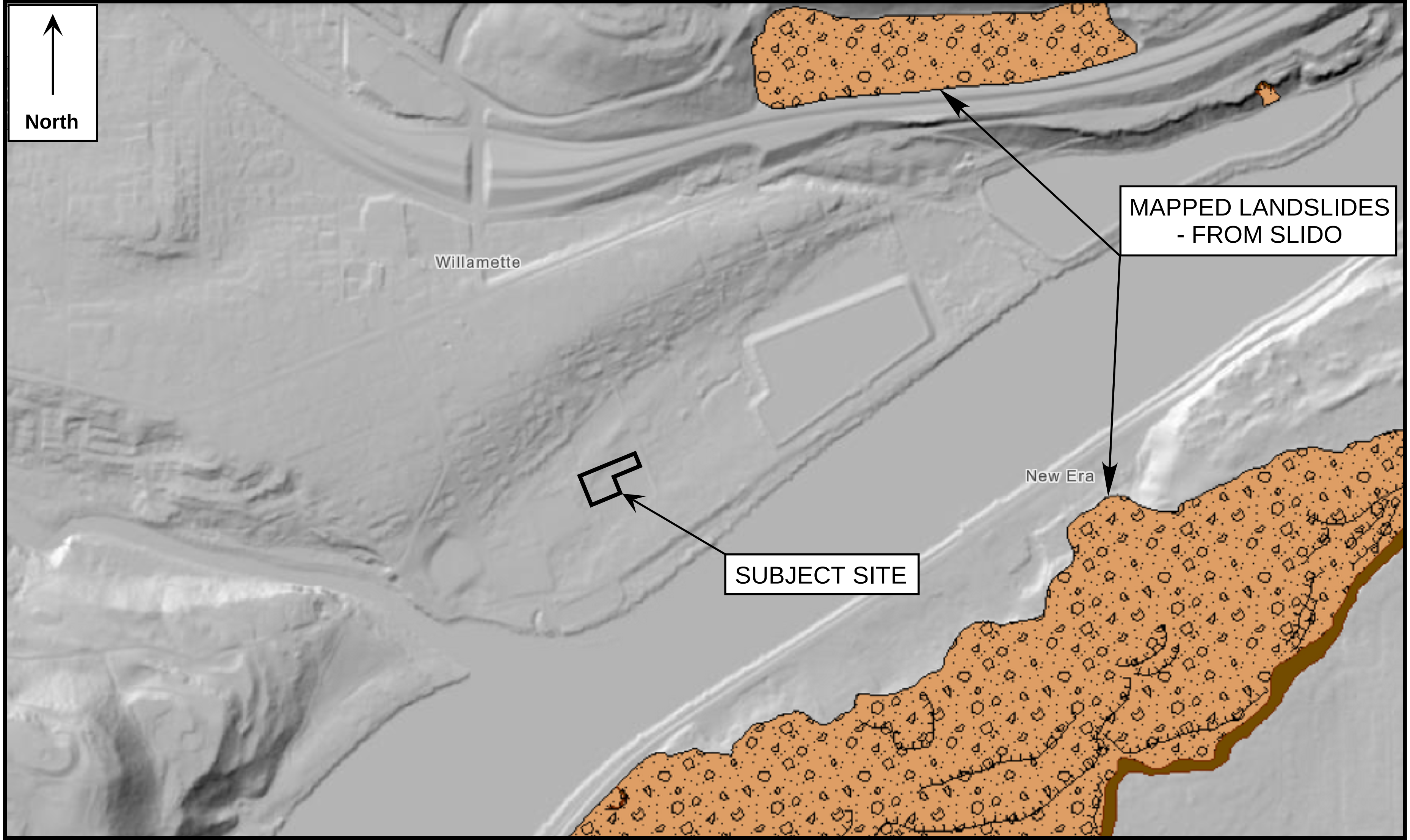
LIDAR BASED VICINITY MAP - WITH MAPPED LANDSLIDES



Legend

Approximate Scale 1 in = 1000 ft

Date: 11.20.2019
Drawn by: MTB

Base map: Oregon Department of Geology and Mineral Industries, 2019, Statewide Landslide Information Database for Oregon (SLIDO): http://www.gis.dogami.oregon.gov/slido

Project: 9th Street
West Linn, Oregon

Project No. 19-5350

FIGURE 1B

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

SITE AERIAL AND EXPLORATION LOCATIONS

NOTE:
POTENTIAL 9TH STREET RIGHT OF WAY DEDICATION NOT SHOWN. PENDING RESPONSE FROM CITY OF WEST LINN.

DRIVEWAY NOTE:
MINIMUM DRIVEWAY SPACING IS 30' ALONG 9TH STREET PER WEST LINN CDC 48.060

SETBACK NOTE:

FRONT SETBACK:	20'
REAR SETBACK:	20'
INTERNAL SIDE SETBACK:	7.5'

Base image provided by AKS Engineering & Forestry, LLC. and PortlandMaps

Legend

Site Boundary

TP-1
2ft
Test Pit Designation, Approximate Location
and Approximate Depth of Fill including Buried Topsoil

PDCP 1
PDCP Designation
and Approximate Location

Drawn by: MTB Date: 11.21.2019

0 80'
APPROXIMATE SCALE 1"=80'

Project: 9th Street
West Linn, Oregon

Project No. 19-5350

FIGURE 2

EXPLORATION LOGS

GeoPacific Engineering, Inc.

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Portland, Oregon 97224
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TEST PIT LOG

Project: 9th Street
West Linn, Oregon

Project No. 19-5350

Exploration No. **TP-1**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	**Material Description**
					Soft, organic SILT (OL), brown, grass roots, very moist [Topsoil Horizon]
1		4.0			Loose, GRAVEL (GM), composed of fractured rock and asphalt fragments up to 12 inch in diameter with sand and silt, moist [Undocumented Fill]
2		1.0			Soft to medium stiff, lean CLAY (CL), light brown, homogenous, tree roots, moist [Undocumented Fill]
3		1.0			
4		1.5		💧	Soft to medium stiff, CLAY (CL-CH), dark gray to brown, very plastic, moist, in lower portion this layer was dark brown to black fragments of extremely soft (R0) to soft (R1) minerals from 1/4 inch to 1.5 inch in diameter, fragments of angular vesicular medium hard (R3) BASALT, moist [Undocumented Fill]
5	100 to 1,000 g				
6					
7					Medium stiff to stiff, SILT (ML) with sand, blue-gray, slightly plastic, homogenous, very moist to wet [Willamette Formation]
8					
9					
10				💧	
11					
12					Test Pit terminated at 11 feet. Groundwater seepage encountered in excavation at 4 feet and 10.5 feet. Flow visually estimated at 1/4 gallons per minute.
13					
14					

LEGEND

- 100 to 1,000 g Bag Sample
- ▯ Split-Spoon
- ▯ Shelby Tube Sample
- 💧 Seepage
- ▽ Static Water Table
- ▨ Water Bearing Zone

Date Drilled: 11.13.2019
Logged By: MTB
Surface Elevation: 74 Feet

GeoPacific Engineering, Inc.

14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: 9th Street
West Linn, Oregon

Project No. 19-5350

Exploration No. **TP-2**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
					Soft, organic SILT (OL), brown, grass roots, moist [Topsoil Horizon]
1		0.5			Loose to medium dense, GRAVEL (GM), composed of medium hard (R3) angular BASALT and asphaltic concrete fragments up to several feet in diameter in a matrix of soft silty CLAY to clayey SILT (CL-ML), moist [Undocumented Fill]
2		1.0			
3		1.5			
4		1.5			
5					
6				💧	Soft, organic SILT (OL), brown, grass roots, moist [Buried Topsoil Horizon]
7					Medium stiff, lean CLAY (CL), blue-gray, moderately plastic, homogenous, moist [Willamette Formation]
8					
9	100 to 1,000 g				Soft to medium stiff, SILT with fine grained sand to sandy SILT (ML-SM), tan with faint orange mottling in thin bands approximately 1/8 to 1/2 inch in thickness, wet [Willamette Formation]
10					
11					Test Pit terminated at 11 feet. Groundwater seepage encountered in excavation at 6 to 7 feet. Flow visually estimated at 1/4 gallons per minute.
12					
13					
14					

LEGEND

100 to 1,000 g	▯	▯	💧	▽	▨
Bag Sample	Split-Spoon	Shelby Tube Sample	Seepage	Static Water Table	Water Bearing Zone

Date Drilled: 11.13.2019
Logged By: MTB
Surface Elevation: 80 Feet

GeoPacific Engineering, Inc.

14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: 9th Street
West Linn, Oregon

Project No. 19-5350

Exploration No. **TP-3**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
					Stiff, organic SILT (OL), brown, grass roots wood debris, moist [Topsoil Horizon]
1		3.0			
2		3.5			
3		4.5			Stiff to very stiff, SILT (ML), light brown, moderately plastic, homogenous, sparse tree roots to 3 feet, moist [Willamette Formation]
4		4.5			
5					
6					
7					
8				▽	Stiff, SILT (ML) with fine-grained sand to sandy SILT (SM), tan with gray and orange mottling, moist to approximately 8 feet than very moist to wet [Willamette Formation]
9					
10					
11					
12					Test Pit terminated at 11 feet. Groundwater seepage encountered in excavation at 8 feet.
13					
14					

LEGEND

- 100 to 1,000 g Bag Sample
- Split-Spoon
- Shelby Tube Sample
- Seepage
- ▽ Static Water Table
- ▨ Water Bearing Zone

Date Drilled: 11.13.2019
Logged By: MTB
Surface Elevation: 80 Feet

GeoPacific Engineering, Inc.

14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

TEST PIT LOG

Project: 9th Street
West Linn, Oregon

Project No. 19-5350

Exploration No. **TP-4**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
1		1.0			Soft, organic SILT (OL), brown, grass roots, moist to very moist [Topsoil Horizon]
2		1.0		💧	Soft to very stiff CLAY (CL), reddish brown, black staining, heavily weathered BASALT fragments, moist to wet [Undocumented Fill]
3		4.5			
4		1.0		💧	
5					
6					Medium stiff to stiff, SILT (ML) with sand, blue-gray, slightly plastic, homogenous, very moist to wet [Willamette Formation]
7				💧	
8					
9					
10					Test Pit terminated at 9 feet. Groundwater seepage encountered in excavation at 2, 4 and 7 feet.
11					
12					
13					
14					

LEGEND

100 to 1,000 g	▯	▯	💧	▽	▨
Bag Sample	Split-Spoon	Shelby Tube Sample	Seepage	Static Water Table	Water Bearing Zone

Date Drilled: 11.13.2019
Logged By: MTB
Surface Elevation: 72 Feet

GeoPacific Engineering, Inc.
Real-World Geotechnical Solutions
Investigiation, Design, Construction Support

14835 SW 72nd Avenue
Portland, Oregon 97224

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

Portable Dynamic Cone Penetrometer (PDCP) / California Bearing Ratio (CBR) Correlation

Project: 9th Street West Linn
Project No. 19-5350
Location: SW Shoulder of 9th Street at N Property Corner
Portable Dynamic Cone: KSE DCP K-100 Model, ASTM D6951, 17.6 lbs Hammer

Date: 11.20.2019
Engineer: MTB

Existing A/C Thickness: 0 Inches
Existing Base Aggregate Thickness: 0 Inches
Subgrade: Fill

Test: PDCP-1
Notes: Location on Figures 2

Length of Shaft	Ref Height at Start	Depth Below Ground at Start
in	in	in
38.75	3.6	2.6

Blows	Ref Height (in)	Depth Below Ground (in)	Depth Below Ground (ft)	Depth Below Ground (mm)	Inches/Blow	mm/Blow	CBR	Corellated PSI
5	10.9	9.9	0.8	251.5	1.5	37.1	5.1	4193
5	13.4	12.4	1.0	315.0	0.5	12.7	16.9	6368
5	21	20.0	1.7	508.0	1.5	38.6	4.9	4127
5	26.7	25.7	2.1	652.8	1.1	29.0	6.7	4617
5	29.5	28.5	2.4	723.9	0.6	14.2	14.9	6092
5	32.9	31.9	2.7	810.3	0.7	17.3	12.0	5648
5	35.9	34.9	2.9	886.5	0.6	15.2	13.8	5931
					Average	23.44	8.5	
		Average Soil Resilient Modulus per ODOT Pavement Design Guide				5014		

Portable Dynamic Cone Penetrometer (PDCP) / California Bearing Ratio (CBR) Correlation

Project: 9th Street West Linn
Project No. 19-5350
Location: SW Shoulder of 9th Street at S Property Corner
Portable Dynamic Cone: KSE DCP K-100 Model, ASTM D6951, 17.6 lbs Hammer

Date: 11.20.2019
Engineer: MTB

Existing A/C Thickness: 0 Inches
Existing Base Aggregate Thickness: 0 Inches
Subgrade: Fill

Test: PDCP-2
Notes: Location on Figures 2

Length of Shaft	Ref Height at Start	Depth Below Ground at Start
in	in	in
38.75	3	2

Blows	Ref Height (in)	Depth Below Ground (in)	Depth Below Ground (ft)	Depth Below Ground (mm)	Inches/Blow	mm/Blow	CBR	Corellated PSI
5	9.8	8.8	0.7	223.5	1.4	34.5	5.5	4310
5	12.7	11.7	1.0	297.2	0.6	14.7	14.4	6010
5	14.2	13.2	1.1	335.3	0.3	7.6	30.0	7772
5	16.6	15.6	1.3	396.2	0.5	12.2	17.7	6470
5	22.8	21.8	1.8	553.7	1.2	31.5	6.1	4468
5	25.6	24.6	2.1	624.8	0.6	14.2	14.9	6092
5	28	27.0	2.3	685.8	0.5	12.2	17.7	6470
5	32.8	31.8	2.7	807.7	1.0	24.4	8.2	4937
5	34.4	33.4	2.8	848.4	0.3	8.1	27.9	7578
					Average	17.72	11.7	
		Average Soil Resilient Modulus per ODOT Pavement Design Guide				5592		

PHOTOGRAPHIC LOG

Overhead of the Property

Proximity to Willamette River

Test Pits TP-2 & TP-3

Test Pit TP-1 Undocumented Fill

Test Pit TP-1

Test Pit TP-2 Undocumented Fill

Test Pit TP-3

Test Pit TP-4

Test Pit TP-4

Exhibit H: Pre-Application Summary

Exhibit H: Pre-Application Summary

	Pre-app Comments	Engineering Contact:
	Project Number: PA-19-14 **Single family dwellings** **North of 1040 9th Street**	Amy Pepper, PE apepper@westlinnoregon.gov Telephone: (503) 722-3437

Project Description: Construct single family homes on existing lots of record north of 1040 9th Street.

Pre-application meeting date: June 20, 2019

The comments provided below are based upon material provided as part of the pre-application packet and are intended to identify potential design challenges associated with the development. Comments are not intended to be exhaustive and do not preclude the engineering department from making additional comments as part of the formal land use application process.

TRANSPORTATION
Minimum Required Improvement:

- 9th St street improvement:
    - 9th Street is identified as a local street in the City's *Transportation System Plan.*
    - Existing right-of-way is unimproved and approximately 40 feet wide.
    - The existing pavement width is approximately 15 feet.
    - Half-street improvements to local street standards will be required at the time of development. Given the WRA restrictions, constrained right-of-way improvements may be supported by the City Engineer. The applicant shall include rationale for any deviations from the 28-foot local street standard.
- Street trees: coordinate with the Park Department to install appropriate number and type of tree, as applicable:
    - Parks Contact: Mike Perkins
      mperkins@westlinnoregon.gov
      503-742-6046
- A Traffic Impact Analysis (TIA) is not anticipated to be required. Review CDC Chapter 85 and Section 5 of the *City of West Linn Public Works Standards*.
- Driveway standards can be found in Section 5 of the *City of West Linn Public Works Standards.*

SANITARY SEWER
Minimum Required Improvement:

- The existing 8" sanitary sewer line in 9th Street appears to have adequate capacity and is available to serve the proposed single family units. The line is approximately 3-4' below the surface of the roadway.

DOMESTIC WATER
Minimum Required Improvement:

- There is an existing 6" cast iron water line. The Water Master Plan identifies this line needs to be upgraded to an 8” ductile iron pipe. The construction of single family homes does not trigger the applicant to upsize this line to serve the development unless installation of a new hydrant necessitates upsizing of the line.

- Fire hydrants in the vicinity of the project exceed the desired 400 foot spacing standard for residential zones. As such, the applicant may be required to install a new hydrant along 9th Street. Coordination with Tualatin Valley Fire and Rescue is needed.

SURFACE WATER (STORM SEWER)
Minimum Required Improvement:

- Onsite run-off generated from new impervious areas of greater than 500 square feet must be captured, treated, and disposed of with the *Portland Stormwater Management Manual,* the Uniform Plumbing Code, and *City of West Linn Public Works Standards*.
- Stormwater facilities shall be privately owned and maintained.

OTHER

- The proposed development will disturb less than 1 acre, therefore a West Linn Erosion Control Permit Application, as outlined in Section 2.0065 of the *City of West Linn Public Works Standards,* will be required prior to the commencement of construction.
- The applicant shall pay all applicable System Development Charges (SDCs).

City of West Linn
PRE-APPLICATION CONFERENCE
MEETING SUMMARY NOTES
June 20, 2019

SUBJECT:	Proposed Water Resource Area (WRA) Permit, Flood Management Area (FMA) Permit, Willamette River Greenway (WRG) Permit (including Habitat Conservation Area (HCA)) and Possible Public Utility Easement Vacation for development of two to three homes on three existing lots of record south of 0 9th Street (Adjacent to 1220 9 Street).
FILE:	PA-19-14
ATTENDEES:	Applicant: Roy Marvin, Zach Pelz (AKS) Staff: Amy Pepper, Development Engineer; Jennifer Arnold, Associate Planner Others: Gray Smith, Kathie Halicki (WNA), Tony Sanseri, Liz Sanseri

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The following is a summary of the meeting discussion provided to you from staff meeting notes. Additional information may be provided to address any "follow-up" items identified during the meeting. These comments are PRELIMINARY in nature. Please contact the Planning Department with any questions regarding approval criteria, submittal requirements, or any other planning-related items. Please note disclaimer statement below.

Site Information

Tax Not No.:	Tax lot 800 of Assessor's Map 31E2AC
Site Area:	163,924 square feet
Zoning:	R-10 (Single-family residential, 10,000 sq. ft. minimum lot size) Environmental Overlays: FMA, HCA and WRA

Project Details: The applicant proposes to build two to three homes on three existing lots of record: lots A, B and C; Block 20 of the Willamette and Tualatin Tracts subdivision plat. The boundary between lots A and C have been modified by a LLA. Parcel A is now referred to as Parcel 1 and Parcel B is now referenced at Parcel 2, leaving Parcel B the same. The applicant vacated the public right-of-way on the north and west side property lines. A requirement of this vacation was to place a public utility easement over the entire vacated right-of-way for each vacated section. The applicant has proposed to vacate half of the public utility easement in an effort to move the buildable envelope further away from the protected wetland and habitat conservation area.

Discussion: The property is fully encompassed by the 100-year floodplain. Homes will have to be built so that all structural elements of the first habitable floor are one foot above the flood elevation. A Flood Management Area (FMA) permit is required.

A wetland delineation was done by AKS Engineering and Forestry LLC dated March 29, 2017. A Department of State Lands (DSL) jurisdictional determination is required. The WRA setback extends 65 feet south of the wetland per CDC Chapter 32. A WRA permit is required. The homes will be constructed outside of the delineated wetlands.

Per the Metro Habitat Conservation Area (HCA) map, the entire property is in a "Moderate" HCA. HCAs are regulated under CDC Chapter 28: Willamette and Tualatin River Protection (WRG). A WRG permit is required.

Both the WRA and WRG chapters have hardship provisions that accommodate the construction of single family homes on lots of record (including those modified by lot line adjustment). CDC 28.110(E) allows "construction of 5,000 square feet of total impervious surface for sites in HCAs". Although CDC

32.110(B) allows a maximum disturbed area (MDA) of (1) Five thousand square feet of the WRA; or (2) Thirty percent of the total area of the WRA, the lesser allowance of Chapter 28.110(E) means that the MDA is limited to 5,000 square feet. The use of a street in the Third Avenue ROW would not count against the 5,000 square foot allowance (per 32.110(E) (3)). All structures including cantilevered decks will count against the 5,000 square feet. To move closer to the wetland than 15 feet, two options are available: a Class II Variance (CDC Chapter 75) or making use of CDC 32.070/32.080 "ALTERNATE REVIEW PROCESS" that applicants can use when there is reason to believe that the width of the WRA setback is larger than necessary to protect the functions and values of the water resource at a particular site. Similarly, the Metro HCA Map Verification process can be used to modify the HCA boundary per 28.070. A wetlands professional is required to support those WRA/HCA adjustments.

Engineering Division Comments: The applicant should contact Amy Pepper of the Engineering Department to determine required improvements at apepper@westlinnoregon.gov. Street improvements per CDC Chapter 96 will be required for 9th Street. Contact Jason Arn of TVFR at jason.arn@tvfr.com for comments; particularly whether a new hydrant is required.

Process: For the WRA permit, address the submittal requirements of CDC Chapter 32.050 and respond to the approval criteria of 32.060 which is the standard process plus the hardship provisions of 32.110. The fee is $2,600 plus a $250 inspection fee. A 1:1 vegetative mitigation plan is required for any development within 65 feet of the wetland boundary per 32.090 and 32.100. Contact DSL for any additional permits.

For the FMA permit, address the submittal requirements of CDC Chapter 27.050 (including a topographic survey of the property) (scaled site plan with lineal scale showing house and driveway footprint) and respond to the criteria of 27.060 and 27.080. The deposit fee is $1,050. Pre and post construction elevation certificates and residential crawl space flow through designs and calculations must be prepared and stamped by an Oregon licensed engineer. Any net fill proposed within the floodplain will require a HEC RAS "no rise" certificate stamped by a certified engineer. You should contact the Federal Emergency Management Agency (FEMA) regarding any additional permits.

For the WRG permit, address the submittal requirements of CDC Chapter 28.090 (28.120-28.150) and the approval criteria of 28.110. A 1:1 on-site vegetative mitigation plan is required for any development within the HCA per 32.090 and 32.100. The deposit fee is $1,700.

N/A is not an acceptable response to the approval criteria. The submittal requirements may be waived, but the applicant must first identify the specific submittal requirement and request, in letter form, that it be waived by the Planning Manager and must identify the specific grounds for that waiver. Once the application and deposit/fee are submitted, the City has 30 days to determine if the application is complete or not. If the application is not complete, the applicant has 180 days to make it complete or provide written notice to staff that no other information will be provided. Once the submittal is declared complete, staff will send out public notice of the anticipated Planning Manager's decision date at least 20 days before it occurs. A sign posted on the site. The Planning Manager's decision may be appealed to City Council by the applicant or anyone with standing.

The street vacation is a separate process per ORS 271. The fee is $1,500 and may require a hearing before City Council. Ideally, the vacation would be undertaken prior to the other permits; but may be done concurrently.

Pre-application notes are void after 18 months. After 18 months with no application approved or in process, a new pre-application conference is required.

Typical land use applications can take 6-10 months from beginning to end.

DISCLAIMER: This summary discussion covers issues identified to date. It does not imply that these are the only issues. The burden of proof is on the applicant to demonstrate that all approval criteria have been met. These notes do not constitute an endorsement of the proposed application ***or provide any assurance of potential outcomes***. Staff responses are based on limited material presented at this pre-application meeting. New issues, requirements, etc. could emerge as the application is developed. ***A new pre-application conference would have to be scheduled one that period lapses and these notes would no longer be valid. Any changes to the CDC standards may require a different design or submittal.***

Exhibit I: Preliminary Stormwater Report

9th Street
West Linn, Oregon
Preliminary Stormwater Report

Date:	January 2020
Client:	Malibar Group, LLC
Engineering Contact:	Jonathon Morse, PE
Engineering Firm:	AKS Engineering & Forestry, LLC
AKS Job No.:	5926

AKS
ENGINEERING & FORESTRY
12965 SW Herman Road, Suite 100
Tualatin, OR 97062
P: (503) 563-6151
www.aks-eng.com

Engineer's Certification

As the design engineer for the above-mentioned development project, I hereby certify that the storm water management facilities have been designed in accordance with the City of West Linn *Public Works Design Standards* (2010) and the City of Portland *Stormwater Management Manual* (2016). The technical information and data contained in this report was prepared under the direction and supervision of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

REGISTERED PROFESSIONAL
ENGINEER
77922PE
OREGON
JANUARY 12, 2010
JONATHON M. MORSE

RENEWAL DATE: 12/31/20

Table of Contents

Tables

Appendices

Preliminary Stormwater Report

9TH STREET

WEST LINN, OREGON

1.0 Purpose Statement

The purpose of this report is to:

- Show compliance with all City of West Linn stormwater drainage requirements and design criteria.
- Provide site data, calculations, maps, drawings, cross-sections, analysis, and other information needed to support and verify the findings and conclusions of the drainage report.
- Prepare a conceptual stormwater drainage plan to mitigate the stormwater drainage impacts of the development.
- Provide evidence (plans) that the planned drainage system and facilities will meet required design criteria, will fit on the site, and will, to the greatest extent possible, avoid or minimize destruction or loss of natural resources.
- Provide design criteria needed to prepare construction plans and specifications.

2.0 Project Overview

2.1 Location

The subject site is located on Tax Lot 802 of Clackamas County Assessor's Map 3 1E 2AC, ±500 feet north of the intersection of Volpp Street and 9th Street.

2.2 Soil Classification

The Natural Resources Conservation Service (NRCS) Soil Survey of Clackamas County, Oregon (Appendix 4-1) classifies the on-site soils as Wapato silty clay loam, 0 to 3 percent slopes (HSG B) and Cloquato silt loam, 0 to 3 percent slopes (HSG C/D).

On November 13th, 2019 the project geotechnical engineer conducted a site evaluation (Appendix 5-1). On-site soil infiltration testing was not performed due to groundwater seepage observed at various depths in all the test pits. It is the opinion of the geotechnical contractor, GeoPacific Engineering, Inc., that on-site stormwater infiltration is not feasible at this site.

2.3 Existing Site

The subject site is currently undeveloped land.

2.4 Project Overview

Planned improvements include the construction of a new single-family residence with associated on-site improvements (e.g., paved driveway, utilities, etc.) and the construction of a private stormwater management facility.

2.5 Design Criteria

New impervious areas created with this project will be greater than 1,000 square feet. Per the City of West Linn *Public Works Design Standards* (2010) Section 2, Storm Drain Requirements, stormwater quality and detention will be required as follows:

- Stormwater discharge from the subject site for the 2-, 10-, and 25-year storm events shall not exceed that of the pre-developed condition.
- Removal of 70 percent of total suspended solids (TSS) from 90 percent of the average annual runoff is required per the City of Portland *Stormwater Management Manual* (2016) Chapter 1, Requirements and Policies, Stormwater Management and Conveyance Requirements.

2.6 Impervious Area Calculations

This project will add approximately 2,765 square feet of new impervious area, including 2,080 square feet of impervious roof area and 685 square feet of impervious driveway and patio/deck area (see Appendix 2-1).

Table 2-1: Impervious Area Table	
Post-Developed Condition	**Area (square feet)**
New Roof Area (Home and Garage)	2,080
New Driveway, Patio, Deck	685
Total New	**2,765**

3.0 Existing Drainage Characteristics

3.1 On-site Drainage Characteristics

Based on the site topographic survey, onsite slopes range between 1 and 20 percent, with the site generally draining south towards an existing wetland.

3.2 Uphill Drainage Characteristics

There are no observed drainage channels entering the site from the uphill drainage area.

The area uphill of the subject site consists of single-family residential homes on large developed lots with partially landscaped yards.

3.3 Downhill Drainage Characteristics

The subject site drains down slope into the existing wetland to the south. Wetland drainage is conveyed across 9th street via an existing 18-inch culvert.

4.0 Proposed Drainage Conveyance Systems

4.1 On-site Conveyance

Stormwater runoff generated by the newly created impervious areas will be managed on site via a private, lined and vegetated stormwater planter.

Stormwater runoff from the home's impervious roof area will be captured by the new home's gutter system and routed via closed-conduit storm pipe into the stormwater planter for detention. Stormwater runoff generated by the impervious patio/deck areas, will be captured by an area drain where it will also be piped to the same stormwater planter for treatment and detention.

Stormwater runoff from the new impervious driveway area will be captured by an area drain where it will be piped via closed-conduit storm pipe to the stormwater planter for treatment and detention.

The City of Portland's Presumptive Approach Calculator web application (PAC) was used to determine the approximate required size of the planned stormwater facility. The lined planter's size reduces the discharge rate from 5-, 10-, and 25-year storm events to that of the pre-development discharge rate. Planter design is preliminary and will be finalized with the building permit application.

4.2 Uphill Conveyance

The site topographic survey indicates there are no defined drainage channels entering the site and there does not appear to be any significant sheet, shallow concentrated, or channelized flow entering the subject site.

4.3 Downstream Conveyance

Stormwater runoff generated from storm events will be conveyed through the private, lined and vegetated planter and discharged to the adjacent ground via an outlet pipe where it will sheet flow and disperse into the adjacent wetland.

5.0 Surface Water Quality and Detention Facilities

5.1 Private Stormwater Management Facility

Stormwater management will consist of a private, lined and vegetated stormwater planter system located on-site. The PAC was used to determine the approximate required size of the planned stormwater facility. The lined planter reduces the discharge rate from 5-, 10-, and 25-year events to that of the pre-development discharge rate. Planter design is preliminary and will be finalized with the building permit application.

Table 5-1 provides a comparison between the pre-developed and post-developed runoff for the 2-, 5-, 10-, and 25-year storm events showing onsite detention.

Table 5-1: Pre-Developed vs. Post-Developed Runoff Comparison

Storm Event	Pre-Developed Runoff (cubic feet per second)	Post-Developed Runoff (cubic feet per second)
2-Year Storm Event	0.003	0.008
5-Year Storm Event	0.008	0.008
10-Year Storm Event	0.013	0.008
25-Year Storm Event	0.019	0.019

As designed, stormwater runoff generated by the new impervious areas will be detained on site and outflow will be reduced to pre-developed rate for 5-, 10-, and 25-year storm events.

<u>APPENDIX 1-1</u>

VICINITY MAP

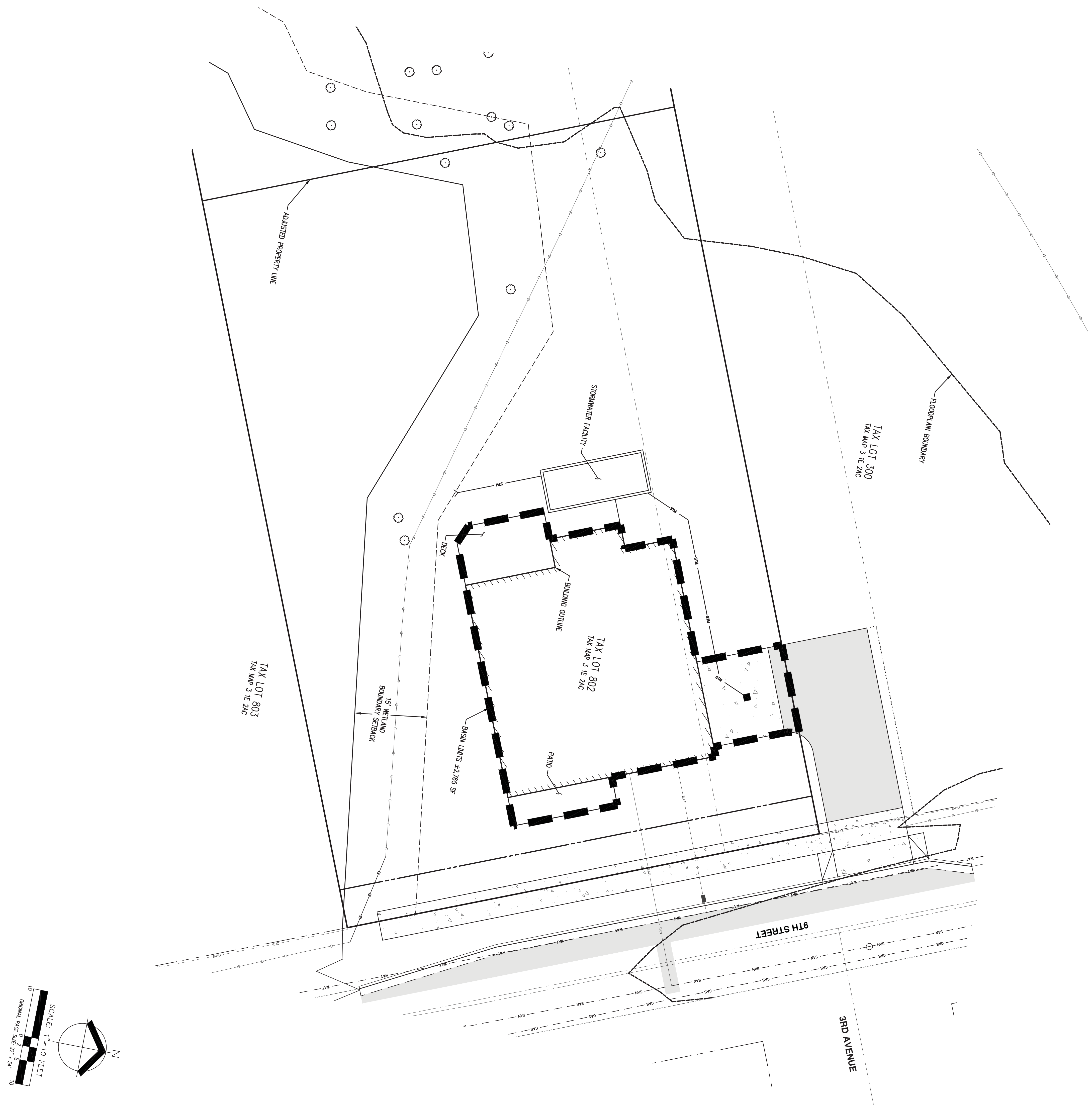
VICINITY MAP

SCALE 1" = 100'

APPENDIX 2-1

BASIN MAP

AKS DRAWING FILE: 5926 BASINS.DWG | LAYOUT: LAYOUT1



BASIN MAP
9TH STREET
CONSOLIDATED LAND USE APPLICATION
WEST LINN, OREGON (TAX LOT 802 TAX MAP 3 1E 2AC)

PRELIMINARY
NOT FOR
CONSTRUCTION

JOHN M. MORSE
RENEWAL DATE: 12/31/20

JOB NUMBER: 5926
DATE:
DESIGNED BY: APC & LTP
DRAWN BY: APC
CHECKED BY: JMM

01

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD, STE 100
TUALATIN, OR 97062
503.563.6151
WWW.AKS-ENG.COM

ENGINEERING · SURVEYING · NATURAL RESOURCES
FORESTRY · PLANNING · LANDSCAPE ARCHITECTURE

APPENDIX 3-1

PORTLAND PRESUMPTIVE APPROACH CALCULATOR REPORT

PAC Report

Project Name 9th Street (West Linn)	Permit No.	Created 12/16/19 2:07 PM
Project Address 1220 9th street west linn, OR 97068	Designer Andreas Collins	Last Modified 12/17/19 3:43 PM
	Company AKS Engineering and Forestry, LLC	Report Generated 12/17/19 3:43 PM

Project Summary

Private development in West Linn

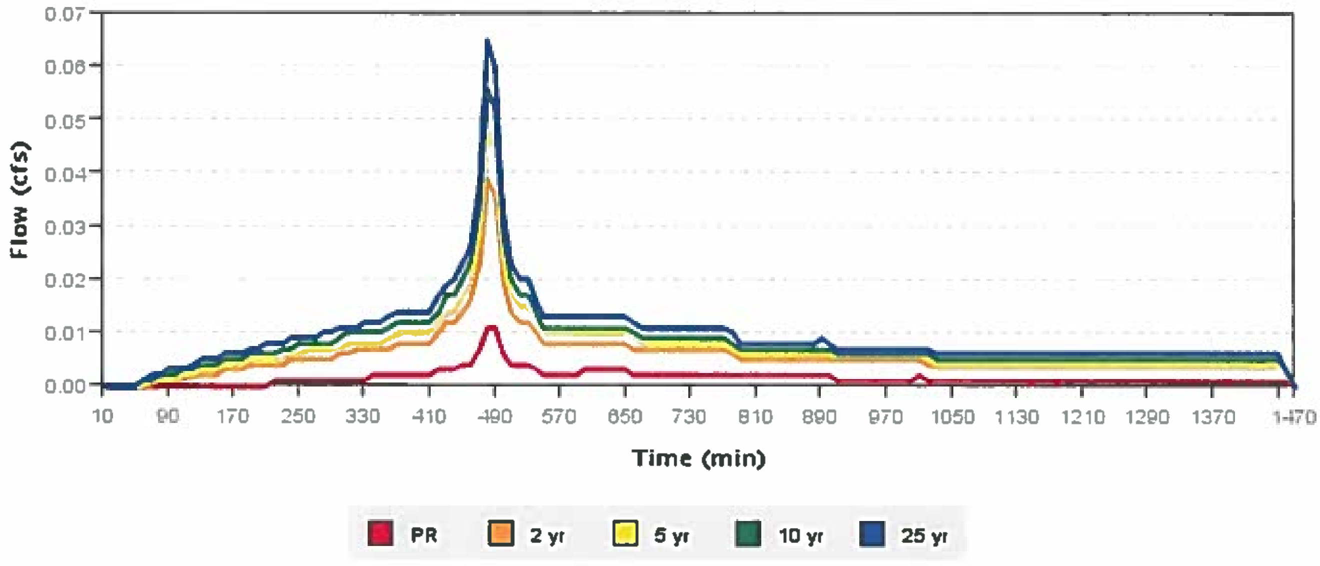
Catchment Name	Impervious Area (sq ft)	Native Soil Design Infiltration Rate	Hierarchy Category	Facility Type	Facility Config	Facility Size (sq ft)	Facility Sizing Ratio	PR Results	Flow Control Results
Planter 1	2765	0.00	3	Planter (Flat)	D	166	6%	Pass	Fail

Catchment Planter 1

Site Soils & Infiltration Testing Data	Infiltration Testing Procedure	**Encased Falling Head**
	Native Soil Infiltration Rate (I_{test})	**0.00** ⚠
Correction Factor	CF_{test}	**2**
Design Infiltration Rates	Native Soil (I_{dsgn})	**0.00 in/hr** ⚠
	Imported Growing Medium	**2.00 in/hr**
Catchment Information	Hierarchy Category	**3**
	Disposal Point	**B**
	Hierarchy Description	**Off-site flow to drainageway, river, or storm-only pipe system**
	Pollution Reduction Requirement	**Pass**
	10-year Storm Requirement	**N/A**
	Flow Control Requirement	**If discharging to an overland drainage system or to a storm sewer that discharges to an overland drainage system, including streams, drainageways, and ditches, the 2-year post-development peak flow must be equal or less than half of the 2-year pre-development rate and the 5, 10, and 25-year post-development peak rate must be equal or less than the pre-development rates for the corresponding design storms.**
	Impervious Area	**2765 sq ft** **0.063 acre**
	Time of Concentration (Tc)	**5**
	Pre-Development Curve Number (CN_{pre})	**72**
	Post-Development Curve Number (CN_{post})	**98**

⚠ Indicates value is outside of recommended range

SBUH Results



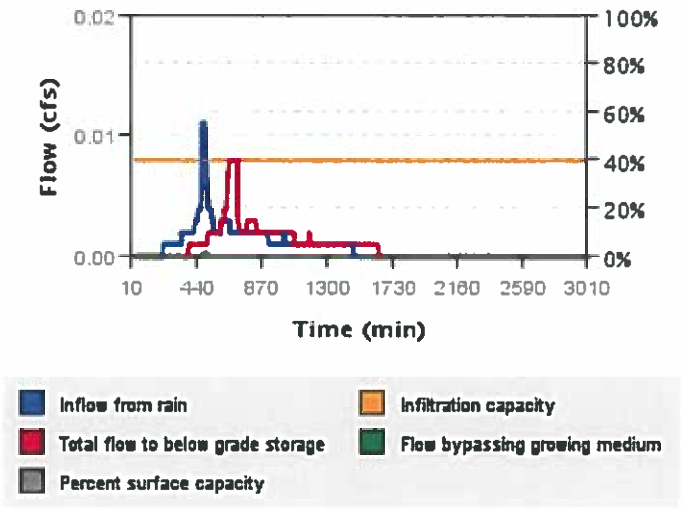
	Pre-Development Rate and Volume		Post-Development Rate and Volume	
	Peak Rate (cfs)	Volume (cf)	Peak Rate (cfs)	Volume (cf)
PR	0	0.159	0.011	144.479
2 yr	0.003	110.026	0.039	500.315
5 yr	0.008	172.64	0.048	614.913
10 yr	0.013	243.331	0.056	729.681
25 yr	0.019	320.372	0.065	844.558

Facility Planter 1

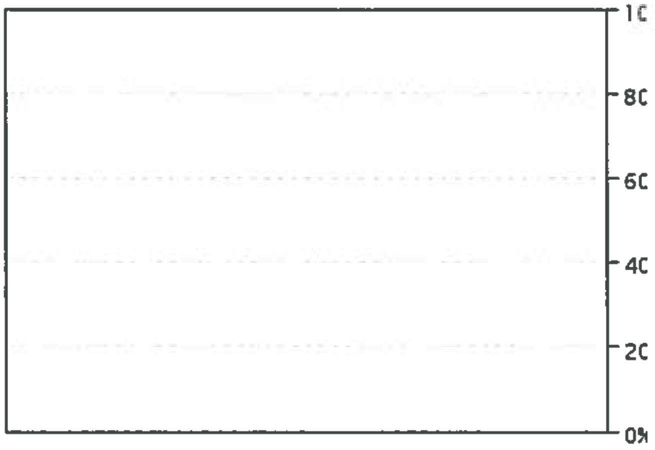
Facility Details	Facility Type	**Planter (Flat)**
	Facility Configuration	**D: Lined Facility with RS and Ud**
	Facility Shape	**Planter**
	Above Grade Storage Data	
	Bottom Area	**166 sq ft**
	Bottom Width	**5.00 ft**
	Storage Depth 1	**15.0 in**
	Growing Medium Depth	**18 in**
	Surface Capacity at Depth 1	**207.5 cu ft**
	Design Infiltration Rate for Native Soil	**0.000 in/hr**
	Infiltration Capacity	**0.008 cfs**
Facility Facts	Total Facility Area Including Freeboard	**166.00 sq ft**
	Sizing Ratio	**6%**
Pollution Reduction Results	Pollution Reduction Score	**Pass**
	Overflow Volume	**148.154 cf**
	Surface Capacity Used	**2%**
Flow Control Results	Flow Control Score	**Fail**
	Overflow Volume	**729.728 cf**
	Surface Capacity Used	**96%**

	Post-development outflow (cfs)		Pre-development inflow (cfs)	
2 year	0.008	≤ ½ of	0.003	Fail
5 year	0.008	≤	0.008	Pass
10 year	0.008	≤	0.013	Pass
25 year	0.016	≤	0.019	Pass

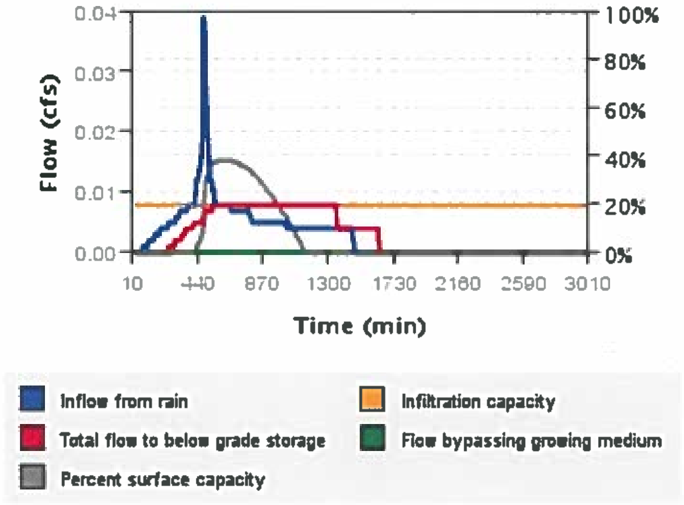
Pollution Reduction Event Surface Facility Modeling



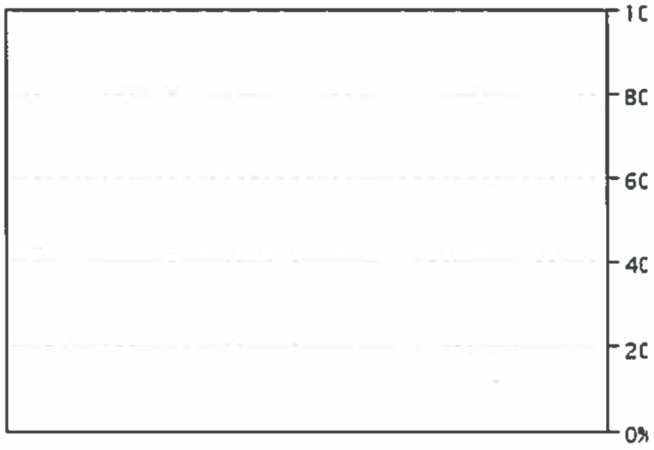
Pollution Reduction Event Below Grade Modeling



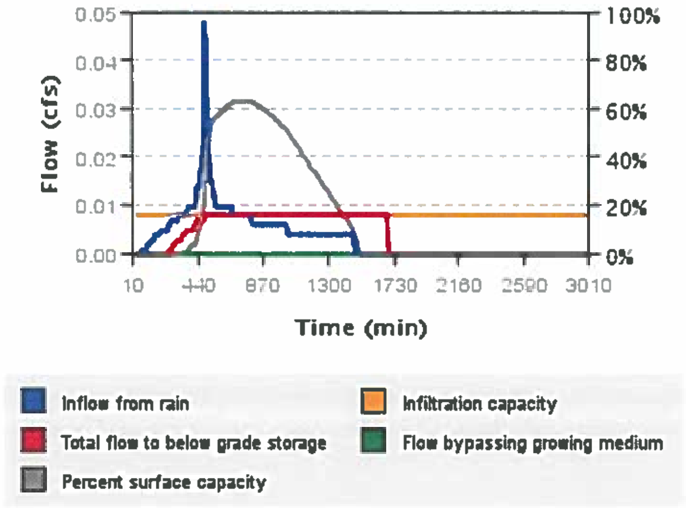
2 Year Event Surface Facility Modeling



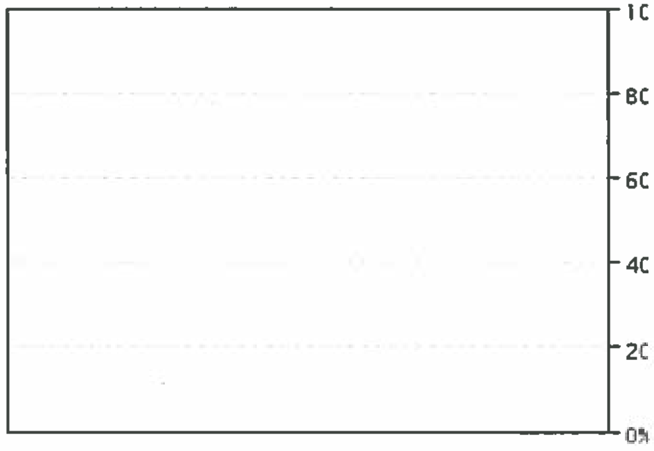
2 Year Event Below Grade Modeling

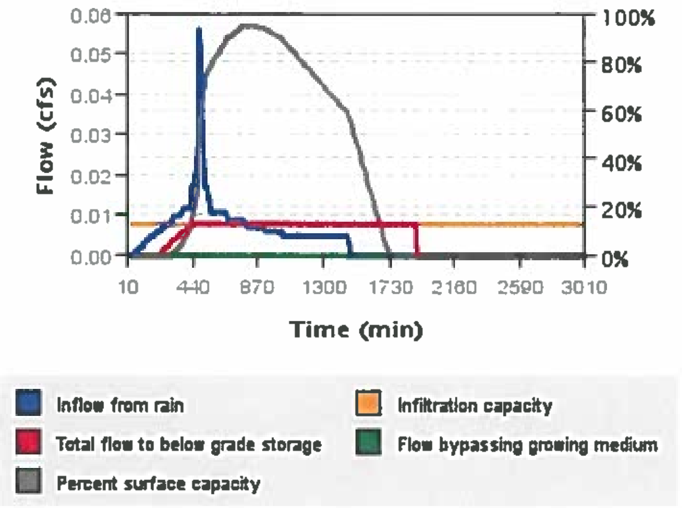


5 Year Event Surface Facility Modeling

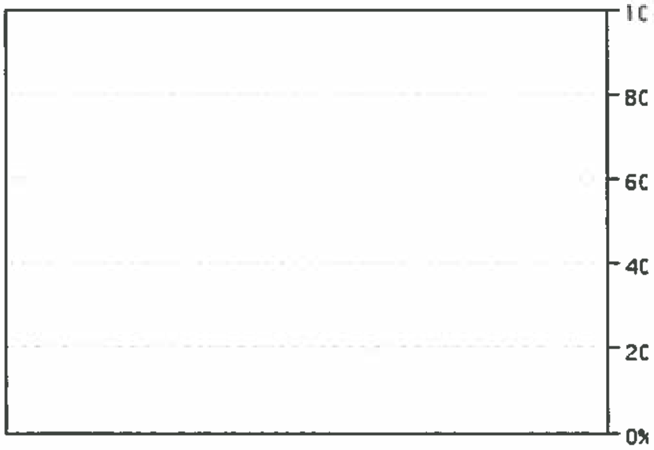


5 Year Event Below Grade Modeling

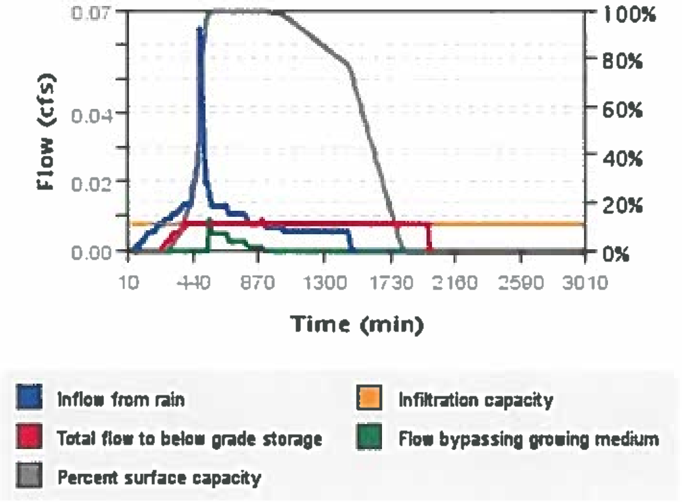




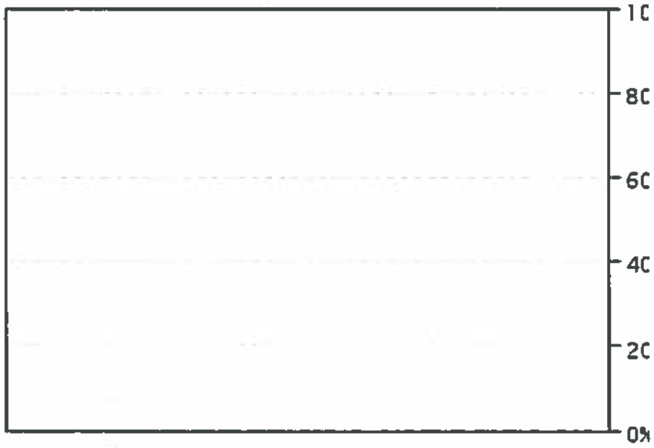
10 Year Event Surface Facility Modeling



10 Year Event Below Grade Modeling



25 Year Event Surface Facility Modeling



25 Year Event Below Grade Modeling

APPENDIX 4-1

SOIL INFORMATION FROM THE NRCS SOIL SURVEY OF CLACKAMAS COUNTY, OREGON

United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Clackamas County Area, Oregon

Tax Lot 802

December 17, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:630 if printed on A landscape (11" x 8.5") sheet.

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:
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 15, Sep 10, 2019

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

Date(s) aerial images were photographed: Jun 13, 2019—Jul 25, 2019

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
19	Cloquato silt loam	0.2	16.6%
84	Wapato silty clay loam	0.8	83.4%
Totals for Area of Interest		**1.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Clackamas County Area, Oregon

19—Cloquato silt loam

Map Unit Setting

National map unit symbol: 223k
Elevation: 50 to 1,200 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Cloquato and similar soils: 85 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cloquato

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 15 inches: silt loam
H2 - 15 to 42 inches: silt loam
H3 - 42 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water storage in profile: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Forage suitability group: Well drained < 15% Slopes (G002XY002OR)
Hydric soil rating: No

Minor Components

Wapato

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear

Across-slope shape: Linear
Hydric soil rating: Yes

Aquolls

Percent of map unit: 1 percent
Landform: Flood plains
Hydric soil rating: Yes

84—Wapato silty clay loam

Map Unit Setting

National map unit symbol: 227j
Elevation: 100 to 1,500 feet
Mean annual precipitation: 40 to 60 inches
Mean annual air temperature: 52 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Wapato and similar soils: 85 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wapato

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 18 inches: silty clay loam
H2 - 18 to 45 inches: silty clay loam
H3 - 45 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water storage in profile: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): 3w

Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Forage suitability group: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Minor Components

Cove

Percent of map unit: 6 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Humaquepts

Percent of map unit: 4 percent
Landform: Flood plains
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX 5-1

GEOTECHNICAL ENGINEERING REPORT FROM GEOPACIFIC ENGINEERING, INC.

Real-World Geotechnical Solutions
Investigation • Design • Construction Support

Geotechnical Engineering Report

9th Street
Clackamas County Tax Map 3 1E 02AC Lot 800 and 802
West Linn, Oregon

GeoPacific Engineering, Inc. Project No. 19-5350
November 26, 2019

14835 SW 72nd Avenue
Portland, Oregon 97224

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

TABLE OF CONTENTS

List of Appendices

List of Figures

Real-World Geotechnical Solutions
Investigation • Design • Construction Support

November 26, 2019
Project No. 19-5350

Mr. Roy Marvin
Malibar Group Retirement Plan FBO
615 W Territorial Road
Canby, Oregon 97013
Cellular Phone: 541-621-2109

CC: Zach Pelz, AKS Engineering & Forestry, LLC.
Email: pelzz@aks-eng.com

SUBJECT: GEOTECHNICAL ENGINEERING REPORT
9TH STREET
CLACKAMAS COUNTY TAX LOTS 3 1E 02AC 800 & 802
WEST LINN, OREGON 97068

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 geotechnical recommendations for site development. This geotechnical study was performed in accordance with GeoPacific Proposal No. P-7124, dated October 8, 2019, and your subsequent authorization of our proposal and *General Conditions for Geotechnical Services*.

SITE AND PROJECT DESCRIPTION

The subject property is composed of two parcels, identified as 31E02AC 0800 and 0802 and located on the southwest side of 9th Street in the City of West Linn, Clackamas County, Oregon. The combined parcels are approximately 1.80 acres in size and slope gently to the east at grades of less than 10 percent, in the direction of the Willamette River. The site is bordered by 9th Street to the northeast, by a wooded area and baseball fields to the southwest, by grass fields of a designated wetland to the south east, and by residential properties to the northwest. Ground elevations range from 70 to 80 feet above mean sea level. The site is currently unimproved, however; several flattened areas are present in the western portion of the site, adjacent to a neighboring stable. There is also an existing pond near the center of the western parcel. Vegetation consists of numerous dense trees to the southeast and grass lawns to the northwest.

It is our understanding that proposed development will include construction of two building lots for single family homes, construction of a private drive, improvements to the south bound lane of 9th Street, and associated underground utilities. A grading plan was not provided for our review; however, we anticipate cuts and fill will be less than 4 feet.

REGIONAL GEOLOGIC SETTING

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.

The southern portions of the site are underlain by alluvium, consisting of silt and clay with trace sand. The soils were deposited in a flood plain of the modern Willamette River, near the mouth of a tributary, the Tualatin River (Gannet and Caldwell, 1998, Beeson et all, 1989).

The alluvium and northern portion of the site are underlain by the Quaternary age (last 2.6 million years) Willamette Formation, a catastrophic flood deposit associated with repeated glacial outburst flooding of the Willamette Valley (Yeats et al., 1996). The last of these outburst floods occurred about 10,000 years ago. These deposits typically consist of horizontally layered, micaceous, silt to coarse sand forming poorly-defined to distinct beds less than 3 feet thick.

The Willamette Formation is underlain by the Columbia River Basalt Formation (Madin, 1990). The Miocene aged (about 14.5 to 16.5 million years ago) Columbia River Basalts are a thick sequence of lava flows which form the crystalline basement of the Tualatin Valley. The basalts are composed of dense, finely crystalline rock that is commonly fractured along blocky and columnar vertical joints. Individual basalt flow units typically range from 25 to 125 feet thick and interflow zones are typically vesicular, scoriaceous, brecciated, and sometimes include sedimentary rocks.

REGIONAL SEISMIC SETTING

At least three major fault zones capable of generating damaging earthquakes are thought to exist in the vicinity of the subject site. These include the Cascadia Subduction Zone, the Portland Hills Fault Zone, and the Bolton Fault Zone.

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 roughly along the Oregon coast at depths of between 20 and 40 miles.

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 3.5 and 5.0 miles. The combined three faults 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 about 5 miles northeast of the site. The Oatfield Fault occurs along the western side of the Portland Hills and is about 4 miles east of the site. The Oatfield Fault is considered to be potentially seismogenic (Wong, et al., 2000). Madin and Mabey (1993) indicate the Portland Hills Fault Zone has experienced Late Quaternary (last 780,000 years) fault movement; however, movement has not been detected in the last 20,000 years. The East Bank Fault occurs along the eastern margin of the Willamette River, and is located approximately 12 miles north of the site. The accuracy of the fault mapping is stated to be within 500 meters (Wong, et al., 2000).

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).

Bolton Fault Zone

The Bolton Fault Zone is a NW-trending fault that lies about 2 miles northeast of the subject site (DOGAMI: HazVu, 2019). The USGS: Earthquake Hazards Program and geologic mapping of the area (Beeson et al, 1989) indicate that a large northeast-facing cliff of Miocene Columbia River Basalt is caused by offset of approximately 200 meters in the fault, which is likely a southwest-dipping reverse fault. This cliff face roughly parallels the existing Highway 43 in the City of West Linn. Unambiguous evidence of Quaternary (last 2.6 million years) displacement has not been presented to date, but the fault is considered potentially active due to the bedrock escarpment along the alignment of the fault (Unruh et al., 1994).

FIELD EXPLORATION AND SUBSURFACE CONDITIONS

On November 13, 2019, GeoPacific explored subsurface conditions at the site by excavating four exploratory test pits to depths of 9 to 11 feet with an extendable back-hoe, operated by Dan Fischer Excavating. The approximate test pit locations are shown on Figure 2. It should be noted that test pit 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.

A GeoPacific geologist continuously monitored the field exploration program and logged the test pit explorations. Soils observed in the explorations were classified in general accordance with the Unified Soil Classification System. Rock hardness was classified in accordance with Table 1, modified from the ODOT Rock Hardness Classification Chart. During exploration, our geologist also noted geotechnical conditions such as soil consistency, moisture and groundwater conditions. Logs of test pits are attached to this report. The following report sections are based on the exploration program and summarize subsurface conditions encountered at the site.

Table 1. Rock Hardness Classification Chart

ODOT Rock Hardness Rating	Field Criteria	Unconfined Compressive Strength	Typical Equipment Needed for Excavation
Extremely Soft (R0)	Indented by thumbnail	<100 psi	Small excavator
Very Soft (R1)	Scratched by thumbnail, crumbled by rock hammer	100-1,000 psi	Small excavator
Soft (R2)	Not scratched by thumbnail, indented by rock hammer	1,000-4,000 psi	Medium excavator (slow digging with small excavator)
Medium Hard (R3)	Scratched or fractured by rock hammer	4,000-8,000 psi	Medium to large excavator (slow to very slow digging), typically requires chipping with hydraulic hammer or mass excavation)
Hard (R4)	Scratched or fractured w/ difficulty	8,000-16,000 psi	Slow chipping with hydraulic hammer and/or blasting
Very Hard (R5)	Not scratched or fractured after many blows, hammer rebounds	>16,000 psi	Blasting

Summary test pit logs are attached. The stratigraphic contacts shown on the individual logs represent the approximate boundaries between soil types. The actual transitions may be more gradual. The soil and groundwater conditions depicted are only for the specific dates and locations reported, and therefore, are not necessarily representative of other locations and times. Soil and groundwater conditions encountered in the explorations are summarized below.

At the completion of exploration, the test pits were backfilled with the excavated spoils and tamped with the backhoe bucket. This backfill should not be expected to behave as compacted structural fill and some minor settling of the ground surface may occur.

Soils

Topsoil Horizon: Directly underlying the ground surface in all test pit explorations was a topsoil horizon consisting of dark brown, highly organic SILT (OL). The topsoil horizon was generally loose, contained fine roots throughout, and extended to depths of 6 to 12 inches.

Undocumented Fill: Beneath the topsoil layer in test pits TP-1, TP-2 and TP-4 was undocumented fill consisting of asphaltic concrete fragments and cobbles to boulders up to several feet in diameter mixed with clayey-silt soils. The undocumented fill extended to 6.5 feet below existing surface grade in test pit TP-1, 7 feet in test pit TP-2 and 3.5 feet in test pit TP-4.

Willamette Formation: Underlying undocumented fill in test pits TP-1, TP-2 and TP-4 and the topsoil horizon in test pit TP-3 were fine-grained soils belonging to the Willamette Formation. Near surface soils in test pit TP-3 were a light brown, moist, clayey SILT (ML) that was stiff to very stiff consistency. Field pocket penetrometer measurements indicate an approximate unconfined compressive strength of 3.0 to 4.5 tons/ft^2 in the upper four feet of test pit TP-3. At depth in test pit TP-3 and beneath the undocumented fill in test pits TP-1, TP-2 and TP-4 was soft to stiff, CLAY (CL) to SILT (ML) with trace fine-grained sand, that ranged in color from light tan with orange and gray mottling to a blue-gray. The Willamette Formation soils ranged from moist to wet and were generally soft in areas of seepage. This material extended beyond the maximum depth of our explorations, approximately 11 feet below the ground surface.

Groundwater and Soil Moisture

On November 13, 2019, groundwater seepage was encountered in all our test pit explorations. Locations and depths of seepage observed are presented below in Table 2. Soil moistures observed were generally considered to be moist to wet. Soils observed at depth, particularly in the southern test pits, TP-1 and TP-4, display a blue-gray color typically observed in anaerobic environments and areas were moisture is present throughout the year.

According to the *Estimated Depth to Groundwater in the Portland, Oregon Area, (United States Geological Survey, 2019)*, groundwater is expected to be present at an approximate depth of 4-10 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.

Table 2- Summary of Groundwater Seepage Encountered

Exploration Designation	Depth (feet)	Soil Type	Visually Estimated Flow Rate
TP-1	4 & 10	Fill & SILT (ML)	¼ Gal/min
TP-2	6 to 7	Organic SILT (OL)	¼ gal/min
TP-3	8 to 11	SILT (ML)	Static
TP-4	2, 4 & 7	Fill & SILT (ML)	½ gal/min

Infiltration Testing

On November 13, 2019, soil infiltration testing was not performed due to groundwater seepage observed at various depths in all of our test pits explorations. It is our opinion that onsite infiltration is not a feasible option for the proposed structures.

CONCLUSIONS AND RECOMMENDATIONS

Our investigation indicates that the proposed development is geotechnically feasible, provided that the recommendations of this report are incorporated into the design and sufficient geotechnical monitoring is incorporated into the construction phases of the project. The primary geotechnical concerns associated with development at the property are:

1) The presence of soft to loose undocumented fill. Undocumented fill consisting of asphaltic concrete fragments, cobbles to boulders and soil was observed in test pits TP-1, TP-2 and TP-4 to depths of 6.5 feet, 7 feet and 3.5 feet, respectfully.

2) The presence of groundwater seepage and low permeability of onsite soils. Onsite infiltration testing could not be performed due to the presence of groundwater seepage at various elevations in all of our test pit explorations (see test pit logs) and the fine-grained native soil types observed in our explorations typically exhibit low permeability.

Site Preparation Recommendations

Areas of proposed buildings, new roadways, and areas to receive fill should be cleared of vegetation and any organic and inorganic debris or fill. Existing buried structures should be demolished and any cavities structurally backfilled. Inorganic debris and organic materials from clearing should be removed from the site.

Existing fill and any organic-rich topsoil should then be stripped from construction areas of the site or where engineered fill is to be placed. The estimated depth necessary for removal of topsoil is approximately 8 to 10 inches – deeper stripping may be necessary to remove large tree roots in isolated areas. Undocumented fill was encountered in test pits TP-1, TP-2 and TP-4 to depths of 6.5 feet, 7 feet and 3.5 feet, respectfully.

The final depth of soil removal will be determined on the basis of a site inspection after the stripping/ excavation has been performed. Stripped topsoil should preferably 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.

Any remaining undocumented fills and subsurface structures (tile drains, basements, driveway and landscaping fill, old utility lines, septic leach fields, etc.) should be removed and the excavations backfilled with engineered fill.

Once stripping of a particular area is approved, the area must be ripped or tilled to a depth of 12 inches, moisture conditioned, root-picked, and compacted in-place prior to the placement of engineered fill or crushed aggregate base for pavement. Exposed subgrade soils should be evaluated by the geotechnical engineer. For large areas, this evaluation is normally performed by proof-rolling the exposed subgrade with a fully loaded scraper or dump truck. For smaller areas where access is restricted, the subgrade should be evaluated by probing the soil with a steel probe. Soft/loose soils identified during subgrade preparation should be compacted to a firm and unyielding condition, over-excavated and replaced with engineered fill (as described below) or stabilized with rock prior to placement of engineered fill. The depth of over-excavation, if required, should be evaluated by the geotechnical engineer at the time of construction.

Engineered Fill

All grading for the proposed development should be performed as engineered grading in accordance with the applicable building code at time of construction with the exceptions and additions noted herein.

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 95% of the maximum dry density determined by ASTM D698 (Standard 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. Rocky fill may need to be evaluated by proofrolling and should be placed wet of optimum moisture content. 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. Earthwork in wet weather would likely require extensive use of cement or lime treatment, or other special measures, at considerable additional cost compared to earthwork performed under dry-weather conditions.

Excavating Conditions and Utility Trench Backfill

All temporary cuts in excess of 4 feet in height should be sloped in accordance with U.S. Occupational Safety and Health Administration (OSHA) regulations (29 CFR Part 1926) or be shored. The existing native soils classify as Type B Soil and temporary excavation side slope inclinations as steep as 1H:1V may be assumed for planning purposes. This cut slope inclination is applicable to excavations above the water table only. 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.

Saturated soils and groundwater may be encountered in utility trenches, particularly during the wet season. We anticipate that dewatering systems consisting of ditches, sumps and pumps would be adequate for control of perched groundwater. Regardless of the dewatering system used, it should be installed and operated such that in-place soils are prevented from being removed along with the groundwater.

Vibrations created by traffic and construction equipment may cause some caving and raveling of excavation walls. In such an event, lateral support for the excavation walls should be provided by the contractor to prevent loss of ground support and possible distress to existing or previously constructed structural improvements.

PVC pipe should be installed in accordance with the procedures specified in ASTM D2321. We recommend that trench backfill be compacted to at least 95% of the maximum dry density obtained by Modified Proctor ASTM D1557 or equivalent. Initial backfill lift thickness for a ¾”-0 crushed aggregate base may need to be as great as 4 feet to reduce the risk of flattening underlying flexible pipe. Subsequent lift thickness should not exceed 1 foot. If imported granular fill material is used, then the lifts for large vibrating plate-compaction equipment (e.g. hoe compactor attachments) may be up to 2 feet, provided that proper compaction is being achieved and each lift is tested. Use of large vibrating compaction equipment should be carefully monitored near existing structures and improvements due to the potential for vibration-induced damage.

Adequate density testing should be performed during construction to verify that the recommended relative compaction is achieved. Typically, one density test is taken for every 4 vertical feet of backfill on each 200-lineal-foot section of trench.

Erosion Control Considerations

During our field exploration program, we did not observe soil types that would be considered highly susceptible to erosion except in areas of moderately sloping topography. 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 wattles and silt fences. If used, these erosion control devices should be in place and 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 are likely to 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 will probably 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 wattles, and fiber rolls should be strategically located to control erosion.

Spread Foundations

The proposed residential structures may be supported on shallow foundations bearing on engineered fill placed and compacted over competent native soils, appropriately designed and constructed as recommended in this report. Foundation design, construction, and setback requirements should conform to the applicable building code at the time of construction. For maximization of bearing strength and protection against frost heave, spread footings should be embedded at a minimum depth of 12 inches below exterior grade. Foundations should be designed by a licensed structural engineer.

The anticipated allowable soil bearing pressure is 1,500 lbs/ft^2 for footings bearing on moisture conditioned and re-compacted native soils and/or structural fill. A maximum chimney and column load of 30 kips is recommended for the site. The recommended maximum allowable bearing pressure may be increased by 1/3 for short-term transient conditions such as wind and seismic loading. For heavier loads, the geotechnical engineer should be consulted. The coefficient of friction between on-site soil and poured-in-place concrete may be taken as 0.42, which includes no factor of safety. The maximum anticipated total and differential footing movements (generally from soil expansion and/or settlement) are 1 inch and ¾ inch over a span of 20 feet, respectively. We anticipate that the majority of the estimated settlement will occur during construction, as loads are applied. Excavations near structural footings should not extend within a 1H:1V plane projected downward from the bottom edge of footings.

Footing excavations should penetrate through topsoil and any loose soil to competent subgrade that is either

1) suitable for bearing support,
2) moisture conditioned and compacted and/or
3) over-excavated and replaced with structural fill.

All footing excavations should be trimmed neat, and all loose or softened soil should be removed from the excavation bottom prior to placing reinforcing steel bars. Due to the moisture sensitivity of on-site native soils, foundations constructed during the wet weather season may require over-excavation of footings and backfill with compacted, crushed aggregate.

Our recommendations are for house construction incorporating raised wood floors and conventional spread footing foundations. If living space of the structures will incorporate basements, a geotechnical engineer should be consulted to make additional recommendations for retaining walls, water-proofing, underslab drainage and wall subdrains. After site development, a Final Soil Engineer's Report should either confirm or modify the above recommendations.

Concrete Slabs-on-Grade

Preparation of areas beneath concrete slab-on-grade floors should be performed as recommended in the *Site Preparation* section. Care should be taken during excavation for foundations and floor slabs, to avoid disturbing subgrade soils. If subgrade soils have been adversely impacted by wet weather or otherwise disturbed, the surficial soils should be scarified to a minimum depth of 8 inches, moisture conditioned to within about 3 percent of optimum moisture content and compacted to engineered fill specifications. Alternatively, disturbed soils may be removed, and the removal zone backfilled with additional crushed rock.

For evaluation of the concrete slab-on-grade floors using the beam on elastic foundation method, a modulus of subgrade reaction of 150 kcf (87 pci) should be assumed for the fine-grained soils anticipated to be present in the upper four feet at the site. This value assumes the concrete slab system is designed and constructed as recommended herein, with a minimum thickness of 8 inches of 1½”-0 crushed aggregate beneath the slab. The total thickness of crushed aggregate will be dependent on the subgrade conditions at the time of construction and should be verified visually by proof-rolling. Under-slab aggregate should be compacted to at least 90 percent of its maximum dry density as determined by ASTM D1557 (Modified Proctor) or equivalent.

In areas where moisture will be detrimental to floor coverings or equipment inside the proposed structure, appropriate vapor barrier and damp-proofing measures should be implemented. A commonly applied vapor barrier system consists of a 10-mil polyethylene vapor barrier placed directly over the capillary break material. Other damp/vapor barrier systems may also be feasible. Appropriate design professionals should be consulted regarding vapor barrier and damp proofing systems, ventilation, building material selection and mold prevention issues, which are outside GeoPacific’s area of expertise.

Permanent Below-Grade Walls

Lateral earth pressures against below-grade retaining walls will depend upon the inclination of any adjacent slopes, type of backfill, degree of wall restraint, method of backfill placement, degree of backfill compaction, drainage provisions, and magnitude and location of any adjacent surcharge loads. At-rest soil pressure is exerted on a retaining wall when it is restrained against rotation. In contrast, active soil pressure will be exerted on a wall if its top is allowed to rotate or yield a distance of roughly 0.001 times its height or greater.

If the subject retaining walls will be free to rotate at the top, they should be designed for an active earth pressure equivalent to that generated by a fluid weighing 35 pcf for level backfill against the wall. For restrained wall, an at-rest equivalent fluid pressure of 55 pcf should be used in design, again assuming level backfill against the wall. These values assume that the recommended drainage provisions are incorporated, and hydrostatic pressures are not allowed to develop against the wall.

During a seismic event, lateral earth pressures acting on below-grade structural walls will increase by an incremental amount that corresponds to the earthquake loading. Based on the Mononobe-Okabe equation and peak horizontal accelerations appropriate for the site location, seismic loading should be modeled using the active or at-rest earth pressures recommended above, plus an incremental rectangular-shaped seismic load of magnitude 6.5H, where H is the total height of the wall.

We assume relatively level ground surface below the base of the walls. As such, we recommend passive earth pressure of 320 pcf for use in design, assuming wall footings are cast against competent native soils or engineered fill. If the ground surface slopes down and away from the base of any of the walls, a lower passive earth pressure should be used and GeoPacific should be contacted for additional recommendations.

A coefficient of friction of 0.42 may be assumed along the interface between the base of the wall footing and subgrade soils. The recommended coefficient of friction and passive earth pressure values do not include a safety factor, and an appropriate safety factor should be included in design. The upper 12 inches of soil should be neglected in passive pressure computations unless it is protected by pavement or slabs on grade.

The above recommendations for lateral earth pressures assume that the backfill behind the subsurface walls will consist of properly compacted structural fill, and no adjacent surcharge loading. If the walls will be subjected to the influence of surcharge loading within a horizontal distance equal to or less than the height of the wall, the walls should be designed for the additional horizontal pressure. For uniform surcharge pressures, a uniformly distributed lateral pressure of 0.3 times the surcharge pressure should be added. Traffic surcharges may be estimated using an additional vertical load of 250 psf (2 feet of additional fill), in accordance with local practice.

The recommended equivalent fluid densities assume a free-draining condition behind the walls so that hydrostatic pressures do not build-up. This can be accomplished by placing a 12 to 18-inch wide zone of sand and gravel containing less than 5 percent passing the No. 200 sieve against the walls. A 3-inch minimum diameter perforated, plastic drain pipe should be installed at the base of the walls and connected to a suitable discharge point to remove water in this zone of sand and gravel. The drain pipe should be wrapped in filter fabric (Mirafi 140N or other as approved by the geotechnical engineer) to minimize clogging.

Wall drains are recommended to prevent detrimental effects of surface water runoff on foundations – not to dewater groundwater. Drains should not be expected to eliminate all potential sources of water entering a basement or beneath a slab-on-grade. An adequate grade to a low point outlet drain in the crawlspace is required by code. Underslab drains are sometimes added beneath the slab when placed over soils of low permeability and shallow, perched groundwater.

Water collected from the wall drains should be directed into the local storm drain system or other suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. Down spouts and roof drains should not be connected to the wall drains in order to reduce the potential for clogging. The drains should include clean-outs to allow periodic maintenance and inspection. Grades around the proposed structure should be sloped such that surface water drains away from the building.

GeoPacific should be contacted during construction to verify subgrade strength in wall keyway excavations, to verify that backslope soils are in accordance with our assumptions, and to take density tests on the wall backfill materials.

Structures should be located a horizontal distance of at least 1.5H away from the back of the retaining wall, where H is the total height of the wall. GeoPacific should be contacted for additional foundation recommendations where structures are located closer than 1.5H to the top of any wall.

Drainage

The upslope edge of perimeter footings may be provided with a drainage system consisting of 3-inch diameter, slotted, plastic pipe embedded in a minimum of 1 ft^3 per lineal foot of clean, free-draining gravel or uncompacted 3/4”-0 rock. Water collected from the footing drains should be directed into the local storm drain system or another suitable outlet. A minimum 0.5 percent fall should be maintained throughout the drain and non-perforated pipe outlet. Down spouts and roof drains should not be connected to the foundation drains in order to reduce the potential for clogging. The footing drains should include clean-outs to allow periodic maintenance and inspection. Grades around the proposed structure should be sloped such that surface water drains away from the building. Footing drain recommendations are given to prevent detrimental effects of groundwater on foundations and should not be expected to eliminate all potential sources of water entering a crawlspace. An adequate grade to a low point outlet drain in the crawlspace is required by code.

Flexible Pavement Design: 9th Street Half Street Improvement

We understand that, as part of development, improvements must be made to the existing south bound lane of 9th Street, within the property boundaries. The City of West Linn Public Works Design Standards, Section Five – Street Requirements states an approved section for Local / Neighborhood streets. Table 3 presents the approved Local / Neighborhood street section for the City of West Linn with estimated structural coefficients.

Table 3 – City of West Linn Minimum Dry-Weather Pavement Section for 9th Street

Material Layer	Section Thickness (in.)	Structural Coefficient	Compaction Standard
Asphaltic Concrete (AC)	4	0.42	91%/ 92% of Rice Density AASHTO T-209
Crushed Aggregate Base ¾"-0 (leveling course)	2	0.10	95% of Modified Proctor AASHTO T-180
Crushed Aggregate Base 1½"-0	10	0.10	95% of Modified Proctor AASHTO T-180
Subgrade	12	5,000 PSI	95% of Standard Proctor AASHTO T-99 or equivalent
Calculated Structural Number		1.88	

Road Subgrade Preparation

The subgrade should be ripped or tilled to a depth of 12 inches, moisture conditioned, root-picked, and compacted in-place prior to the placement of crushed aggregate base for pavement. Any pockets of organic debris or loose fill encountered during ripping or tilling should be removed and replaced with engineered fill (see *Site Preparation* section). In order to verify subgrade strength, we recommend proof-rolling directly on subgrade with a loaded dump truck during dry weather and on top of base course in wet weather. Soft areas that pump, rut, or weave should be stabilized prior to paving.

If pavement areas are to be constructed during wet weather, the subgrade and construction plan should be reviewed by the project geotechnical engineer at the time of construction so that condition specific recommendations can be provided. The moisture sensitive subgrade soils make the site a difficult wet weather construction project. General recommendations for wet weather pavement sections are provided below.

During placement of pavement section materials, density testing should be performed to verify compliance with project specifications. Generally, one subgrade, one base course, and one asphalt compaction test is performed for every 100 to 200 linear feet of paving.

Wet Weather Construction Pavement Section

This section presents our recommendations for wet weather pavement section and construction for new pavement sections at the project. These wet weather pavement section recommendations are intended for use in situations where it is not feasible to compact the subgrade soils, due to wet subgrade soil conditions, and/or construction during wet weather.

Based on our site review, we recommend a wet weather section with a minimum subgrade deepening of 6 inches to accommodate a working subbase of additional 1½"-0 crushed rock. Geotextile fabric, Mirafi 500x or equivalent, should be placed on subgrade soils prior to placement of base rock.

In some instances, it may be preferable to use Special Treated Base (STB) in combination with over-excavation and increasing the thickness of the rock section. GeoPacific should be consulted for additional recommendations regarding use of STB in wet weather pavement sections if it is desired to pursue this alternative. Cement treatment of the subgrade may also be considered instead of over-excavation. For planning purposes, we anticipate that treatment of the onsite soils would involve mixing cement powder to approximately 6 percent cement content and a mixing depth on the order of 12 to 18 inches.

With implementation of the above recommendations, it is our opinion that the resulting pavement section will provide equivalent or greater structural strength than the dry weather pavement section currently planned. However, it should be noted that construction in wet weather is risky and the performance of pavement subgrades depend on a number of factors including the weather conditions, the contractor’s methods, and the amount of traffic the road is subjected to. There is a potential that soft spots may develop even with implementation of the wet weather provisions recommended in this letter. If soft spots in the subgrade are identified during roadway excavation, or develop prior to paving, the soft spots should be over-excavated and backfilled with additional crushed rock.

During subgrade excavation, care should be taken to avoid disturbing the subgrade soils. Removals should be performed using an excavator with a smooth-bladed bucket. Truck traffic should be limited until an adequate working surface has been established. We suggest that the crushed rock be spread using bulldozer equipment rather than dump trucks, to reduce the amount of traffic and potential disturbance of subgrade soils.

Care should be taken to avoid over-compaction of the base course materials, which could create pumping, unstable subgrade soil conditions. Heavy and/or vibratory compaction efforts should be applied with caution. Following placement and compaction of the crushed rock to project specifications (95 percent of Modified Proctor), a finish proof-roll should be performed before paving.

The above recommendations are subject to field verification. GeoPacific should be on-site during construction to verify subgrade strength and to take density tests on the engineered fill, base rock and asphaltic pavement materials.

Seismic Design

The Oregon Department of Geology and Mineral Industries (Dogami), Oregon HazVu: Statewide GeoHazards Viewer indicates that the site is in an area where *severe* ground shaking is anticipated during an earthquake (Dogami HazVu, 2019). Structures should be designed to resist earthquake loading in accordance with the methodology described in the 2018 International Building Code (IBC) with applicable Oregon Structural Specialty Code (OSSC) revisions (current 2019). We recommend Site Class D be used for design per the OSSC, Table 1613.5.2 and as defined in ASCE 7-16, Chapter 20, Table 20.3-1. Design values determined for the site using the ATC (Applied Technology Council) *ASCE7-10 Hazards by Location online Tool* website are summarized in Table 3.

Table 3 - Recommended Earthquake Ground Motion Factors (ASCE 7-16)

Parameter	Value
Location (Lat, Long), degrees	45.3426, -122.6486
Probabilistic Ground Motion Values, 2% Probability of Exceedance in 50 yrs	
Site Modified Peak Ground Acceleration	0.459 g
Short Period, S_S	0.831 g
1.0 Sec Period, S_1	0.376 g
Soil Factors for Site Class D:	
F_a	1.168
F_v	1.924
$SD_S = 2/3 \times F_a \times S_S$	0.647 g
$SD_1 = 2/3 \times F_v \times S_1$	0.482 g
Seismic Design Category	D

* F_v value reported in the above table is a straight-line interpolation of mapped spectral response acceleration at 1-second period, S_1 per Table 1613.2.3(2) of OSSC 2019 with the assumption that Exception 2 of ASCE 7-16 Chapter 11.4.8 is met per the Structural Engineer. If Exception 2 is not met, and the long-period site coefficient (F_v) is required for design, GeoPacific Engineering can be consulted to provide a site-specific procedure as per ASCE 7-16, Chapter 21.

Soil Liquefaction

Soil liquefaction is a phenomenon wherein saturated soil deposits temporarily lose strength and behave as a liquid in response to ground shaking caused by strong earthquakes. Soil liquefaction is generally limited to loose, sands and granular soils located below the water table. The Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon HazVu: 2019 Statewide GeoHazards Viewer indicates that the site is in an area considered to be at *low* to *high* risk for soil liquefaction during an earthquake (DOGAMI:HazVu, 2019).

An in-depth analysis of seismic hazards is beyond the scope of this study. However, if additional information is desired regarding the potential for soil liquefaction during a seismic event, GeoPacific may be consulted to perform additional subsurface explorations, consisting of soil borings and/or CPT testing, and to perform a quantitative liquefaction analysis.

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.

REGISTERED PROFESSIONAL ENGINEER
14743PE
OREGON
JAN. 23, 1990
JAMES D. IMBRIE

EXPIRES: 06/30/2021

Michael T. Baker, G.I.T.
Geotechnical Staff

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

REFERENCES

Applied Technology Council (ATC), 2019, Hazards by Location Online Tool, https://hazards.atcouncil.org/#/seismic, 2019.

Atwater, B.F., 1992, Geologic evidence for earthquakes during the past 2,000 years along the Copalis River, southern coastal Washington: Journal of Geophysical Research, v. 97, p. 1901-1919.

Beeson, M.H., Tolan, T.L., and Anderson, J.L., 1989, The Columbia River Basalt Group in western Oregon; Geologic structures and other factors that controlled flow emplacement patterns: Geological Society of America Special Paper 239, in Volcanism and tectonicism in the Columbia River flood-basalt province published by the Geological Society of America, p. 223-246.

Carver, G.A., 1992, Late Cenozoic tectonics of coastal northern California: American Association of Petroleum Geologists-SEPM Field Trip Guidebook, May 1992.

Gannett, M.W. and Caldwell, R.R., 1998, Geologic framework of the Willamette Lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-A, 32 pages text, 8 plates.

Geomatrix Consultants, 1995, Seismic Design Mapping, State of Oregon: unpublished report prepared for Oregon Department of Transportation, Personal Services Contract 11688, January 1995.

Goldfinger, C., Kulm, L.D., Yeats, R.S., Appelgate, B, MacKay, M.E., and Cochrane, G.R., 1996, Active strike-slip faulting and folding of the Cascadia Subduction-Zone plate boundary and forearc in central and northern Oregon: in Assessing earthquake hazards and reducing risk in the Pacific Northwest, v. 1: U.S. Geological Survey Professional Paper 1560, P. 223-256.

Mabey, M.A., Madin, I.P., Youd, T.L. and Jones, C.F., 1993, Earthquake hazard maps of the Portland Quadrangle, Multnomah and Washington Counties, Oregon: Oregon Department of Geology and Mineral Industries, GMS-79, map scale 1:24,000.

Mabey, M.A., Black, G.L., Madin, I.P., Meier, D.B., Youd, T.L., Jones, C.F., and Rice, J.B., 1995, Relative earthquake hazard map of the Portland Metro Region, Clackamas, Multnomah and Washington Counties, Oregon: Oregon Department of Geology and Mineral Industries, IMS-032, map scale 1: 62,500 to 1: 216,000.

Madin, I.P., 1990, Earthquake hazard geology maps of the Portland metropolitan area, Oregon: Oregon Department of Geology and Mineral Industries Open-File Report 0-90-2, scale 1: 24,000, 22 p.

Oregon Department of Geology and Mineral Industries, 2018, Oregon HazVu: Statewide Geohazards Viewer (HazVu): http://www.oregongeology.org/hazvu/

Oregon Department of Geology and Mineral Industries, 2018, SLIDO: Statewide Landslide Information Layer of Orgeon: http://gis.dogami.oregon.gov/slido/

Peterson, C.D., Darioenzo, M.E., Burns, S.F., and Burris, W.K., 1993, Field trip guide to Cascadia paleoseismic evidence along the northern California coast: evidence of subduction zone seismicity in the central Cascadia margin: Oregon Geology, v. 55, p. 99-144.

PortlandMaps, 2018, https://www.portlandmaps.com

United States Geologic Survey, 2018, U.S. Estimated Depth to Ground Water in the Portland, Oregon Area, https://or.water.usgs.gov/projs_dir/puz/

Unruh, J.R., Wong, I.G., Bott, J.D., Silva, W.J., and Lettis, W.R., 1994, Seismotectonic evaluation: Scoggins Dam, Tualatin Project, Northwest Oregon: unpublished report by William Lettis and Associates and Woodward Clyde Federal Services, Oakland, CA, for U. S. Bureau of Reclamation, Denver CO (in Geomatrix Consultants, 1995).

Werner, K.S., Nabelek, J., Yeats, R.S., Malone, S., 1992, The Mount Angel fault: implications of seismic-reflection data and the Woodburn, Oregon, earthquake sequence of August 1990: Oregon Geology, v. 54, p. 112-117.

Wong, I. Silva, W., Bott, J., Wright, D., Thomas, P., Gregor, N., Li., S., Mabey, M., Sojourner, A., and Wang, Y., 2000, Earthquake Scenario and Probabilistic Ground Shaking Maps for the Portland, Oregon, Metropolitan Area; State of Oregon Department of Geology and Mineral Industries; Interpretative Map Series IMS-16.

Yeats, R.S., Graven, E.P., Werner, K.S., Goldfinger, C., and Popowski, T., 1996, Tectonics of the Willamette Valley, Oregon: in Assessing earthquake hazards and reducing risk in the Pacific Northwest, v. 1: U.S. Geological Survey Professional Paper 1560, P. 183-222, 5 plates, scale 1: 100,000.

Yelin, T.S., 1992, An earthquake swarm in the north Portland Hills (Oregon): More speculations on the seismotectonics of the Portland Basin: Geological Society of America, Programs with Abstracts, v. 24, no. 5, p. 92.

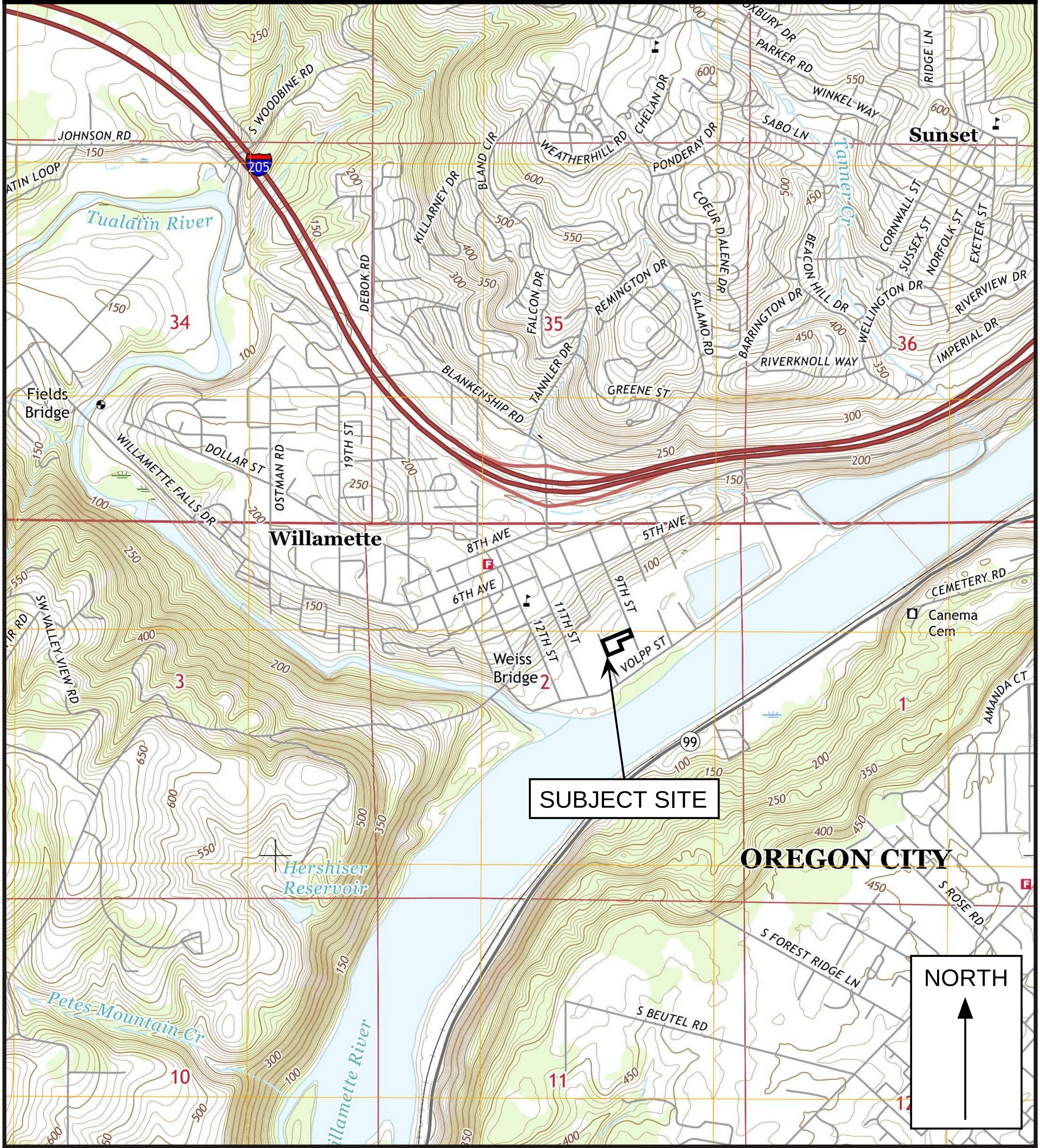
CHECKLIST OF RECOMMENDED GEOTECHNICAL TESTING AND OBSERVATION

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	Footing Subgrade Inspection	Prior to placement of forms	Soil Technician/ Geotechnical Engineer	
9	Final Geotechnical Engineer's Report	Completion of project	Geotechnical Engineer	

FIGURES

GeoPacific Engineering, Inc.
14835 SW 72nd Avenue
Portland, Oregon 97224
Tel: (503) 598-8445 Fax: (503) 941-9281

VICINITY MAP



Legend

Approximate Scale 1 in = 2,000 ft

Date: 11.20.2019
Drawn by: MTB

Base maps: U.S. Geological Survey 7.5 minute Topographic Map Series, Canby, Oregon Quadrangle, 2017.

Project: 9th Street
West Linn, Oregon

Project No. 19-5350

FIGURE 1A

14835 SW 72nd Avenue
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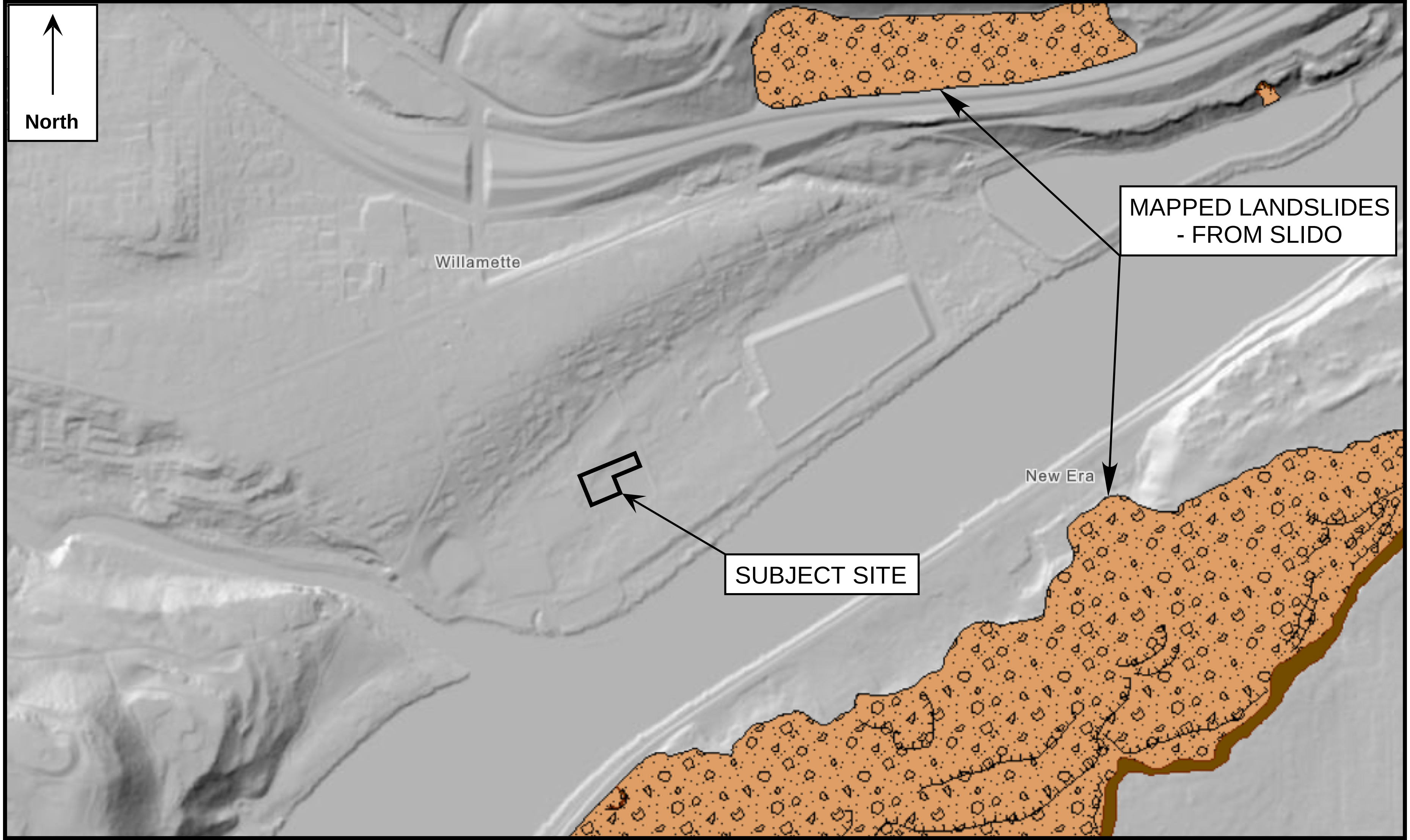
LIDAR BASED VICINITY MAP - WITH MAPPED LANDSLIDES



Legend

Approximate Scale 1 in = 1000 ft

Date: 11.20.2019
Drawn by: MTB

Base map: Oregon Department of Geology and Mineral Industries, 2019, Statewide Landslide Information Database for Oregon (SLIDO):
http://www.gis.dogami.oregon.gov/slido

Project: 9th Street
West Linn, Oregon

Project No. 19-5350

FIGURE 1B

14835 SW 72nd Avenue
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SITE AERIAL AND EXPLORATION LOCATIONS

Base image provided by AKS Engineering & Forestry, LLC. and PortlandMaps

Legend

Site Boundary

TP-1
2ft
Test Pit Designation, Approximate Location and Approximate Depth of Fill including Buried Topsoil

PDCP 1
PDCP Designation and Approximate Location

Drawn by: MTB Date: 11.21.2019

0 80'
APPROXIMATE SCALE 1"=80'

Project: 9th Street
West Linn, Oregon

Project No. 19-5350

FIGURE 2

EXPLORATION LOGS

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TEST PIT LOG

Project: 9th Street
West Linn, Oregon

Project No. 19-5350

Exploration No. **TP-1**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
					Soft, organic SILT (OL), brown, grass roots, very moist [Topsoil Horizon]
1		4.0			Loose, GRAVEL (GM), composed of fractured rock and asphalt fragments up to 12 inch in diameter with sand and silt, moist [Undocumented Fill]
2 3		1.0 1.0			Soft to medium stiff, lean CLAY (CL), light brown, homogenous, tree roots, moist [Undocumented Fill]
4 5 6	100 to 1,000 g	1.5		💧	Soft to medium stiff, CLAY (CL-CH), dark gray to brown, very plastic, moist, in lower portion this layer was dark brown to black fragments of extremely soft (R0) to soft (R1) minerals from 1/4 inch to 1.5 inch in diameter, fragments of angular vesicular medium hard (R3) BASALT, moist [Undocumented Fill]
7 8 9 10				💧	Medium stiff to stiff, SILT (ML) with sand, blue-gray, slightly plastic, homogenous, very moist to wet [Willamette Formation]
11 12 13 14					Test Pit terminated at 11 feet. Groundwater seepage encountered in excavation at 4 feet and 10.5 feet. Flow visually estimated at 1/4 gallons per minute.

LEGEND

- 100 to 1,000 g Bag Sample
- Split-Spoon
- Shelby Tube Sample
- 💧 Seepage
- ▽ Static Water Table
- ▨ Water Bearing Zone

Date Drilled: 11.13.2019
Logged By: MTB
Surface Elevation: 74 Feet

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TEST PIT LOG

Project: 9th Street West Linn, Oregon	Project No. 19-5350	Exploration No. **TP-2**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
					Soft, organic SILT (OL), brown, grass roots, moist [Topsoil Horizon]
1		0.5			Loose to medium dense, GRAVEL (GM), composed of medium hard (R3) angular BASALT and asphaltic concrete fragments up to several feet in diameter in a matrix of soft silty CLAY to clayey SILT (CL-ML), moist [Undocumented Fill]
2		1.0			
3		1.5			
4		1.5			
5					
6				💧	Soft, organic SILT (OL), brown, grass roots, moist [Buried Topsoil Horizon]
7					Medium stiff, lean CLAY (CL), blue-gray, moderately plastic, homogenous, moist [Willamette Formation]
8					
9	100 to 1,000 g				Soft to medium stiff, SILT with fine grained sand to sandy SILT (ML-SM), tan with faint orange mottling in thin bands approximately 1/8 to 1/2 inch in thickness, wet [Willamette Formation]
10					
11					Test Pit terminated at 11 feet. Groundwater seepage encountered in excavation at 6 to 7 feet. Flow visually estimated at 1/4 gallons per minute.
12					
13					
14					

LEGEND

- 100 to 1,000 g Bag Sample
- Split-Spoon
- Shelby Tube Sample
- 💧 Seepage
- ▽ Static Water Table
- ▨ Water Bearing Zone

Date Drilled: 11.13.2019
Logged By: MTB
Surface Elevation: 80 Feet

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TEST PIT LOG

Project: 9th Street
West Linn, Oregon

Project No. 19-5350

Exploration No. **TP-3**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	Material Description
					Stiff, organic SILT (OL), brown, grass roots wood debris, moist [Topsoil Horizon]
1		3.0			Stiff to very stiff, SILT (ML), light brown, moderately plastic, homogenous, sparse tree roots to 3 feet, moist [Willamette Formation]
2		3.5			
3		4.5			
4		4.5			
5					
6					Stiff, SILT (ML) with fine-grained sand to sandy SILT (SM), tan with gray and orange mottling, moist to approximately 8 feet than very moist to wet [Willamette Formation]
7					
8				▽	
9					
10					
11					Test Pit terminated at 11 feet. Groundwater seepage encountered in excavation at 8 feet.
12					
13					
14					

LEGEND

100 to 1,000 g	▯	▯	💧	▽	▨
Bag Sample	Split-Spoon	Shelby Tube Sample	Seepage	Static Water Table	Water Bearing Zone

Date Drilled: 11.13.2019
Logged By: MTB
Surface Elevation: 80 Feet

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TEST PIT LOG

Project: 9th Street West Linn, Oregon	Project No. 19-5350	Exploration No. **TP-4**

Depth (ft)	Sample Type	tons/sq.ft.	Moisture Content (%)	Water Bearing Zone	**Material Description**
1		1.0			Soft, organic SILT (OL), brown, grass roots, moist to very moist [Topsoil Horizon]
2		1.0		💧	Soft to very stiff CLAY (CL), reddish brown, black staining, heavily weathered BASALT fragments, moist to wet [Undocumented Fill]
3		4.5			
4		1.0		💧	Medium stiff to stiff, SILT (ML) with sand, blue-gray, slightly plastic, homogenous, very moist to wet [Willamette Formation]
5					
6					
7				💧	
8					
9					
10					Test Pit terminated at 9 feet. Groundwater seepage encountered in excavation at 2, 4 and 7 feet.
11					
12					
13					
14					

LEGEND

100 to 1,000 g	▯	▯	💧	▽	▨
Bag Sample	Split-Spoon	Shelby Tube Sample	Seepage	Static Water Table	Water Bearing Zone

Date Drilled: 11.13.2019
Logged By: MTB
Surface Elevation: 72 Feet

GeoPacific Engineering, Inc.
Real-World Geotechnical Solutions
Investigiation, Design, Construction Support

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Portland, Oregon 97224

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

Portable Dynamic Cone Penetrometer (PDCP) / California Bearing Ratio (CBR) Correlation

Project: 9th Street West Linn **Date:** 11.20.2019 **Existing A/C Thickness:** 0 Inches **Test:** PDCP-1
Project No. 19-5350 **Engineer:** MTB **Existing Base Aggregate Thickness:** 0 Inches
Location: SW Shoulder of 9th Street at N Property Corner **Subgrade:** Fill **Notes:** Location on Figures 2
Portable Dynamic Cone: KSE DCP K-100 Model, ASTM D6951, 17.6 lbs Hammer

Length of Shaft	Ref Height at Start	Depth Below Ground at Start
in	in	in
38.75	3.6	2.6

Blows	Ref Height (in)	Depth Below Ground (in)	Depth Below Ground (ft)	Depth Below Ground (mm)	Inches/Blow	mm/Blow	CBR	Corellated PSI
5	10.9	9.9	0.8	251.5	1.5	37.1	5.1	4193
5	13.4	12.4	1.0	315.0	0.5	12.7	16.9	6368
5	21	20.0	1.7	508.0	1.5	38.6	4.9	4127
5	26.7	25.7	2.1	652.8	1.1	29.0	6.7	4617
5	29.5	28.5	2.4	723.9	0.6	14.2	14.9	6092
5	32.9	31.9	2.7	810.3	0.7	17.3	12.0	5648
5	35.9	34.9	2.9	886.5	0.6	15.2	13.8	5931
					Average	23.44	8.5	
			Average Soil Resilient Modulus per ODOT Pavement Design Guide			5014		

Portable Dynamic Cone Penetrometer (PDCP) / California Bearing Ratio (CBR) Correlation

Project: 9th Street West Linn **Date:** 11.20.2019 **Existing A/C Thickness:** 0 Inches **Test:** PDCP-2
Project No. 19-5350 **Engineer:** MTB **Existing Base Aggregate Thickness:** 0 Inches
Location: SW Shoulder of 9th Street at S Property Corner **Subgrade:** Fill **Notes:** Location on Figures 2
Portable Dynamic Cone: KSE DCP K-100 Model, ASTM D6951, 17.6 lbs Hammer

Length of Shaft	Ref Height at Start	Depth Below Ground at Start
in	in	in
38.75	3	2

Blows	Ref Height (in)	Depth Below Ground (in)	Depth Below Ground (ft)	Depth Below Ground (mm)	Inches/Blow	mm/Blow	CBR	Corellated PSI
5	9.8	8.8	0.7	223.5	1.4	34.5	5.5	4310
5	12.7	11.7	1.0	297.2	0.6	14.7	14.4	6010
5	14.2	13.2	1.1	335.3	0.3	7.6	30.0	7772
5	16.6	15.6	1.3	396.2	0.5	12.2	17.7	6470
5	22.8	21.8	1.8	553.7	1.2	31.5	6.1	4468
5	25.6	24.6	2.1	624.8	0.6	14.2	14.9	6092
5	28	27.0	2.3	685.8	0.5	12.2	17.7	6470
5	32.8	31.8	2.7	807.7	1.0	24.4	8.2	4937
5	34.4	33.4	2.8	848.4	0.3	8.1	27.9	7578
					Average	17.72	11.7	
			Average Soil Resilient Modulus per ODOT Pavement Design Guide			5592		

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Real-World Geotechnical Solutions
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PHOTOGRAPHIC LOG

Overhead of the Property

Proximity to Willamette River

Test Pits TP-2 & TP-3

Test Pit TP-1 Undocumented Fill

Test Pit TP-1

Test Pit TP-2 Undocumented Fill

Test Pit TP-3

Test Pit TP-4

Test Pit TP-4