CITY OF West Linn

PLANNING MANAGER DECISION

DATE: October 16, 2018

FILE NO.: WAP-18-03

REQUEST: Request for a Water Resource Area (WRA) hardship allowance to construct a single-family home at 19738 Wildwood Drive

PLANNER: Darren Wyss, Associate Planner

Planning Manager

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GENERAL INFORMATION

APPLICANT:	Max Eckelman 509 Washington Street Oregon City, OR 97045
OWNER:	Max Eckelman 509 Washington Street Oregon City, OR 97045
SITE LOCATION:	19738 Wildwood Drive
SITE SIZE:	10,670 square feet
LEGAL DESCRIPTION:	Assessor Map and Tax Lot – 21E23AC 09004
COMP PLAN DESIGNATION:	Low Density Residential
ZONING:	R-10: Single-Family Residential Detached
APPROVAL CRITERIA:	Community Development Code (CDC) Chapter 32
120-DAY RULE:	The application was declared complete on September 11, 2018. The 120-day period ends on January 4, 2019.
PUBLIC NOTICE:	Notice was mailed to property owners within 500 feet of the subject property, to all Neighborhood Associations, and posted on the City's website on September 12, 2018. A sign was placed on the property on September 21, 2018. Therefore, public notice requirements of CDC Chapter 99 have been met.

EXECUTIVE SUMMARY

The subject property is located at 19738 Wildwood Drive and currently vacant. The property is zoned R-10 and the applicant proposes the construction of a single-family home. The property has slopes of 20 to 40 percent as it rises out of the drainage from a tributary of Robin Creek. The applicant is seeking hardship approval per Community Development Code Chapter 32.110 due to the Water Resource Area Protection (WRA) buffer encumbering the entire property due to the slope. The applicant has submitted a geotechnical report and stormwater detention and treatment plan. The allowable maximum disturbed area (MDA) of the WRA is 5,000 square feet and the applicant proposes an MDA of 2,510 square feet. All temporary disturbed areas will be restored on-site. The WRA is in good condition with no opportunity for mitigation on-site, so the applicant has proposed paying mitigation credits as allowed at a two-to-one ratio.

Public comments:

Staff received no public comments.

DECISION

The Planning Manager (designee) approves this application (WAP-18-03), based on: 1) the findings submitted by the applicant, which are incorporated by this reference, 2) supplementary staff findings included in the Addendum below, and 3) the addition of conditions of approval below. With these findings, the applicable approval criteria are met. The conditions are as follows:

1. **Site Plan, Elevations, and Narrative. With the exception of modifications required by these conditions, the project shall conform to the submitted plans, elevations, and narrative submitted in Exhibit PD-4.**

2. **Stormwater Design. At the time of building permit application, the applicant shall address stormwater pursuant to the Geologic Hazards and Geotechnical Investigation prepared by H.G. Schlicker & Associates dated July 19, 2018 (see Exhibit PD-4) and meet West Linn Public Works Design Standards.**

3. **Geotechnical Design. The applicant shall submit a copy of the Geologic Hazards and Geotechnical Investigation prepared by H.G. Schlicker & Associates dated July 19, 2018 (see Exhibit PD-4) as part of the building permit application per Staff Finding 29 and shall provide any supplemental reports required by the Building Official. The report must be submitted prior to application for building permits.**

4. **<u>Off-Site Mitigation Credits</u>. The applicant shall purchase off-site mitigation credits at a two-to-one ratio from the West Linn Parks Department at $1.00 per square foot. Maximum Disturbed Area will be confirmed during building permit application per Staff Finding 36. The credits must be purchased prior to issuance of building permits.**

The provisions of the Community Development Code Chapter 99 have been met.

Darren Wyss, Associate Planner

October 16, 2018
DATE

Appeals to this decision must be filed with the West Linn Planning Department within 14 days of the mailing date listed below. The cost of an appeal is $400. The appeal must be filed by an individual who has established standing by submitting comments prior to the date identified in the public notice. Appeals will be heard by City Council.

Mailed this 16th day of October, 2018.

Therefore, the 14-day appeal period ends at 5 p.m., on October 30, 2018.

ADDENDUM
APPROVAL CRITERIA AND FINDINGS
WAP-18-03

CHAPTER 11: R-10 SINGLE-FAMILY RESIDENTIAL DETACHED
11.030 Permitted Uses
The following are uses permitted outright in this zoning district:
1. Single-family detached residential unit.
(...)

Staff Finding 1: The applicant proposes to construct a single-family home on the subject property. The criteria are 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.
2. The minimum front lot line length or the minimum lot width at the front lot line shall be 35 feet.
3. The average minimum lot width shall be 50 feet.
4. Repealed by Ord. 1622.

Staff Finding 2: The subject property is 10,670 square feet and has an average lot width of approximately 75 feet. The front lot line is 55 linear feet. The criteria are met.

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.

Staff Finding 3: The applicant has requested a reduced setback of 18 feet as allowed by the hardship provisions found in CDC 32.110.F.1. Please see Staff Finding 17. Subject to Water Resource Area hardship approval, this criteria is met.

b. For an interior side yard, seven and one-half feet.
c. For a side yard abutting a street, 15 feet.

Staff Finding 4: The applicant has requested a reduced setback of 3.9 feet for the west side yard setback as allowed by the hardship provisions found in CDC 32.110.F.1. Please see Staff

Finding 17. The reduced setback is adjacent to an open space tract. The east side yard setback is 6.0 feet. There are no side yards abutting a street on the subject property. Subject to Water Resource Area hardship approval, these criteria are met.

d. For a rear yard, 20 feet.
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.

Staff Finding 5: The applicant proposes a rear yard setback of 59 feet. The maximum building height will be confirmed during the building permit process. These criteria are met.

7. The maximum lot coverage shall be 35 percent.
8. The minimum width of an accessway to a lot which does not abut a street or a flag lot shall be 15 feet.

Staff Finding 6: The applicant proposes a water resource maximum disturbed area of 2,510 square feet for a lot coverage of 23.5 percent. The subject property abuts Wildwood Drive, a public street. These criteria are 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.

Staff Finding 7: The applicant proposes a three-story home of approximately 3,000 square feet for a floor-area-ratio of 0.281. Sidewall provisions and building height exceptions for steep slopes will be confirmed during the building permit process. These criteria are met.

CHAPTER 32: WATER RESOURCE AREA PROTECTION
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.

Staff Finding 8: The subject property, 19738 Wildwood Drive, is completely encumbered by the required 200 foot water resource area (WRA) per the analysis found on page 2 of the Wildwood Drive Natural Resource Assessment prepared by AKS and dated September 4, 2018 (please see Exhibit PD-4). The WRA will deny the "reasonable use" of the property without hardship allowance. The proposal is for a new house in the water resource area as allowed by hardship in CDC Table 32-1. The subject property is eligible for hardship allowance as it was created as Lot 4 of the Hidden Springs Ranch No. 9 Subdivision Plat on May 21, 1982. The subject property meets minimum lot size and dimensional standards of the R-10 zone (see Staff Finding 2). This criteria 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.

Staff Finding 9: The subject property, 19738 Wildwood Drive, is completely encumbered by the required 200 foot water resource area per the analysis found on page 2 of the Wildwood Drive Natural Resource Assessment prepared by AKS and dated September 4, 2018 (please see Exhibit PD-4). The subject property is 10,670 square feet in area. Thirty percent of total WRA area is 3,201 square feet. The allowed MDA is 5,000 square feet as it is greater than the 30 percent. The applicant is proposing an MDA of 2,510 square feet. This criteria is met.

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.

Staff Finding 10: Staff adopts applicant findings found on page 2 of the Wildwood Drive Natural Resource Assessment prepared by AKS and dated September 4, 2018 (please see Exhibit PD-4). These criteria are met.

3. The minimum distance from a water resource shall be 15 feet.

Staff Finding 11: The MDA remains a minimum distance of 65 feet from the stream. This criteria is met.

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.

Staff Finding 12: The proposed driveway is 20 feet wide to accommodate access to the proposed two-car garage and allowance for completing a two-point turnaround. City regulations do not allow backing onto a public street. There is no option to share a driveway and the front loading garage is located as close to Wildwood Drive as allowed (see Staff Finding 17). This criteria is 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.

Staff Finding 13: The proposed 2,510 square foot MDA includes the house/garage footprint, deck, fireplace, and driveway. This criteria is met.

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.

Staff Finding 14: The applicant proposes to restore all Temporarily Disturbed Areas to pre-construction conditions and planted with native pineland sword fern. All non-restored areas have been included in the proposed 2,510 square foot MDA. This criteria is 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.);

Staff Finding 15: The applicant proposes to restore all Temporarily Disturbed Areas to pre-construction conditions and planted with native pineland sword fern. All non-restored areas have been included in the proposed 2,510 square foot MDA. These criteria are met.

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.

Staff Finding 16: Wildwood Drive has an existing curb. The applicant proposes to install a six-foot, curb-tight, public sidewalk adjacent to the subject property, which is not included in the MDA. This criteria is 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.

Staff Finding 17: The subject property is located in the R-10 zone, requiring a 7.5 foot side yard setback. The applicant proposes a reduced setback of three feet nine inches on the west side property line (adjacent to an open space tract), which is a 50 percent reduction and a setback of six feet on the east side property line. The applicant proposes a front loading garage set back from Wildwood Drive 18 feet. This criteria is 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.

Staff Finding 18: The applicant is not requesting a reduction in landscaping or parking requirements. These criteria are not applicable.

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.

Staff Finding 19: The applicant owns one lot of record. This criteria is not applicable.

H. Mitigation and re-vegetation of disturbed WRAs shall be completed per CDC 32.090 and 32.100 respectively.
Staff Finding 20: Please see Staff Findings 34 to 37. This criteria 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.

Staff Finding 21: The applicant is not requesting a variance. This criteria is not applicable.

32.060 APPROVAL CRITERIA (STANDARD PROCESS)
No application for development on property containing a WRA shall be approved unless the approval authority finds that the proposed development is consistent with the following approval criteria, or can satisfy the criteria by conditions of approval:
A. WRA protection/minimizing impacts.
1. Development shall be conducted in a manner that will avoid or, if avoidance is not possible, minimize adverse impact on WRAs.
2. Mitigation and re-vegetation of disturbed WRAs shall be completed per CDC 32.090 and 32.100, respectively.

Staff Finding 22: The subject property is completely encumbered by the WRA. The applicant is seeking hardship approval under CDC 32.110 (please see Staff Findings 8 to 21) and is allowed 5,000 square feet of MDA. The applicant is proposing 2,510 square feet of MDA to minimize adverse impacts on the WRA. Please see Staff Findings 35 to 38 for mitigation and re-vegetation compliance. The criteria are met.

B. Storm water and storm water facilities.
1. Proposed developments shall be designed to maintain the existing WRAs and utilize them as the primary method of storm water conveyance through the project site unless:
a. The surface water management plan calls for alternate configurations (culverts, piping, etc.); or
b. Under CDC 32.070, the applicant demonstrates that the relocation of the water resource will not adversely impact the function of the WRA including, but not limited to, circumstances where the WRA is poorly defined or not clearly channelized.
Re-vegetation, enhancement and/or mitigation of the re-aligned water resource shall be required as applicable.

Staff Finding 23: Staff adopts applicant findings found on pages 2-3 of the Wildwood Drive Natural Resource Assessment prepared by AKS and dated September 4, 2018 (please see Exhibit PD-4). These criteria are met.

2. Public and private storm water detention, storm water treatment facilities and storm water outfall or energy dissipaters (e.g., rip rap) may encroach into the WRA if:
a. Accepted engineering practice requires it;
b. Encroachment on significant trees shall be avoided when possible, and any tree loss shall be consistent with the City's Tree Technical Manual and mitigated per CDC 32.090;
c. There shall be no direct outfall into the water resource, and any resulting outfall shall not have an erosive effect on the WRA or diminish the stability of slopes; and
d. There are no reasonable alternatives available.
A geotechnical report may be required to make the determination regarding slope stability.

Staff Finding 24: The subject property contains no significant trees. The applicant does not propose a direct outfall to the water resource. Staff adopts applicant findings found on pages 2-3 of the Wildwood Drive Natural Resource Assessment prepared by AKS and dated September 4, 2018 (please see Exhibit PD-4). The applicant submitted a geotechnical report (please see Exhibit PD-4) that supports the proposed stormwater option for disposal in the WRA at the northwest portion of the site. These criteria are met.

3. Roadside storm water conveyance swales and ditches may be extended within rights-of-way located in a WRA. When possible, they shall be located along the side of the road furthest from the water resource. If the conveyance facility must be located along the side of the road closest to the water resource, it shall be located as close to the road/sidewalk as possible and include habitat friendly design features (treatment train, rain gardens, etc.).

Staff Finding 25: The application does not include any roadside stormwater conveyance ditches or swales. This criteria is not applicable.

4. Storm water detention and/or treatment facilities in the WRA shall be designed without permanent perimeter fencing and shall be landscaped with native vegetation.

Staff Finding 26: The applicant does not propose perimeter fencing for the rain garden, which will be planted with native vegetation per Exhibit PD-4. This criteria is met.

5. Access to public storm water detention and/or treatment facilities shall be provided for maintenance purposes. Maintenance driveways shall be constructed to minimum width and use water permeable paving materials. Significant trees, including roots, shall not be disturbed to the degree possible. The encroachment and any tree loss shall be mitigated per CDC 32.090. There shall also be no adverse impacts upon the hydrologic conditions of the site.

Staff Finding 27: The proposal does not include any public stormwater facilities. This criteria is not applicable.

6. Storm detention and treatment and geologic hazards. Per the submittals required by CDC 32.050(F)(3) and 92.010(E), all proposed storm detention and treatment facilities must comply with the standards for the improvement of public and private drainage systems located in the West Linn Public Works Design Standards, there will be no adverse off-site impacts caused by the development (including impacts from increased intensity of runoff downstream or constrictions causing ponding upstream), and the applicant must provide sufficient factual data to support the conclusions of the submitted plan.

Staff Finding 28: Staff adopts applicant findings found in Exhibit PD-4. West Linn Engineering staff has given preliminary approval of the applicant's proposed storm detention and treatment design. West Linn Engineering staff may require additional analysis or reports and final storm detention and treatment design will be approved by West Linn Engineering during the building permit process. This criteria is met.

D. WRA width. Except for the exemptions in CDC 32.040, applications that are using the alternate review process of CDC 32.070, or as authorized by the approval authority consistent with the provisions of this chapter, all development is prohibited in the WRA as established in Table 32-2 below:

Staff Finding 29: Staff adopts applicant findings found on page 2 of the Wildwood Drive Natural Resource Assessment prepared by AKS and dated September 4, 2018 (please see Exhibit PD-4). The subject property is completely encumbered by the WRA and the applicant is seeking hardship approval. These criteria are met.

E. Per the submittals required by CDC 32.050(F)(4), the applicant must demonstrate that the proposed methods of rendering known or potential hazard sites safe for development, including proposed geotechnical remediation, are feasible and adequate to prevent landslides or other damage to property and safety. The review authority may impose conditions, including limits on type or intensity of land use, which it determines are necessary to mitigate known risks of landslides or property damage.

Staff Finding 30: The applicant submitted a Geologic Hazards and Geotechnical Investigation prepared by H.G. Schlicker & Associates dated July 19, 2018 (see Exhibit PD-4). The report listed a series of recommendations to follow during design and construction. Subject to Condition of Approval 3, this criteria is met.

F. Roads, driveways and utilities.
1. New roads, driveways, or utilities shall avoid WRAs unless the applicant demonstrates that no other practical alternative exists. In that case, road design and construction techniques shall minimize impacts and disturbance to the WRA by the following methods:
a. New roads and utilities crossing riparian habitat areas or streams shall be aligned as close to perpendicular to the channel as possible.

b. Roads and driveways traversing WRAs shall be of the minimum width possible to comply with applicable road standards and protect public safety. The footprint of grading and site clearing to accommodate the road shall be minimized.

c. Road and utility crossings shall avoid, where possible:

1) Salmonid spawning or rearing areas;

2) Stands of mature conifer trees in riparian areas;

3) Highly erodible soils;

4) Landslide prone areas;

5) Damage to, and fragmentation of, habitat; and

6) Wetlands identified on the WRA Map.

2. Crossing of fish bearing streams and riparian corridors shall use bridges or arch-bottomless culverts or the equivalent that provides comparable fish protection, to allow passage of wildlife and fish and to retain the natural stream bed.

Staff Finding 31: The proposal does not require any new roads or public utilities. The access driveway has been designed to minimize impacts on the WRA (please see Staff Findings 12 and 17). These criteria are met.

3. New utilities spanning fish bearing stream sections, riparian corridors, and wetlands shall be located on existing roads/bridges, elevated walkways, conduit, or other existing structures or installed underground via tunneling or boring at a depth that avoids tree roots and does not alter the hydrology sustaining the water resource, unless the applicant demonstrates that it is not physically possible or it is cost prohibitive. Bore pits associated with the crossings shall be restored upon project completion. Dry, intermittent streams may be crossed with open cuts during a time period approved by the City and any agency with jurisdiction.

4. No fill or excavation is allowed within the ordinary high water mark of a water resource, unless all necessary permits are obtained from the City, U.S. Army Corps of Engineers and Oregon Department of State Lands (DSL).

5. Crossings of fish bearing streams shall be aligned, whenever possible, to serve multiple properties and be designed to accommodate conduit for utility lines. The applicant shall, to the extent legally permissible, work with the City to provide for a street layout and crossing location that will minimize the need for additional stream crossings in the future to serve surrounding properties.

Staff Finding 32: No road or utilities are proposed to cross any streams. No fill or excavation is proposed within the ordinary high water mark of the stream. These criteria are not applicable.

G. Passive recreation. Low impact or passive outdoor recreation facilities for public use including, but not limited to, multi-use paths and trails, not exempted per CDC 32.040(B)(2), viewing platforms, historical or natural interpretive markers, and benches in the WRA, are subject to the following standards:

H. Daylighting Piped Streams.

Staff Finding 33: No passive recreation facilities are proposed. No daylighting of streams is proposed. These criteria are not applicable.

I. The following habitat friendly development practices shall be incorporated into the design of any improvements or projects in the WRA to the degree possible:

Staff Finding 34: The applicant proposes to restore TDAs, provide a rain garden to treat and detain impervious surface runoff, minimize WRA disturbance by only using 50 percent of the allowable MDA (2,510 square feet of allowed 5,000 square feet), and constructing a multi-story structure to minimized WRA disturbance. No new roads or utilities are proposed. These criteria are met.

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.

Staff Finding 35: The applicant proposes to restore TDAs with native vegetation. The subject property is completely encumbered by the WRA that has been assessed as in good condition per the Wildwood Drive Natural Resource Assessment prepared by AKS and dated September 4, 2018 (please see Exhibit PD-4). There is no opportunity for on-site mitigation, thus no need for a mitigation plan. This criteria 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.

Staff Finding 36: The subject property is completely encumbered by the WRA that has been assessed as in good condition per the Wildwood Drive Natural Resource Assessment prepared by AKS and dated September 4, 2018 (please see Exhibit PD-4). There is no

opportunity for on-site mitigation. The applicant proposes to purchase mitigation credits from the West Linn Parks Department on a two-to-one ratio. This criteria 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.

Staff Finding 37: The applicant proposes to restore on-site TDAs with native vegetation. The subject property is completely encumbered by the WRA that has been assessed as in good condition per the Wildwood Drive Natural Resource Assessment prepared by AKS and dated September 4, 2018 (please see Exhibit PD-4). There is no opportunity for on-site mitigation and the applicant proposes to purchase off-site mitigation credits. The proposed MDA is 2,510 square feet, thus requiring 5,020 square feet of off-site mitigation per the two-to-one requirement. The applicant proposes to purchase mitigation credits from the West Linn Parks Department at $1.00 per square foot (per Ken Worcester, Parks Director). The applicant shall purchase the mitigation credits from the West Linn Parks Department at the time of building permit application per Condition of Approval 4. The maximum disturbed area shall be confirmed and mitigation credit paid to the West Linn Parks Department at $1.00 per square foot. Subject to completion and acceptance of appropriate fee, this criteria 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.
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.

Staff Finding 38: The subject property is completely encumbered by the WRA that has been assessed as in good condition per the Wildwood Drive Natural Resource Assessment prepared by AKS and dated September 4, 2018 (please see Exhibit PD-4). There is no opportunity for on-site mitigation, thus no need for a mitigation plan. This criteria is met.

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.)
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.

Staff Finding 39: The subject property is covered by "Habitat and Impact Areas Not Designated as HCAs". The proposed single-family home is allowed. This criteria is met.

PD-1 AFFADAVIT AND NOTICE PACKET

AFFIDAVIT OF NOTICE

We, the undersigned do hereby certify that, in the interest of the party (parties) initiating a proposed land use, the following took place on the dates indicated below:

GENERAL
File No. WAP-18-03 Applicant's Name Max Eckelman
Development Name _____
Scheduled ~~Meeting~~/Decision Date 10-2-18

NOTICE: Notices were sent at least 20 days prior to the scheduled hearing, meeting, or decision date per Section 99.080 of the Community Development Code. **(check below)**

TYPE A ✓

A.	The applicant (date) 9-12-18	(signed)	S. Shroyer
B.	Affected property owners (date) 9-12-18	(signed)	S. Shroyer
C.	School District/Board (date) _____	(signed)	_____
D.	Other affected gov't. agencies (date) 9-12-18	(signed)	S. Shroyer
E.	Affected neighborhood assns. (date) 9-12-18 ALL	(signed)	S. Shroyer
F.	All parties to an appeal or review (date) _____	(signed)	_____

At least 10 days prior to the scheduled hearing or meeting, notice was published/posted:

Tidings (published date) N/A (signed) S. Shroyer
City's website (posted date) 9-12-18 (signed) S. Shroyer

SIGN

At least 10 days prior to the scheduled hearing, meeting or decision date, a sign was posted on the property per Section 99.080 of the Community Development Code.

(date) 9-21-2018 (signed) Dan S Wyn

NOTICE: Notices were sent at least 14 days prior to the scheduled hearing, meeting, or decision date per Section 99.080 of the Community Development Code. **(check below)**

TYPE B _____

A.	The applicant (date) _____	(signed)	_____
B.	Affected property owners (date) _____	(signed)	_____
C.	School District/Board (date) _____	(signed)	_____
D.	Other affected gov't. agencies (date) _____	(signed)	_____
E.	Affected neighborhood assns. (date) _____	(signed)	_____

Notice was posted on the City's website at least 10 days prior to the scheduled hearing or meeting.
Date: _____ (signed) _____

STAFF REPORT mailed to applicant, City Council/Planning Commission and any other applicable parties 10 days prior to the scheduled hearing.

(date) _____ (signed) _____

FINAL DECISION notice mailed to applicant, all other parties with standing, and, if zone change, the County surveyor's office.

(date) 10-16-2018 (signed) Dan S Wyn

p:\devrvw\forms\affidvt of notice-land use (9/09)

CITY OF WEST LINN
NOTICE OF UPCOMING
PLANNING MANAGER DECISION
FILE NO. WAP-18-03

The West Linn Planning Manager is considering a request for a Water Resource Area permit to construct a new single-family home 19738 Wildwood Drive.

The decision will be based on the approval criteria in Chapters 11 and 32 of the Community Development Code (CDC). The approval criteria from the CDC are available for review at City Hall, the City Library, and http://www.westlinnoregon.gov/cdc.

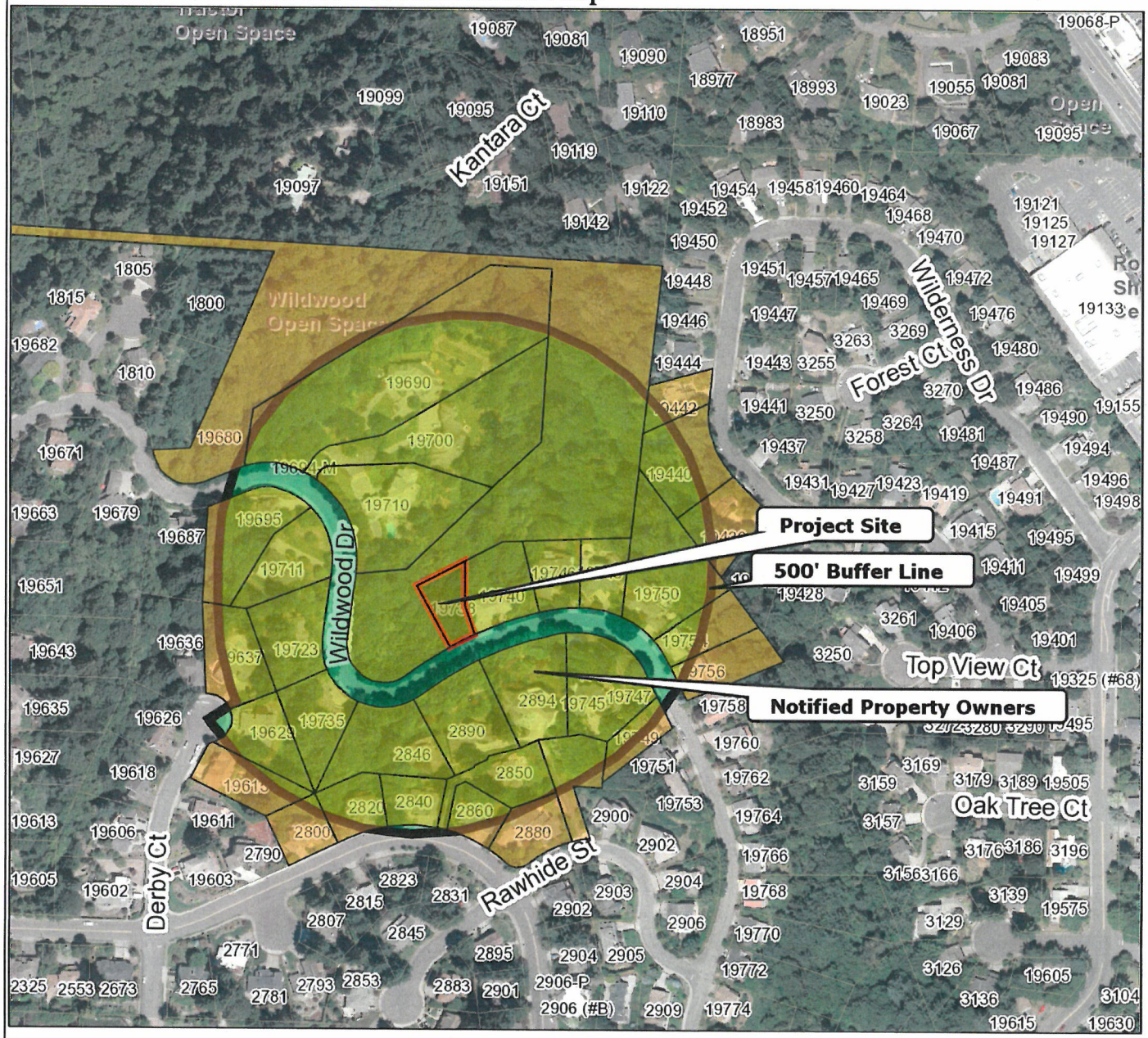
You have received this notice because County records indicate that you own property within 500 feet of this property (Tax Lot 9004 of Clackamas County Assessor's Map 21E 23AC) or as otherwise required by Chapter 99 of the CDC.

All relevant materials in the above noted file are available for inspection at no cost at City Hall, and on the city web site https://westlinnoregon.gov/planning/19738-wildwood-drive-water-resource-area-protection-new-single-family-home or copies may be obtained for a minimal charge per page. A public hearing will not be held on this decision. **Anyone wishing to present written testimony for consideration on this matter shall submit all material before 4:00 p.m. on October 2, 2018. Persons interested in party status should submit their letter along with any concerns related to the proposal by the comment deadline.** For further information, please contact Darren Wyss, Associate Planner, City Hall, 22500 Salamo Rd., West Linn, OR 97068, (503)742-6064, dwyss@westlinnoregon.gov.

Any appeals to this decision must be filed within 14 days of the final decision date with the Planning Department. Failure to raise an issue in person or by letter, or failure to provide sufficient specificity to afford the decision-maker an opportunity to respond to the issue, precludes the raising of the issue at a subsequent time on appeal or before the Land Use Board of Appeals.

WAP-18-03

19738 Wildwood Drive Notification Map



CITY OF West Linn

N
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Feet
0 150

Scale 1:3,600 - 1 in = 300 ft
Scale is based on 8-1/2 x 11 paper size

Map created by: SSHROYER
Date Created: 11-Sep-18 04:11 PM

WEST LINN GIS

DISCLAIMER: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. Map scale is approximate. Source: West Linn GIS (Geographic Information System) MapOptix.

CITY OF West Linn

CITY OF WEST LINN
NOTICE OF UPCOMING
PLANNING MANAGER DECISION

PROJECT # WAP-18-03
MAIL: 9/12/18 TIDINGS: N/A

CITIZEN CONTACT INFORMATION

To lessen the bulk of agenda packets, land use application notice, and to address the worries of some City residents about testimony contact information and online application packets containing their names and addresses as a reflection of the mailing notice area, this sheet substitutes for the photocopy of the testimony forms and/or mailing labels. A copy is available upon request.

PD-2 COMPLETENESS LETTER

September 11, 2018

Max Eckelman
509 Washington Street
Oregon City, OR 97045

SUBJECT: WAP-18-03 application for Water Resource Area Permit at 19738 Wildwood Dr.

Dear Max:

You submitted this application on July 26, 2018. The Planning and Engineering Departments found that this application was incomplete on August 23, 2018. All required information was subsequently provided on September 6, 2018 and the application has now been deemed **complete.** The city has 120 days to exhaust all local review; that period ends January 4, 2019.

Please be aware that a determination of a complete application does not guarantee a recommendation of approval from staff for your proposal as submitted – it signals that staff believes you have provided the necessary information for the Planning Director to render a decision on your proposal.

A 20-day public notice will be prepared and mailed. This notice will identify the earliest potential decision date by the Planning Director.

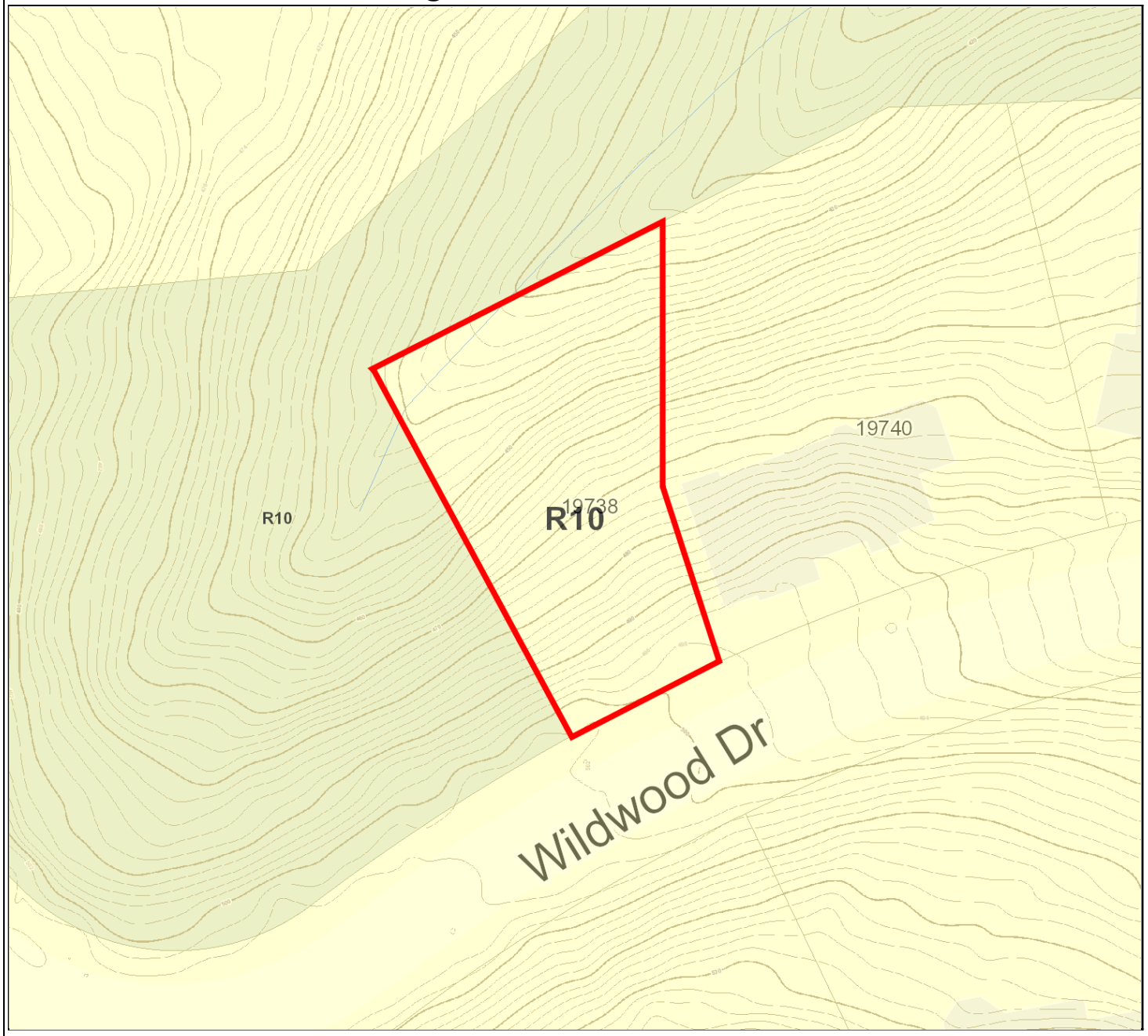
Please contact me at 503-742-6064, or by email at dwyss@westlinnoregon.gov if you have any questions or comments.

Sincerely,

Darren Wyss
Associate Planner

PD-3 PROPERTY MAPS

19738 Wildwood Dr - Zoning



CITY OF West Linn

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0 25

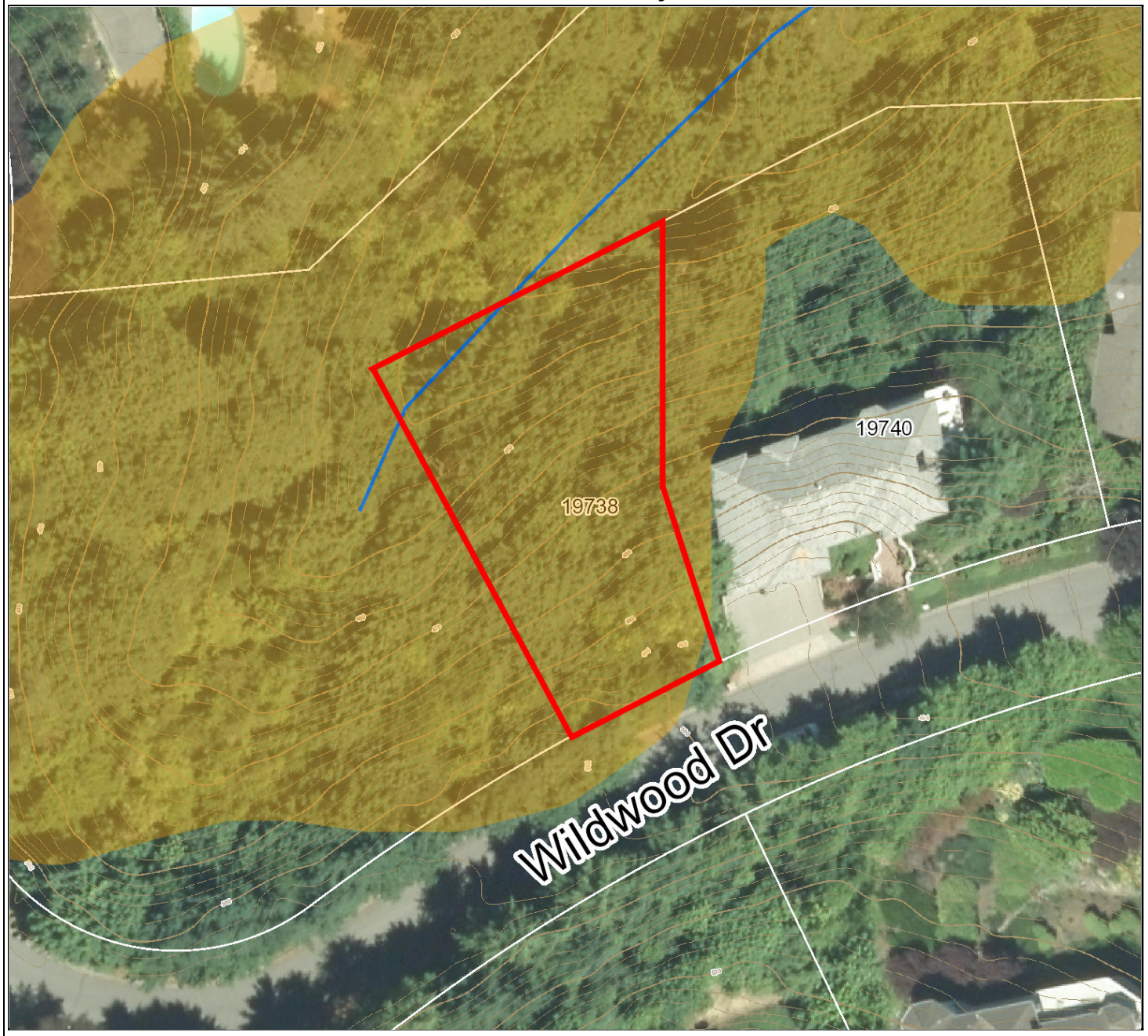
Scale 1:600 - 1 in = 50 ft
Scale is based on 8-1/2 x 11 paper size

Map created by: DWYSS
Date Created: 10-Oct-18 10:39 AM

WEST LINN GIS

DISCLAIMER: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. Map scale is approximate. Source: West Linn GIS (Geographic Information System) MapOptix.

19738 Wildwood Dr - Environmental Overlays



CITY OF West Linn

Legend

Metro Habitat Protection
Published October 2005

Habitat Conservation Area

Allow Development

N
W E
S

Feet
0 25

Scale 1:600 - 1 in = 50 ft
Scale is based on 8-1/2 x 11 paper size

Map created by: DWYSS
Date Created: 10-Oct-18 10:37 AM

WEST LINN GIS

DISCLAIMER: This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information. Map scale is approximate. Source: West Linn GIS (Geographic Information System) MapOptix.

PD-4 APPLICANT SUBMITTAL

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: Darren Wyss	PROJECT NO(S).: WA-18-03	
NON-REFUNDABLE FEE(S): 2850	REFUNDABLE DEPOSIT(S):	TOTAL: 2850

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:

19738 Wildwood Dr.

Assessor's Map No.: 2-1E-23AC
Tax Lot(s): 9004
Total Land Area: 10000 sq ft

Brief Description of Proposal:

New Home

Applicant Name: (please print) Max Eckelman
Address: 509 Washington st.
City State Zip: Oregon City OR 97045
Phone: 503-572-0239
Email: max@eckwork.com

Owner Name (required): (please print) Max Eckelman
Address: 509 Washington St.
City State Zip: Oregon City OR 97045
Phone: ~~503-572-0239~~
Email: max@eckwork.com

Consultant Name: (please print)
Address:
City State Zip:
Phone:
Email:

RECEIVED
JUL 18 2018
PLANNING & BUILDING
CITY OF WEST LINN

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: 7/19/18
Owner's signature ***(required)*** — Date: 7/19/18

AKS ENGINEERING & FORESTRY

BEND, OR
3052 NW Merchant Way, Suite 100
Bend, OR 97703
(503) 317-8429

KEIZER, OR
4300 Cherry Avenue NE
Keizer, OR 97303
(503) 400-6028

TUALATIN, OR
12965 SW Herman Road, Suite 100
Tualatin, OR 97062
(503) 563-6151

VANCOUVER, WA
9600 NE 126th Avenue, Suite 2520
Vancouver, WA 98682
(360) 882-0419

www.aks-eng.com

Wildwood Drive Natural Resource Assessment

Date:	7/23/2018
To:	City of West Linn Planning Department
From:	Stacey Reed, PWS, Senior Wetland Scientist
Project:	19738 Wildwood Drive Single Family Residence on Lot of Record
Subject:	WRA Permit and Hardship Variance
Site Location:	T2S, R1E, Section 23AC, Tax Lot 9004 West Linn, Clackamas County, Oregon

Introduction

AKS Engineering & Forestry, LLC (AKS) conducted a natural resource assessment for 19738 Wildwood Drive, West Linn, Clackamas County, Oregon (Tax Lot 9004 of Assessor's Tax Map 2S 1E 23AC). The study area is shown on attached Figures 1-2. An unnamed tributary to Robin Creek is mapped on the City of West Linn's Water Resource Area (WRA) map flowing northeasterly through the northwest corner of the site. The tributary is located at the bottom of a ravine with no distinct top of slope for at least 150 feet, requiring a 200 foot wide WRA buffer. The WRA buffer consumes the entire site.

This memorandum describes the results of the natural resource assessment and requests a hardship variance approval for a single-family home within the outer edges of the WRA buffer. This memo documents the project meets all of the hardship provisions described in Section 32.110 of City of West Linn Community Development Code (CDC) Chapter 32 Water Resource Area Protection.

Existing Conditions and Background Mapping

The project site consists of an undeveloped property located within the Hidden Springs residential neighborhood of West Linn. The project site is generally dominated with Douglas fir (*Pseudotsuga menziesii*), bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), and pineland swordfern (*Polystichum munitum*) with Himalayan blackberry (*Rubus armeniacus*) along the edges near Wildwood Drive. The topography on the site slopes northerly toward the tributary that flows through the northern portion of the site. Topography is steep, with greater than 25 percent slopes throughout.

According to the Natural Resources Conservation Service (NRCS) soil survey map for Clackamas County, Oregon Area soil survey and the Clackamas County hydric soil list Saum silt loam with 30%-60% slopes are mapped extending throughout the entire site (Figures 3). Saum silt loams are not listed as hydric, nor do they have any hydric inclusions.

The City of West Linn has an Oregon Department of State Lands (DSL) approved Local Wetland Inventory (LWI) map (Figure 4). The LWI map has an unnamed drainage mapped within the project site. Our study confirmed a portion of the drainage is located within the site. According to the City's WRA map, an unnamed tributary to Robin Creek is mapped in the northwest portion of the site (Figure 5). According to the WRA map, no Significant Riparian Corridors are mapped on the site.

On-Site Protected Water Resource

AKS Senior Wetland Scientist, Stacey Reed, PWS, conducted site visits on May 9 and 14, 2018 to evaluate site conditions and determine whether the flow regime within the on-site portions of the tributary was ephemeral or intermittent. The channel daylights approximately 50 feet off-site to the west from a large diameter culvert that passes flow under Wildwood Drive. On-site, the channel is narrow averaging approximately 3 foot wide channel bed with 1 foot tall banks. The dominant streambed substrate is silt loam with scattered gravels and cobbles. The on-site portion of the channel contained approximately 1/2-inch deep continuous flow during the May 9, 2018 site visit. However, according to the National Weather Service (NWS) Portland station, approximately 0.25-inch of rainfall was received within the 3 days prior to the May 9, 2018 site visit. Therefore, a follow up site visit was conducted a week later on May 14, 2018. The on-site upper portions of the channel were dry (lacked flow) during the May 14, 2018 site visit, but the lower half of the channel contained approximately ¼-inch deep continuous flow. Since portions of the channel still contained flow, we determined the on-site portions of the channel to be intermittent. Intermittent drainages mapped on West Linn's WRA map are considered a Protected Water Feature requiring a WRA buffer.

The ordinary high water mark (OHWM) for the on-site portion of drainage was professionally land surveyed by Andy Paris and Associates, Inc. The Existing Conditions Map depicting the surveyed water boundaries and adjacent topography is included as Figure 6. Representative site photographs are attached for reference.

Extent of the Water Resource Area (WRA)

The slopes within the first 50 feet from the OHWM of the tributary are greater than 25%, with no distinct top of bank until Wildwood Drive. Therefore, according to Table 32-2 *Required Width of WRA* of Chapter 32.030 of the City's CDC, the width of a WRA for the on-site tributary extends 200 feet, which consumes the entire site (0.24 acres of on-site WRA). The extent of WRA and slope measurements are shown on the attached Existing Conditions Map (Figure 6).

Existing Conditions 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 was determined to be in *good* condition due to having a dense native tree canopy and native understory. The entire site is under native tree canopy (red alder, bigleaf maple, and Douglas-fir trees). The understory was primarily dominated by pineland sword fern and vine maple, generally lacking any non-native invasive plants. Only a few Himalayan blackberry thickets were observed near the edge of the property, near Wildwood Drive.

Hardship Provision Compliance

The project will consist of a single-family 3-story home within WRA. No impacts will occur within the Water Resource (drainage). The total area of the home is +/-3,000 square feet, with each story +/-1,000 square feet. The home is situated as far away from the on-site drainage as possible, near the top of the slope adjacent to Wildwood Drive. A geotechnical investigation was completed to confirm slope stability for the project. The geotechnical report prepared by H.G. Schlicker & Associates is attached. The site plan figures are included as Figures 7 and 7A. Figure 7 shows the full build out of the bottom story, along with the location for the fireplace. Figure 7A shows site erosion and control measures (construction management plan per Section 32.050.G)

Stormwater Management: According to the attached Geotech report, stormwater collected from roof drains, footing drains, and impervious surfaces on the site can be collected and directed downslope via a pipe to discharge into a riprap energy dissipation pad above the OHWM of the tributary. To minimize disturbance within the WRA, we recommend laying the pipe above ground, stapled with #3 rebar to secure the pipe to the ground surface. The area north of the house is shaded; therefore, minimal sunlight damage is expected due to exposed pipe. The riprap

energy dissipation pad will be approximately 10 square feet (5 foot by 5 foot) and will be placed within the WRA, at least 5 feet upslope from the OHWM of the drainage (approximate location shown on attached Figure 7). The location of the energy dissipater is not expected to have an erosive effect on the tributary or diminish the stability of the slope. According to Table 32-1 of West Linn CDC, the energy dissipater can occur within the WRA if no reasonable alternative exists. Since the entire site is within WRA, there are no alternatives to avoiding impact. Impacts to WRA have been minimized by proposing above ground pipe and not trenching to install buried pipe. Due to steep slopes and low permeability, the Geotech report does not recommend on-site water quality treatment.

Tree Preservation: Figure 6 illustrates the surveyed location of all trees on the site. Figure 7A illustrates planned tree removal and preservation. A total of only 8 trees will be removed from the site for the project. The project preserves 9 trees, including the larger diameter trees on the site. The trees to be removed are smaller diameter, with the largest being a 12-inch diameter Douglas fir and a 15-inch diameter bigleaf maple. Of the 8 trees to be removed, only 2 bigleaf maple trees with greater than 12-inch DBH will be removed.

The project site is an established lot of record with the Assessor's office before January 1, 2006, meeting the hardship provision criteria under CDC 32.110.A.

The project will only require a total of 2,510 square feet of maximum disturbed area (MDA), consisting of home, deck, driveway and energy dissipation pad, meeting the hardship provision criteria under CDC 32.110.B.

Impact Evaluation Per CDC 32.110.C.

The entire site is located with WRA buffer. Therefore, impacts to WRA are unavoidable. The project consists of relatively small impact to the buffer, resulting in under 5,000 square feet of MDA (impervious surfaces). The MDA encroachment is the least amount of square footage necessary to develop a single-family home compatible with the surrounding neighborhood. Therefore, the project meets criteria listed under CDC 32.110.C.1.

The home is approximately 85 feet from the edge of the drainage (at closest extent), and avoids impacts to the drainage. The home will not have a functional loss on the intermittent drainage. An 85 foot wide protective buffer between the home and the seasonal drainage is adequate to protect the stream functions. A total of 9 trees and dense native vegetation will remain between the home and the drainage; therefore, the project meets criteria listed under CDC 32.110.C.2.

The development will occur greater than 15 feet from the water resource, meeting criteria listed under CDC 32.110.C.3.

The access driveway is approximately 17-feet wide, with the home being situated as close to Wildwood Drive as possible; therefore, the project meets criteria listed under CDC 32.110.C.4.

Temporary disturbed areas (TDA) adjacent to the development area will be restored to pre-construction conditions and planted with native pineland sword fern.

Mitigation

The project results in a total of 2,510 square feet of MDA. Permanent encroachment will be mitigated off-site through payment in lieu to the City of West Linn Parks Department. The remaining portions of the on-site WRA can be described as being in *good* condition. There are no non-native invasive plants to remove within remaining WRA and no opportunity to install additional plants as the remaining WRA is densely vegetated with native

pineland sword fern and dense canopy of bigleaf maple trees. Off-site mitigation is the most practical approach for this project.

According to Section 32.090, off-site mitigation is allowed if there is not sufficient on-site area. According to Section 32.090.C, off-site mitigation ratios are 2:1; therefore, the project requires 5,020 square feet of off-site credits.

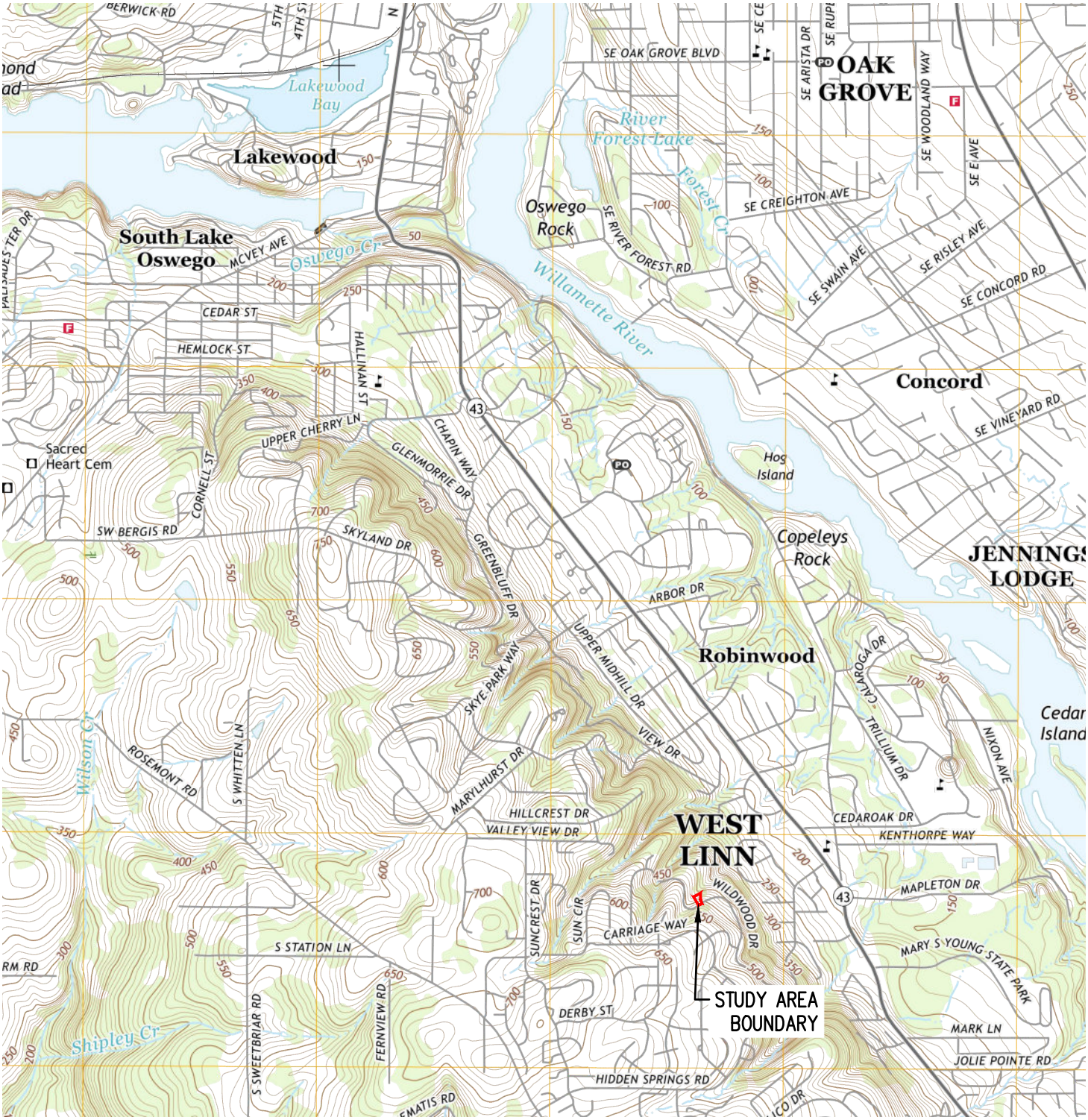
Please do not hesitate to contact me regarding this memorandum.

Stacey Reed

Stacey Reed, PWS
Senior Wetland Scientist

List of Figures
Figure 1. USGS Vicinity Map
Figure 2. Tax Map (2S 1E 23AC)
Figure 3. NRCS Soil Survey Map
Figure 4. Local Wetland Inventory (LWI) Map
Figure 5. West Linn Water Resource Area (WRA) Map
Figure 6. Existing Conditions Map
Figure 7 and 7A. Site and Erosion Control Figures

List of Attachments
Representative Site Photographs
Geotech Report prepared by H.G. Schlicker & Associates



USGS 7.5' TOPOGRAPHIC SERIES
QUADRANGLE: LAKE OSWEGO, OR (2017)

N

SCALE: 1"= 2000 FEET

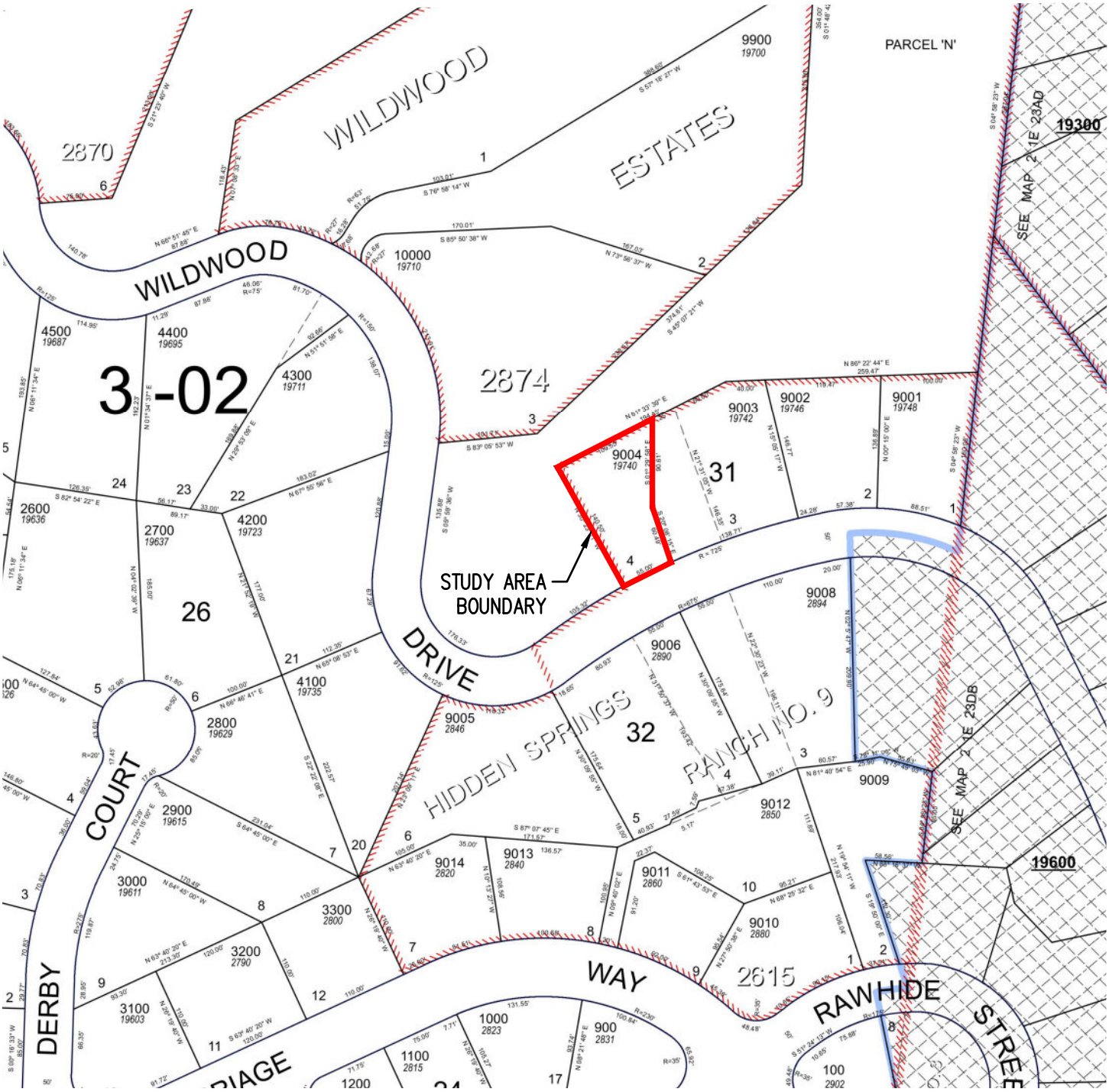
2000 0 800 1200 1600 2000

WAP-18-03

DATE: 06/22/2018

USGS VICINITY MAP **WILDWOOD DRIVE WEST LINN NATURAL RESOURCE ASSESSMENT MEMO**	FIGURE **1**
AKS ENGINEERING & FORESTRY, LLC 12965 SW HERMAN RD SUITE 100 TUALATIN, OR 97062 www.aks-eng.com PHONE: 503.563.6151 FAX: 503.563.6152	DRWN: KMK CHKD: HS AKS JOB: 6786

DWG: 6786 NRA FIGURES 1-4 | FIGURE 1



CLACKAMAS COUNTY
TAX LOT 9004
TAX MAP 2 1 E 23AC

N

SCALE: 1"=150 FEET

150 0 60 90 120 150

WAP-18-03

DATE: 06/22/2018

TAX MAP (MAP 2 1E 23AC) WILDWOOD DRIVE WEST LINN NATURAL RESOURCE ASSESSMENT MEMO	FIGURE 2
AKS ENGINEERING & FORESTRY, LLC 12965 SW HERMAN RD SUITE 100 TUALATIN, OR 97062 www.aks-eng.com PHONE: 503.563.6151 FAX: 503.563.6152	DRWN: KMK CHKD: HS AKS JOB: 6786

DWG: 6786 NRA FIGURES 1-4 | FIGURE 2

MAP UNIT SYMBOL	MAP UNIT NAME
78E	SAUM SILT LOAM, 30% TO 60% SLOPES; NON-HYDRIC

NRCS WEB SOIL SURVEY FOR
CLACKAMAS COUNTY

N

SCALE: 1"= 80 FEET

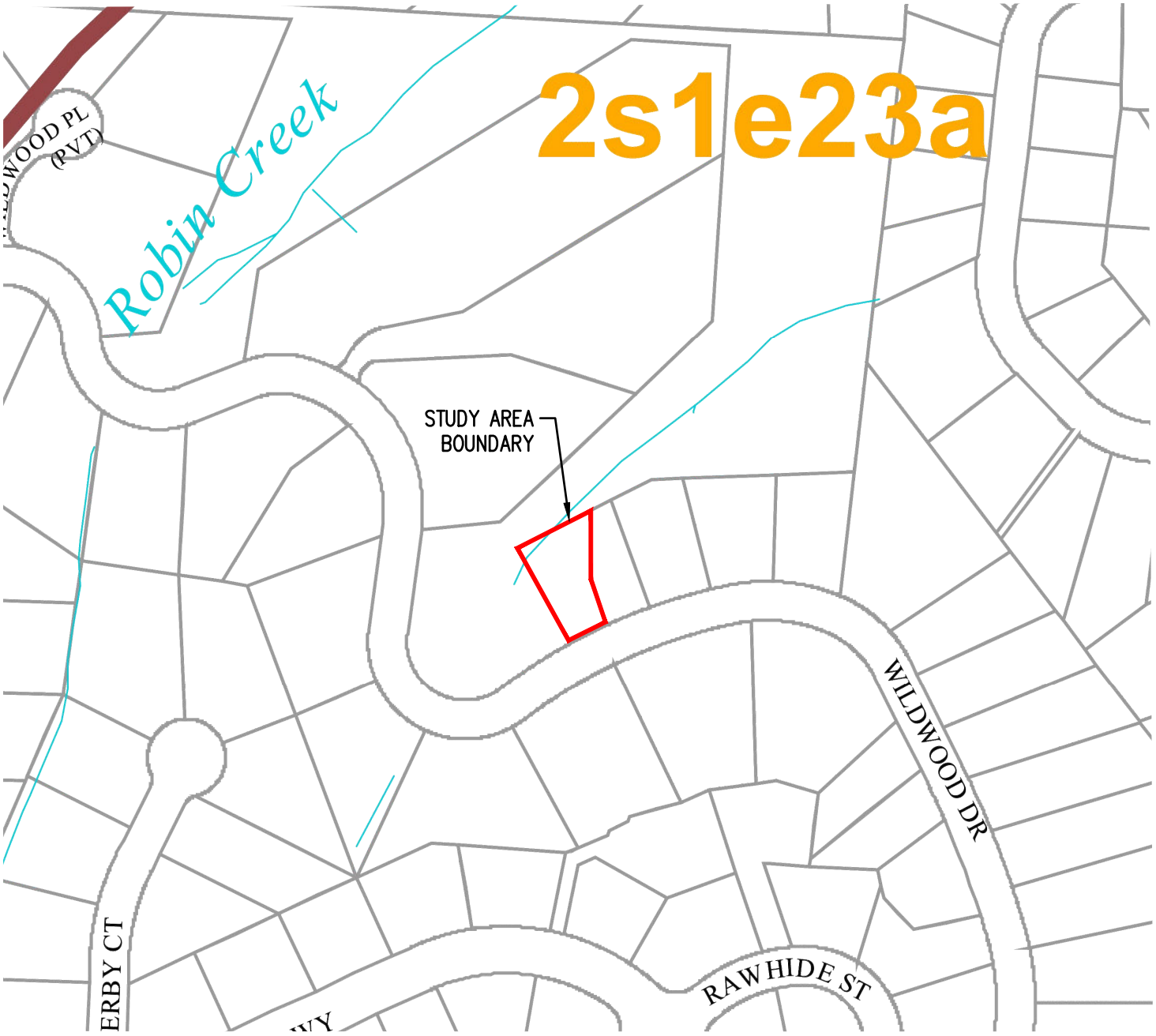
80 0 32 48 64 80

WAP-18-03

DATE: 06/22/2018

NRCS SOIL SURVEY MAP WILDWOOD DRIVE WEST LINN NATURAL RESOURCE ASSESSMENT MEMO	FIGURE 3
AKS ENGINEERING & FORESTRY, LLC 12965 SW HERMAN RD SUITE 100 TUALATIN, OR 97062 www.aks-eng.com PHONE: 503.563.6151 FAX: 503.563.6152	DRWN: KMK CHKD: HS AKS JOB: 6786

DWG: 6786 NRA FIGURES 1-4 | FIGURE 3



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

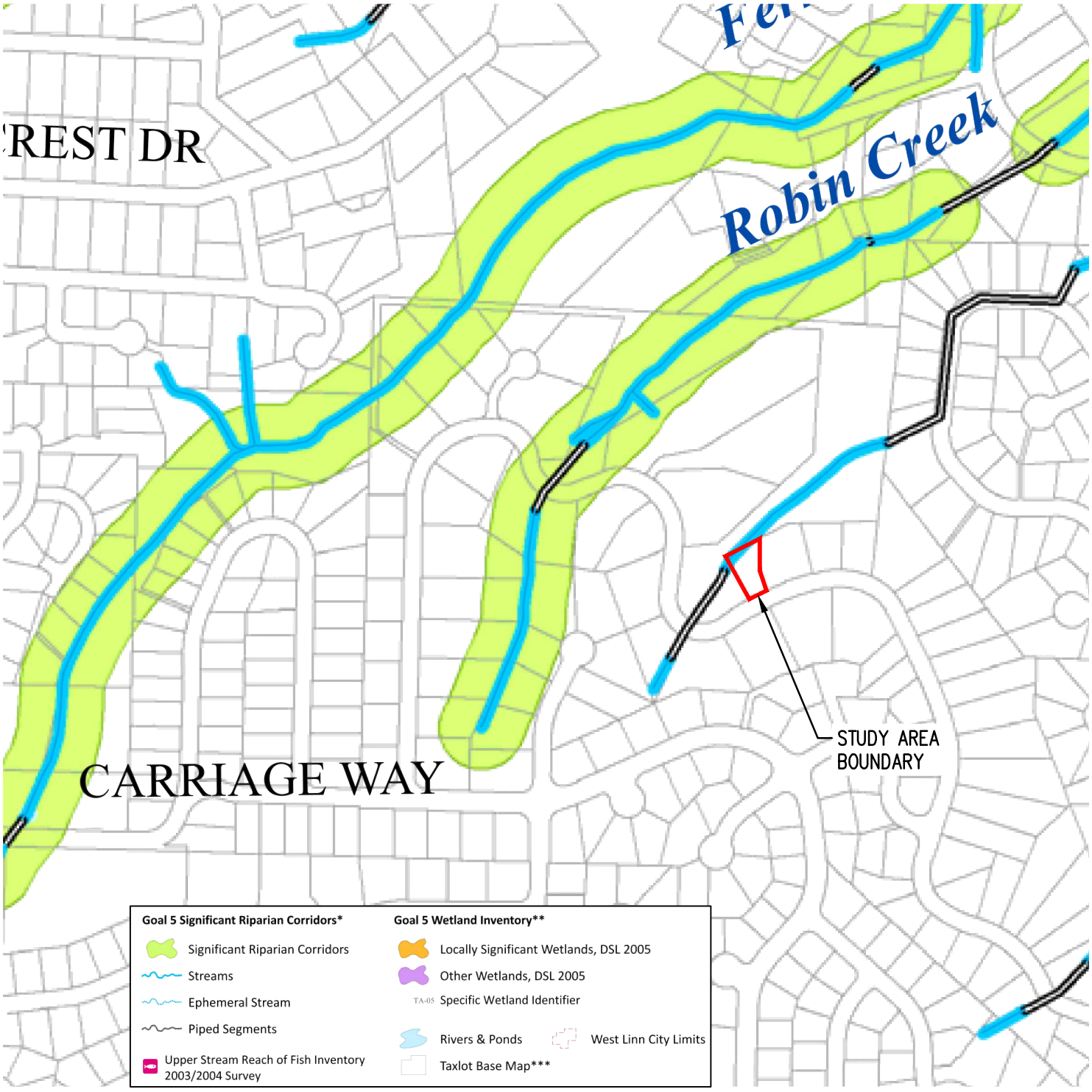
SCALE: 1"= 200 FEET

200 WAP-18-03 0 80 120 160 200

DATE: 06/22/2018

LOCAL WETLAND INVENTORY MAP WILDWOOD DRIVE WEST LINN NATURAL RESOURCE ASSESSMENT MEMO	FIGURE 4
AKS ENGINEERING & FORESTRY, LLC 12965 SW HERMAN RD SUITE 100 TUALATIN, OR 97062 www.aks-eng.com PHONE: 503.563.6151 FAX: 503.563.6152	DRWN: KMK CHKD: HS AKS JOB: 6786

DWG: 6786 NRA FIGURES 1-4 | FIGURE 4



WEST LINN PLANNING DEPARTMENT AND GIS
(MAY, 2014)

N

SCALE: 1"= 400 FEET

400 WAP-18-03 0 160 240 320 400

DATE: 07/17/2018

WEST LINN WATER RESOURCE AREA (WRA) MAP
WILDWOOD DRIVE WEST LINN NATURAL RESOURCE ASSESSMENT MEMO

FIGURE 5

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD SUITE 100
TUALATIN, OR 97062 www.aks-eng.com
PHONE: 503.563.6151 FAX: 503.563.6152

DRWN: JRI
CHKD: SAR
AKS JOB: 6786

DWG: 6786 NRA FIGURES 1-4 | FIGURE 5

TITLE NOTE:

1. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY SURVEYOR. THERE MAY EXIST EASEMENTS, CONDITIONS, OR RESTRICTIONS THAT COULD AFFECT THE TITLE OF THIS PROPERTY. NO ATTEMPT HAS BEEN MADE IN THIS SURVEY TO SHOW SUCH MATTERS THAT MAY AFFECT TITLE.

TOPOGRAPHIC SURVEY

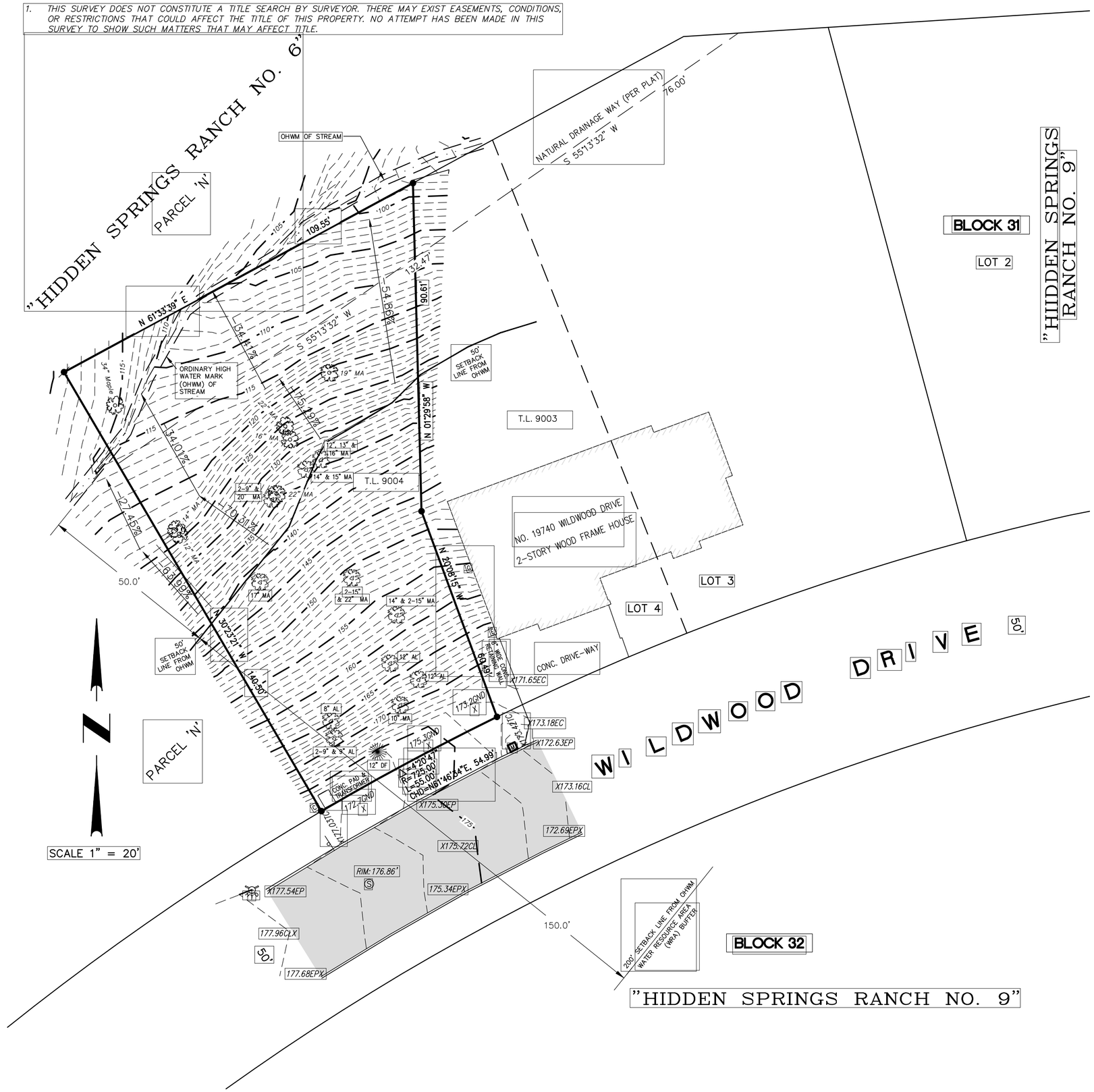
FOR:

MAX ECKELMAN

BEING A PORTION OF LOT 4, BLOCK 31, "HIDDEN SPRINGS RANCH NO. 9"

IN THE NE 1/4 SEC. 23, T.2S., R.1E., W.M.
CITY OF WEST LINN
CLACKAMAS COUNTY, OREGON

JULY 11, 2018 MAP 2 1E 23AC



LEGEND:

FOUND 5/8" IRON ROD WITH YELLOW PLASTIC CAP STAMPED: "ANDY PARIS & ASSOC, INC."	DF DOUGLAS FIR TREE
FOUND 5/8" I.R. (SMOOTH) W/YPC "LS 937" PER PLAT OF "HIDDEN SPRINGS RANCH NO. 9"	AL ALDER TREE
	MA MAPLE TREE
S SANITARY SEWER MANHOLE	000.00FFX SPOT ELEVATION TOP OF CURB
FIRE HYDRANT	000.00GNDX SPOT ELEVATION GROUND
M MAILBOX IN BRICK COLUMN	000.00EPX SPOT ELEVATION EDGE OF PAVEMENT
E ELECTRIC METER	000.00CLX SPOT ELEVATION CENTER OF ROAD
G GAS METER	CONC. VERTICAL CURB (UNLESS OTHERWISE NOTED)
C CABLE PEDESTAL	
ROAD SIGN	ASPHALT
DECIDUOUS TREE AS NOTED	
CONIFEROUS TREE AS NOTED	

NOTES:

1. ELEVATIONS ARE ON AN ASSUMED DATUM..
2. THE BOUNDARIES AS SHOWN ON THIS MAP ARE BASED ON RECORD DATA AND FOUND MONUMENTS. THIS MAP DOES NOT REPRESENT A SURVEY TO BE RECORDED, BUT WAS DONE FOR SITE/TOPO INFORMATION ONLY.
3. THIS SURVEY IS MADE FOR THE ORIGINAL PURCHASER OF THE SURVEY ONLY. ANDY PARIS & ASSOCIATES, INC. ASSUMES NO LIABILITY FOR INFORMATION SHOWN HEREON TO ANY OTHER INSTITUTIONS OR SUBSEQUENT PURCHASERS OF THE PROPERTY.
4. SURVEY IS VALID ONLY IF PRINT HAS SEAL AND SIGNATURE OF SURVEYOR.
5. THE LOCATION AND OR EXISTENCE OF UTILITY SERVICE LINES AS SHOWN ON THIS MAP ARE BASED ON FIELD OBSERVATION ONLY. THERE MAY EXIST ADDITIONAL SERVICE LINES NOT SHOWN ON THIS SURVEY.
6. SUBSURFACE AND ENVIRONMENTAL CONDITIONS WERE NOT EXAMINED OR CONSIDERED AS A PART OF THIS SURVEY. NO STATEMENT IS MADE CONCERNING THE EXISTENCE OF UNDERGROUND OR OVERHEAD CONTAINERS OR FACILITIES THAT MAY AFFECT THE USE OR DEVELOPMENT OF THIS TRACT.
7. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY SURVEYOR. THERE MAY EXIST EASEMENTS, CONDITIONS, OR RESTRICTIONS THAT COULD AFFECT THE TITLE OF THIS PROPERTY. NO ATTEMPT HAS BEEN MADE IN THIS SURVEY TO SHOW SUCH MATTERS THAT MAY AFFECT TITLE.

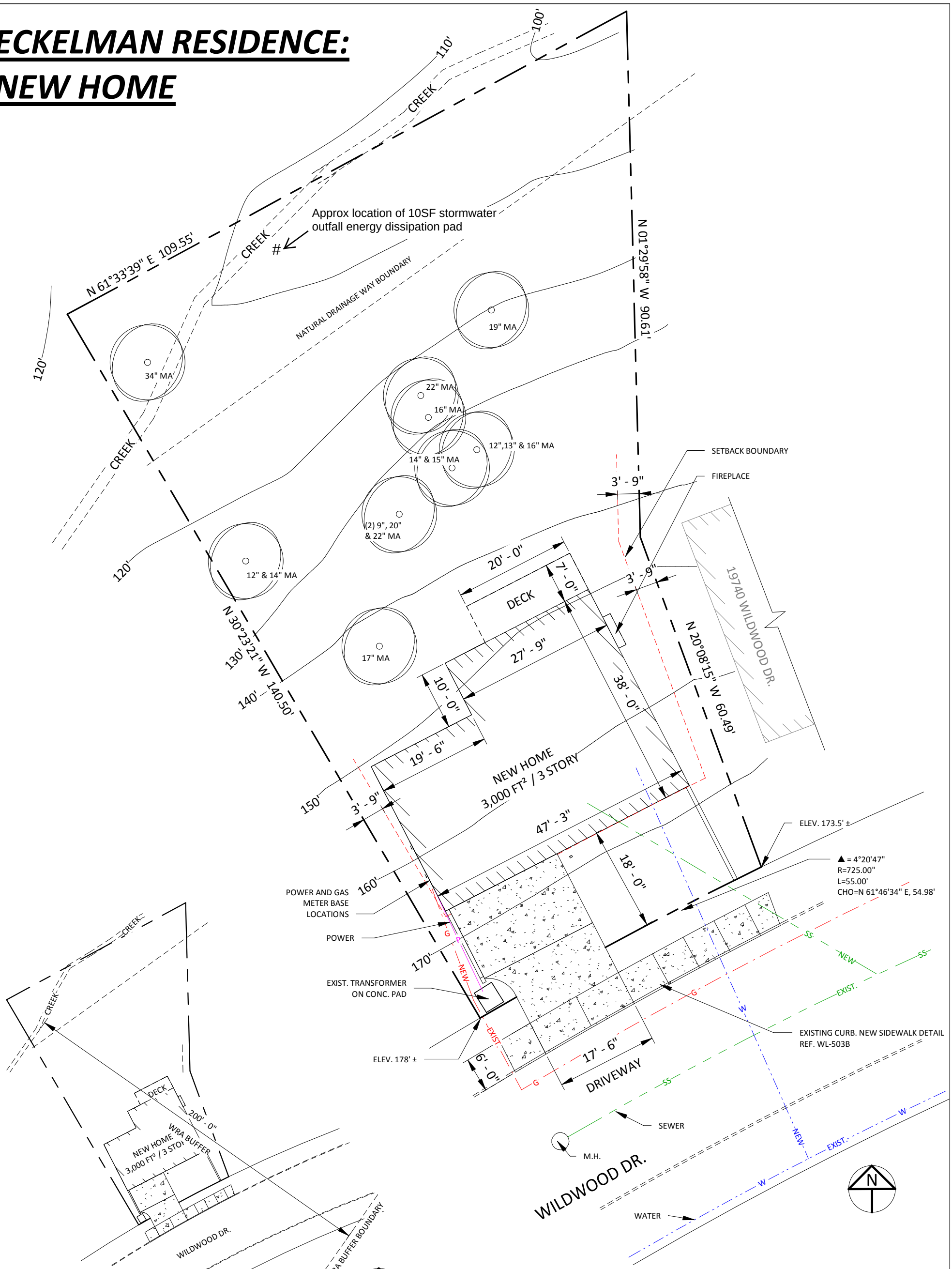
REGISTERED PROFESSIONAL LAND SURVEYOR
OREGON
JANUARY 15, 1987
HAROLD P. SALO
2264
EXPIRES: JUNE 30, 2020

SINCE 1952
ANDY PARIS AND ASSOCIATES, INC.
PROFESSIONAL LAND SURVEYORS
16057 BOONES FERRY ROAD
LAKE OSWEGO, OREGON 97035
PH: 503-636-3341
www.andyparis.com

PROJECT: 18134
DRAWING: 18134TP1.DWG
DRAFTED: AH 07/11/18

FIGURE 6 EXISTING CONDITIONS

ECKELMAN RESIDENCE:
NEW HOME



2 WRA BUFFER ZONE
1" = 50'-0"

1 SITE PLAN
1/16" = 1'-0"

PERMANENT DISTURBANCE AREA WITHIN WRA BUFFER ZONE: 2,510 FT²
(BUILDING FOOTPRINT, CONCRETE DRIVEWAY AREA, NEWLY GRADED LANDSCAPED AREA, ETC.)

APPLICANT:
MAX ECKELMAN
509 WASHINGTON ST.
OREGON CITY, OR 97045
(503) 572-0239

ECKELMAN
GARY ECKELMAN, ARCHITECT
4529 SE 67TH AVE, PORTLAND, OR 97206
P. (503) 572-1247

WAP-18-03

ECKELMAN - NEW SINGLE FAMILY HOME
19738 WILDWOOD DR, WEST
LINN, OR 97068

WRA - SITE PLAN FIGURE 7

Project number	18-102
Date	7/12/2018
Drawn by	CE
Checked by	GE

A1

Scale As indicated
7/12/2018 3:33:55 PM

EROSION CONTROL / TREE PROTECTION NOTES:

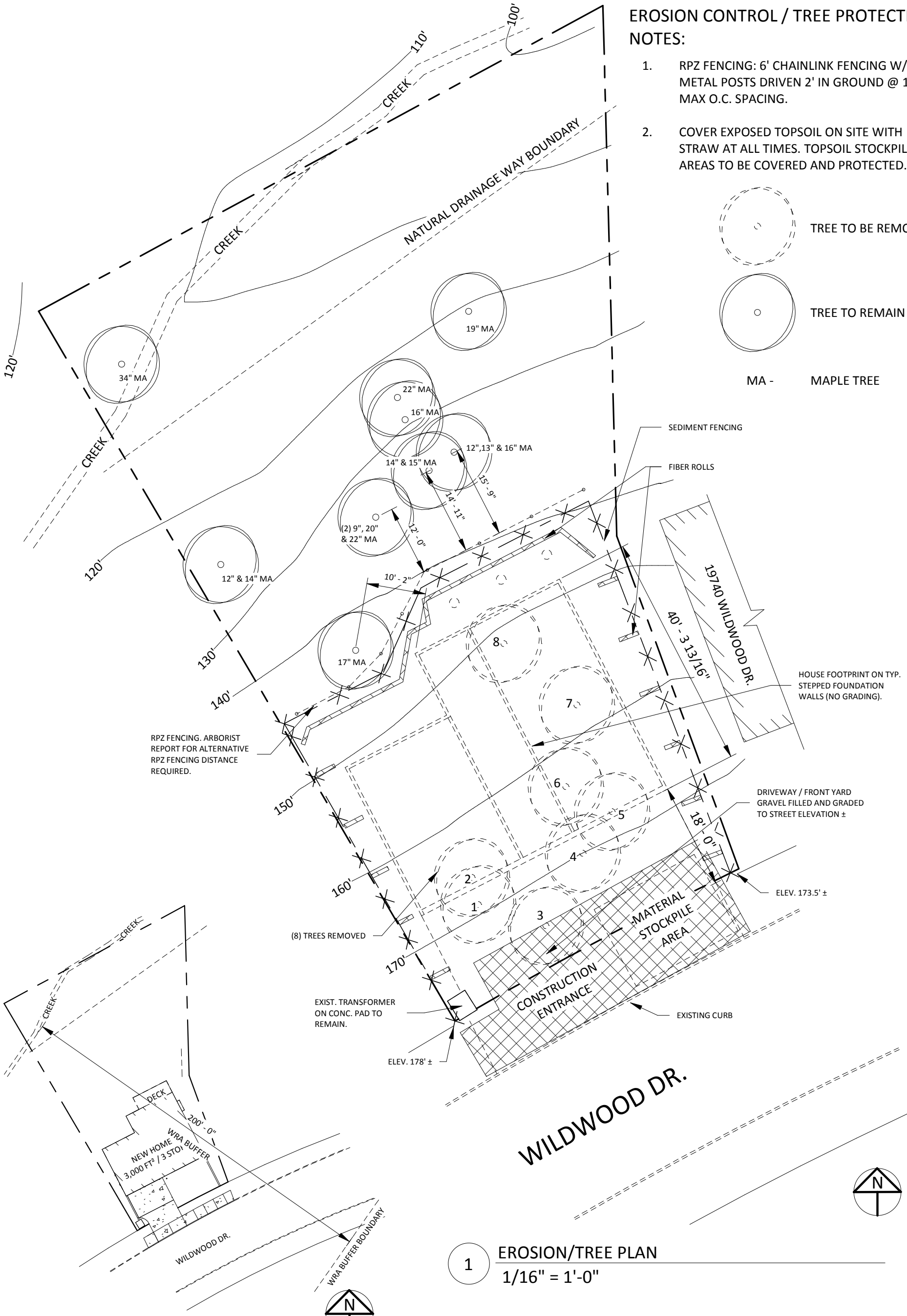
1. RPZ FENCING: 6' CHAINLINK FENCING W/ 8' METAL POSTS DRIVEN 2' IN GROUND @ 10' MAX O.C. SPACING.

2. COVER EXPOSED TOPSOIL ON SITE WITH STRAW AT ALL TIMES. TOPSOIL STOCKPILE AREAS TO BE COVERED AND PROTECTED.

TREE TO BE REMOVED

TREE TO REMAIN

MA - MAPLE TREE



1 EROSION/TREE PLAN
1/16" = 1'-0"

2 WRA BUFFER ZONE
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PERMANENT DISTURBANCE AREA WITHIN WRA BUFFER ZONE: 2,510 FT²
(BUILDING FOOTPRINT, CONCRETE DRIVEWAY AREA, NEWLY GRADED LANDSCAPED AREA, ETC.)

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ECKELMAN - NEW SINGLE FAMILY HOME
19738 WILDWOOD DR, WEST LINN, OR 97068

WAP-18-03

40

WRA - EROSION/TREE PLAN

FIGURE 7A

Project number	18-102
Date	7/12/2018
Drawn by	CE
Checked by	GE

A2

Scale As indicated

7/12/2018 3:33:55 PM

Photos taken by Stacey Reed on May 14, 2018

Photo A. View of property from Wildwood Drive.

Photo B. View northeast of good condition Water Resource Area (WRA).

Photo B. View of on site portion of drainage.

Photo D. View south of steep slopes adjacent to drainage.

Geologic Hazards and
Geotechnical Investigation
Tax Lot 9004, Map 2-1E-23AC
19738 Wildwood Drive
West Linn, Oregon

Prepared for:
Mr. Max Eckelman
Eckelman Construction LLC.
4529 S.E. 67th Avenue
Portland, Oregon 97206

Project #Y184154

July 19, 2018

H.G. Schlicker & Associates, Inc.
607 Main Street, Suite 200 • Oregon City, Oregon 97045
(503) 655-8113 • FAX (503) 655-8173

Project #Y184154

July 19, 2018

To: **Mr. Max Eckelman**
Eckelman Construction LLC.
4529 S.E. 67th Avenue
Portland, Oregon 97206

Subject: **Geologic Hazards and**
Geotechnical Investigation
Tax Lot 9004, Map 2-1E-23AC
19738 Wildwood Drive
West Linn, Oregon

Dear Mr. Eckelman:

The accompanying report presents the results of our geologic hazards and geotechnical investigation for the above subject site.

After you have reviewed our report, we would be pleased to discuss it and to answer any questions you might have.

This opportunity to be of service is sincerely appreciated. If we can be of any further assistance, please contact us.

H.G. SCHLICKER & ASSOCIATES, INC.

J. Douglas Gless, MSc, RG, CEG, LHG
President/Principal Engineering Geologist

JDG:mgb

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FIGURES

APPENDICES

H.G. Schlicker & Associates, Inc.
607 Main Street, Suite 200 · Oregon City, Oregon 97045
(503) 655-8113 · FAX (503) 655-8173

Project #Y184154 July 19, 2018

To: **Mr. Max Eckelman**
Eckelman Construction LLC.
4529 S.E. 67th Avenue
Portland, Oregon 97206

Subject: **Geologic Hazards and**
Geotechnical Investigation
Tax Lot 9004, Map 2-1E-23AC
19738 Wildwood Drive
West Linn, Oregon

Dear Mr. Eckelman:

1.0 Introduction and General Information

At your request and authorization, a representative of H.G. Schlicker and Associates, Inc. (HGSA) visited the subject site on June 6, 2018 to complete a geologic hazards and geotechnical investigation of Tax Lot 9004, Map 2-1E-23AC, located at 19738 Wildwood Drive, West Linn, Oregon (Figures 1 and 2; Appendix A). It is our understanding that you are are planning to construct a new home on the property.

This report addresses the engineering geology and geologic hazards at the site with respect to constructing a home. The scope of our work consisted of a site visit, site observations and measurements, hand augered borings, a slope profile, limited review of the geologic literature, interpretation of topographic maps, lidar and stereo aerial photographs, and preparation of this report which provides our findings, conclusions, and recommendations.

2.0 Site Description

The site is located on a northwest facing hillside in West Linn, Oregon (Figures 1 and 2; Appendix A). The site consists of a vacant 0.24-acre lot approximately 140 feet deep, southeast to northwest, and 55 to 109 feet wide, southwest to northeast (Figure 2). The lot is bound to the south by Wildwood Drive, to the east by an existing home, and to the north and west by Wildwood Open Space.

The site generally slopes down to the north from 20 to 40 degrees. Uncontrolled fill, landscape and construction-related debris, including large pieces of concrete and bricks as much as 6 feet thick were observed near the top of the slope near the southern portion of the site. Cracks on the asphalt surface of Wildwood Drive were observed near the site. The site is vegetated with evergreen and deciduous trees, ferns, ivy, and other brush.

Wildwood Open Space and a tributary of Robin Creek occupy the northern portion of the site. The banks of the creek were heavily vegetated and in places overgrown to the point of obscuring the creek bed. The areas of exposed creek bed were lined with rock fragments. Debris was observed in the creek including a section of metal pipe and a tire.

3.0 Geologic Mapping, Investigation and Descriptions

The site lies in an area mapped as middle Miocene-aged basalt of the Columbia River Basalt Group (Schlicker and Finlayson, 1979; Beeson et al., 1989). Volcanic rocks of Columbia River Basalt Group are flood-basalt flows of variable thickness that were erupted from long linear fissures in northeastern Oregon, eastern Washington, and western Idaho. These lavas generally consist of dense, fine-grained to glassy rock in the lower portion, with a middle zone of massive columnar jointed to close cubic jointed rock and an upper zone of vesicular or scoriaceous rock which is often deeply weathered and altered to a residual clayey soil. The subject site is mapped as having middle Miocene basalt of the Sentinel Bluffs unit of the Grande Ronde Basalt; middle Miocene basalt rocks of the Winter Water unit are also mapped on the northern part of the site (Beeson et al., 1989) In the area of the site, total unit thickness of Columbia River Basalt rocks is more than 900 feet (Schlicker and Finlayson, 1979).

At the time of our site visit, we completed three hand augered borings as deep as approximately 4 feet. The approximate locations of the borings are shown in Figure 3. An engineering geologist from our office visually classified the soils encountered according to the Unified Soil Classification System (USCS) as follows:

B-1	Depth (ft.)	USCS	Description
	0 – 1.0	ML	SILT, medium brown, moist, soft, with organic matter and 0.5" > roots.
	1.0 – 1.5	ML	SILT, medium brown, moist, soft, with fragments of clayey silt.
	1.5 – 3.0	ML	CLAYEY SILT, brown, moist, soft, with reddish brown, medium stiff, clayey silt fragments.

	3.0 – 4.5	ML	CLAYEY SILT, brown, moist medium stiff, with orange stained rock fragments.
B-2	**Depth (ft.)**	**USCS**	**Description**
	0 – 1.5	ML (Disturbed)	CLAYEY SILT, red-brown, moist, medium stiff, with roots less than 0.5" diameter.
	1.5 – 3.0	ML	CLAYEY SILT, medium brown, moist, medium stiff.
B-3	**Depth (ft.)**	**USCS**	**Description**
	0 – 2.0	ML (Disturbed)	CLAYEY SILT, dark brown, moist, soft, with roots less than 0.5" diameter.
	2.0 – 3.5	ML	CLAYEY SILT, light brown, moist, medium stiff, with roots less than 0.25" diameter.

Soils encountered at the site generally consisted 2-6 feet of uncontrolled fill and debris at upper elevations near the road. Soft to medium stiff native silts are underlain at shallow depth by medium stiff silts with weathered basaltic rock fragments.

3.1 Structures

The site is located approximately 1.5 miles southwest of the Portland Hills fault, and approximately 1 mile southwest of Oatfield fault. These potentially active faults are part of the Portland Hills fault zone which also includes the East Bank fault. These faults are believed to be characterized by dextral strike-slip motion, and have a potential of generating magnitude 6.5 to 7.1 earthquakes (Geomatrix, 1995; Wong et al., 2000). The Portland Hills fault is believed to have a potential of generating a magnitude 6.6 to 7.1 earthquake, and the Oatfield fault is believed to have a potential of generating a magnitude 6.5 to 6.9 earthquake (Wong et al., 2000). The site is mapped approximately 800 feet southwest of the Bolton fault, an approximately 5-mile long, northwest striking, southwest-dipping reverse fault which trends generally along the Willamette River; the fault is part of the Portland Hills fault zone and the Portland Hills–Clackamas River structural zone (Beeson et al., 1989, Personius et al., 2003). The Bolton fault is considered to be potentially active (Wong et al., 2000; Personius et al., 2003).

Based on mapping, the subject site lies approximately 3 miles northeast of the Molalla-Canby fault. The Molalla-Canby fault is an approximately 30-mile long northwest

trending, northeast dipping fault. Delineation of the Molalla-Canby fault has been largely based on data obtained from low-altitude aeromagnetic data (Blakely et al., 1995). Although there is no definitive evidence that has established the seismic potential of this fault, seismic reflection data across the East Bank and Portland Hills faults, which the Molalla-Canby fault may be associated with, have indicated possible displacements in the last 15,000 years (Wong et al., 2000). The fault appears to deform Missoula flood deposits which were deposited approximately 15,000 years ago.

4.0 Slope Stability and Erosion

The area of the site is located on a generally northeast-sloping hillside which formed as the result of downcutting and erosion of the Willamette River (Figure 1). The site generally slopes from approximately 20 to 40 degrees toward the northwest and is located on the flanks of a small stream valley. A tributary of Robin Creek flows across the northwest corner of the site at the base of the slope (Figure 3).

DOGAMI's SLIDO-3 landslide mapping shows a southeast facing complex earth flow (Lake_Oswego_324) mapped approximately 1,100 feet northwest of the site; no other significant landslide features are mapped within a ¼ mile radius of the subject site (Burns and Duplantis, 2010; Burns and Watzig, 2014). However, the site is in area mapped with a landslide hazard of Moderate, landsliding possible, to High, landsliding likely, according to DOGAMI.

At the time of our site visit, we observed some minor signs of shallow sloughing near the top of the slope in the uncontrolled fill. Clearing and grading activity at the site could expose surface soils to surface water erosion if not mitigated. Because of the steeply sloping nature of the site, stormwater runoff from the site could cause rill erosion in areas of exposed soil.

5.0 Regional Seismic Hazards

The historical earthquake record for the Willamette Valley and Portland basin is dominated by small to moderate earthquakes and an appreciable lack of significantly large earthquakes. Most of the earthquakes which have occurred within the Portland metropolitan area and surrounding areas could not be associated with any known faults. There have been at least 17 earthquake events of Richter magnitude (M) 4 or larger which have occurred in the region in historic time, of which 6 of these events have been of magnitude (M) 5.0 and greater. The largest historic earthquakes within the region have been the 2001 Nisqually, Washington earthquake (M 6.8), the 1993 Scotts Mills earthquake (M 5.6) northeast of Salem, Oregon, the 1964 Vancouver, Washington earthquake (M 5.3), the 1962 Portland earthquake (M 5.5), and the 1961 earthquake (M 5.0) northwest of Portland. There are at least three crustal faults beneath the Portland metropolitan area which researchers believe could generate earthquakes of M 6.5 or

larger (Wong et al., 2000). These larger earthquakes may occur at an average interval of approximately 1,000 years (Bott and Wong, 1993).

Abundant evidence indicates that a series of earthquakes related to the Cascadia Subduction Zone (CSZ) have occurred along the coastline of the Pacific Northwest. Evidence suggests that there have been as many as thirteen major earthquakes, or more, in the last 7,700 years (Priest et al., 1997). These earthquakes were likely of magnitude (M) 8.0 to 9.0, and are believed to have had a mean recurrence interval of 500 to 600 years; however, some of the past earthquakes have had intervals less than 300 years (Clague et al., 2000). Evidence suggests the last major earthquake occurred in 1700 and may have been of magnitude (M) 9.0 (Clague et al., 2000). Locally, these great coastal earthquakes would likely have about the same effects as a local large earthquake, although ground shaking due to a CSZ earthquake may have a longer duration.

As noted above, faults within the Portland Fault Zone have a potential of generating magnitude 6.5 to 7.1 earthquakes (Geomatrix, 1995; Wong et al., 2000). Based on 1997 Relative Earthquake Hazard Map of the Portland Metro Region (Mabey et al., 1997), the subject site lies in an area designated as Zone A. Zone A represents areas which show the greatest hazard associated with earthquakes. The degree of relative hazard was based on the factors of ground motion amplification, liquefaction, and slope instability.

6.0 Flooding Hazards and Riparian Mapping

Based on the 2008 Flood Insurance Rate Map (FIRM, Panel #41005 C0019D) the site lies in an area rated as Zone X which is defined as an area determined to be outside the 0.2% annual chance floodplain.

The site is not mapped as lying in an area of wet soils or high water table (Schlicker and Finlayson, 1979). However, as mentioned above, the site lies on the flanks of the valley of a small, primarily stormwater fed, stream. At the time of our site visit, we observed the stream at the site, which is mapped as a tributary of Robin Creek. Stormwater runoff above the site flows downslope toward the site. The site may be subject to seasonally high groundwater. Based on mapping from the City of West Linn GIS MapOptix website, (accessed July 2018) the site is not mapped as Goal 5 Significant Riparian. However, the area immediately to the northwest of the subject site, the main branch of Robin Creek, has been mapped as Goal 5 Significant Riparian.

7.0 Climate Change

According to most of the recent scientific studies, the Earth's climate is changing as the result of human activities which are altering the chemical composition of the atmosphere through the buildup of greenhouse gases, primarily carbon dioxide, methane, nitrous oxide, and

chlorofluorocarbons (EPA, 1998). Although there are uncertainties about exactly how and when the Earth's climate will respond to enhanced concentrations of greenhouse gases, scientific observations indicate that detectable changes are under way (EPA, 1998; Church and White, 2006). Global climate change can lead to increased rainfall which can result in an increase in landslide occurrence.

8.0 Conclusions and Recommendations

The main engineering geologic concerns at the site are:

1. The hillsides in the draw above the site have the potential of generating debris slides and mudflows that could travel downslope and impact the lower elevations of the site in the immediate vicinity of the stream.

2. Uncontrolled fills up to several feet thick are present on the northern part of the site, along the north side of Wildwood Drive. These fills will need to be removed and replaced with properly compacted structural fill in order to construct the driveway.

3. Foundations can be footings stepped down the slope, grade beams supported on deep foundations such as augered or driven pile, or a daylight basement type design. Please note that prior to design of a deep foundation system, the site would need to be drilled to obtain deep subsurface information as required by the Oregon Structural Specialty Code (OSSC).

4. Stormwater discharged or concentrated on the slope has the potential to cause erosion and/or slope instability effects at the site. As discussed in Section 8.11, stormwater will need to be collected from the roof drains, impervious surfaces and flatwork, and footing drains, directed downslope in a buried pvc pipe and discharged at one or more energy dissipaters near the creek at the northwest portion of the site.

5. There is an inherent risk of earthquakes in Oregon which could cause harm and damage structures, and the subject site is located in the vicinity of Portland-area seismically active faulting. These risks must be accepted by the owners, future owners, developers, and residents of the site.

The following recommendations shall be adhered to during design and construction:

8.1 Site Preparation

A stepped foundation design would be most appropriate for the site. An HGSA representative shall observe the footing locations and foundation excavations prior to placing fill, forming and/or pouring of concrete.

Building loads may be supported on individual and continuous spread footings bearing in undisturbed, native, non-organic, firm soils or properly designed and compacted structural fill placed on these soils. All footing areas should be stripped of all organic soils, organic debris, and any existing fills. We anticipate that non-organic, firm soils will be encountered at depths of approximately 4 feet. However depths may vary substantially which will necessitate HGSA's professional site observations during excavation for the foundations. Care should be taken during excavation so that materials exposed in the excavations are not disturbed or softened. Protection of footing areas from deterioration may be necessary, and can be accomplished by placing 3 to 4 inches of well compacted crushed rock aggregate in footing and slab areas.

Any tree stumps, including the root systems, shall be removed from beneath footing, slab and pavement areas, and the resulting holes backfilled with compacted structural backfill placed in lifts not exceeding 8 inches and compacted to a dry density of at least 92 percent of the Modified Proctor maximum dry density (ASTM D1557).

8.2 Soil Bearing Capacities

Footings bearing in undisturbed, native, non-organic, firm soils or properly compacted structural fill placed on these soils may be designed for the following:

ALLOWABLE SOIL BEARING CAPACITIES	
Allowable Dead Plus Live Load Bearing Capacity [a]	2,000 psf
Passive Resistance	250 psf/ft embedment depth
Lateral Sliding Coefficient	0.35
[a] Allowable bearing capacity may be increased by one-third for short term wind or seismic loads.	

8.3 Footings

Our recommended minimum footing widths and embedment depths are as follows:

MINIMUM FOOTING WIDTHS & EMBEDMENT DEPTHS			
Number of Stories	One	Two	Three
Minimum Footing Width	18 inches	24 inches	28 inches
Minimum Exterior Footing Embedment Depth [a]	18 inches	20 inches	24 inches
Minimum Interior Footing Embedment Depth [b]	6 inches	6 inches	6 inches

[a] All footings shall be embedded as specified above, or extend below the frost line as per Table R301.2(1) of the 2014 ORSC, whichever provides greater embedment.

[b] Interior footings shall be embedded a minimum of 6 inches below the lowest adjacent finished grade, or as otherwise recommended by our firm. In general, interior footings placed on sloping or benched ground shall be embedded or set back from cut slopes in such a manner as to provide a minimum horizontal distance between the foundation component and face of the slope of one foot per every foot of elevation change.

8.4 Slabs-On-Ground

All areas beneath slabs shall be excavated a minimum of 6 inches into native, non-organic, firm soils. The exposed subgrade in the slab excavation shall be cut smooth, without loose or disturbed soil and rock remaining in the excavation.

SLABS-ON-GROUND	
Minimum thickness of 3/4 inch minus crushed rock beneath slabs	6 inches
Compaction Requirements	92% ASTM D1557, compacted in 8-inch lifts maximum

The slab excavation shall then be backfilled with a minimum of 6 inches of ¾ inch minus, clean, free-draining, crushed rock placed in 8-inch lifts maximum which are compacted to 92 percent of the Modified Proctor (ASTM D1557). Reinforcing of the slab is recommended and the slab shall be fully waterproofed in accordance with structural design considerations. An underslab drainage system is recommended for all slabs, as per the architect's recommendations. Where floor coverings are planned, slabs shall also be underlain by a suitable moisture barrier.

8.5 Retaining Walls

For static conditions free standing retaining walls shall be designed for a lateral static active earth pressure expressed as an equivalent fluid density (EFD) of 35 pounds per cubic foot, assuming level backfill. An EFD of 45 pounds per cubic foot shall be used assuming sloping backfill of 2H:1V. At-rest retaining walls shall be designed for a lateral at-rest pressure expressed as an equivalent fluid density (EFD) of 60 pounds per cubic foot, assuming level backfill behind the wall equal to a distance of at least half of the height of the wall. Walls need to be fully drained to prevent the build-up of hydrostatic pressures.

The EFDs below assume static conditions, and no surcharge loads from vehicles or structures. If surcharge loads will be applied to the retaining walls, forces on the walls resulting from these loads will need to be added to the pressures given above.

For seismic loading a unit pseudostatic force equal to 8.23 pcf $(H)^2$, where H is the height of the wall in feet, shall be added to the static lateral earth pressure. The location of the pseudostatic force can be assumed to act at a distance of 0.6H above the base of the wall.

RETAINING WALL EARTH PRESSURE PARAMETERS	
Static Case, Active Wall (level backfill/grades)	35 pcf [a]
Static Case, Active Wall (2H:1V backfill/grades)	45 pcf [a]
Static Case, At-Rest Wall (level backfill/grades)	60 pcf [a]
Seismic Loading (level backfill/grades)	8.23 pcf $(H)^2$ [b]

[a] Earth pressure expressed as an equivalent fluid density (EFD).
[b] Seismic loading expressed as a pseudostatic force, where H is the height of the wall in feet. The location of the pseudostatic force can be assumed to act at a distance of 0.6H above the base of the wall.

Free-draining granular backfill for walls shall be placed in 8-inch horizontal lifts and machine compacted to 92 percent of the maximum dry density as determined by ASTM D1557. Compaction within 2 feet of the wall shall be accomplished with light weight hand operated compaction equipment to avoid applying additional lateral pressure on the walls. Drainage of the retaining wall shall consist of slotted drains placed at the base of the wall on the backfilled side and backfilled with free-draining crushed rock (less than 5% passing the 200-mesh sieve using a washed sieve method) protected by non-woven filter fabric (Mirafi® 140N or equivalent) placed between the native soil and the backfill. Filter fabric protected free-draining crushed rock shall extend to within 2 feet of the ground surface behind the wall, and the filter fabric shall be overlapped at the top per the manufacturer's recommendations. All walls shall be fully drained to prevent the build-up

of hydrostatic pressures. All retaining walls shall have a minimum of 2 feet of embedment at the toe, or be designed without passive resistance. The EFDs provided above assume that free draining crushed rock will be used for the retaining wall backfill.

8.6 Seismic Requirements

The structure and all structural elements shall be designed to meet current Oregon Residential Specialty Code (ORSC) seismic requirements. Based on our knowledge of subsurface conditions at the site, and our analysis using the guidelines recommended in the ORSC, the structure shall be designed to meet the following seismic parameters:

SEISMIC DESIGN PARAMETERS	
Site Class	D
Seismic Design Category	D_1
Mapped Spectral Response Acceleration for Short Periods	S_S = 0.857 g
Site Coefficients	F_a = 1.200 F_v = 1.917
Design Spectral Response Acceleration at Short Periods	S_{DS} = 0.686 g

8.7 Structural Fills

Structural fills supporting building loads or slabs shall consist of granular material, free of organics and deleterious materials, and contain no particles greater than 1½ inches in diameter so that nuclear methods (ASTM D2922 & ASTM D3017) can be easily used for field density and moisture testing. All areas to receive fill shall be stripped of all soft soils, organic soils, organic debris, existing fill, and disturbed soils.

Proper test frequency and earthwork documentation usually requires daily observation during stripping, rough grading, and placement of structural fill. Field density testing shall generally conform to ASTM D2922 and D3017, or D1556. To minimize the number of field and laboratory tests, fill materials shall be from a single source and of a consistent character. Structural fill shall be approved and periodically observed by HGSA and tested by a qualified testing firm. Test results will need to be reviewed and approved by HGSA. We recommend that at least three density tests be performed for every 18 inches or every 200 cubic yards of fill placed, whichever requires more testing. Because testing is performed on an on-call basis, we recommend that the earthwork contractor schedule the testing. Relatively more testing is typically necessary on smaller projects.

STRUCTURAL FILL	
Compaction Requirements	92% ASTM D1557, compacted in 8-inch lifts maximum, at or near the optimum moisture content (± 2%).
Benching Requirements [a]	Slopes steeper than 5H:1V that are to receive fill shall be benched. Fills shall not be placed along slopes steeper than 3H:1V, unless approved by H.G. Schlicker & Associates, Inc.
[a] Benches shall be cut into native, non-organic, firm soils. Benches shall be a minimum of 6 feet wide with side cuts no steeper than 1H:1V and no higher than 6 feet. The lowest bench shall be keyed in a minimum of 2 feet into native, non-organic, firm soils.	

8.8 Groundwater

Groundwater may be encountered at shallow depths in excavations during the wet season. If groundwater is encountered, unwatering of the excavation is required and shall be the contractor's responsibility. This can typically be accomplished by pumping from one or more sumps, or daylighting the excavations to drain.

8.9 Erosion Control

Vegetation shall be removed only as necessary and exposed areas shall be replanted following construction. Disturbed ground surfaces exposed during the wet season (November 1 through April 30) shall be temporarily planted with grasses, or protected with erosion control blankets or hydromulch.

Temporary sediment fences shall be installed downslope of any disturbed areas of the site until permanent vegetation cover can be established (Figure 5).

Exposed sloping areas steeper than 3 horizontal to 1 vertical (3H:1V) shall be protected with a straw erosion control blanket (North American Green S150 or equivalent) to provide erosion protection until permanent vegetation can be established. Erosion control blankets shall be installed as per the manufacturer's recommendations.

8.10 Cut and Fill Slopes

Temporary unsupported cut and fill slopes less than 9 feet in height shall be sloped no steeper than 1 horizontal to 1 vertical (1H:1V). If temporary slopes greater than 9 feet high are desired, or if water seepage is encountered in cuts, our firm shall be contacted to provide additional recommendations. Temporary cuts in excess of 4 feet high and steeper than 1H:1V will likely require appropriate shoring to provide for worker safety, per OSHA regulations. Temporary cuts shall be protected from inclement weather by the use of plastic sheeting to help prevent erosion and/or failure.

TEMPORARY AND PERMANENT CUTS	
Temporary Cuts	1H:1V (maximum) [a]
Permanent Cuts	2H:1V (maximum) [a]
[a] All cuts greater than 9 feet high, or cuts where water seepage is encountered, shall be approved by a representative of H.G. Schlicker & Associates, Inc.	

If the above cut slope recommendations cannot be achieved due to construction and/or property line constraints, temporary or permanent retention of cut slopes may be required, as determined by a representative of HGSA.

Permanent unsupported cut and fill slopes shall be constructed no steeper than 2 horizontal to 1 vertical (2H:1V). Cut slopes steeper than 2H:1V shall be retained with an engineered retaining wall. Fill slopes steeper than 2H:1V shall be retained or be mechanically reinforced using geogrids, or other suitable products as approved by HGSA. Areas that slope steeper than 5H:1V and are to receive fill shall be benched. Benches shall be cut into native, non-organic, firm soil. The lowest bench shall be keyed a minimum of 2 feet into native, firm soil, and be a minimum of 6 feet wide.

8.11 Drainage

Surface water shall be diverted from building foundations and walls to approved disposal points by grading the ground surface to slope away a minimum of 2 percent for 6 feet towards a suitable gravity outlet to prevent ponding near the structures. Permanent subsurface drainage of the building perimeter is recommended to prevent extreme seasonal variation in moisture content of subgrade materials and subjection of foundations and slabs to hydrostatic pressures.

Perimeter drains shall be installed adjacent to the perimeter footings and sloped a minimum of 1.0 percent to a gravity outlet. A suitable perimeter drain system would consist of a 4-inch diameter, perforated PVC pipe (typical) embedded below and adjacent to the bottom of footings and backfilled with approved drain rock. The type of PVC pipe to be utilized may depend on building agency requirements and shall be verified prior to construction. HGSA also recommends lining the drainage trench excavation with a non-woven filter fabric which prevents undermining of foundation or slab components or any disturbance to supporting soils.

In addition to the perimeter foundation drain system, drainage of any crawlspace areas is required. Each crawlspace shall be graded to a low point for installation of a drain that is tied into the perimeter footing drain and tightlined to an approved disposal point.

All crawlspaces will need to be vented as per ORSC requirements.

On site infiltration is not recommended due to the increased risk of slope instability for the site. All roof drains shall be collected and tightlined in a separate system independent of the footing drains, or an approved backflow prevention device shall be used. All roof and footing drains shall be discharged to an approved disposal point, we recommend that energy dissipaters, such as splash blocks or a rock apron, be utilized at all pipe outfall locations. See Figure 6 for stormwater outfall design recommendations. The existing tributary of Robin Creek along the northwest portion of the site appears to be a suitable disposal point at the toe of the slope. However, the stream and areas near the disposal points should be routinely monitored for signs of erosion.

8.12 Plan Review and Site Observations

We shall be provided the opportunity to review all site development, foundation, drainage, and grading plans prior to construction to assure conformance with the intent of our recommendations (Appendix B). The plans, details and specifications shall clearly show that the above recommendations have been implemented into the design.

We shall observe the basement excavation and footing excavations prior to placing structural fill, forming and pouring concrete to assure that suitable bearing materials and recommended setbacks have been achieved (Appendix B). Please provide us with at least five (5) days' notice prior to any needed site observations. There will be additional costs for these services.

9.0 Limitations

Landsliding, erosion, storms, earthquakes and other natural events can cause severe impacts to structures built within this environment and can be detrimental to the health and welfare of those who choose to place themselves within this environment. The client is warned that, although this report is intended to identify the geologic hazards causing these risks, the scientific and engineering communities knowledge and understanding of geologic hazards processes is not complete. This report pertains to the subject site only, and is not applicable to adjacent sites nor is it valid for types of development other than that to which it refers. Geologic conditions including materials, processes and rates can change with time and therefore a review of the site and/or this report may be necessary as time passes to assure its accuracy and adequacy.

The hand augered boring logs and related information depict generalized subsurface conditions only at these specific locations and at the particular time the subsurface exploration was completed. Soil and groundwater conditions at other locations may differ from the conditions at these locations.

Our investigation was based on engineering geological reconnaissance and a limited review of published information. The information presented in this report is believed to be representative of the site. The conclusions herein are professional opinions derived in accordance with current standards of professional practice, budget and time constraints. No warranty is expressed or implied. The performance of this site during a seismic event has not been evaluated. If you would like us to do so, please contact us. This report may only be copied in its entirety.

10.0 Disclosure

H.G. Schlicker & Associates, Inc. and the undersigned Certified Engineering Geologist have no financial interest in the subject site, the project or the Client's organization.

11.0 References

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It has been our pleasure to serve you. If you have any questions concerning this report, or the site, please contact us.

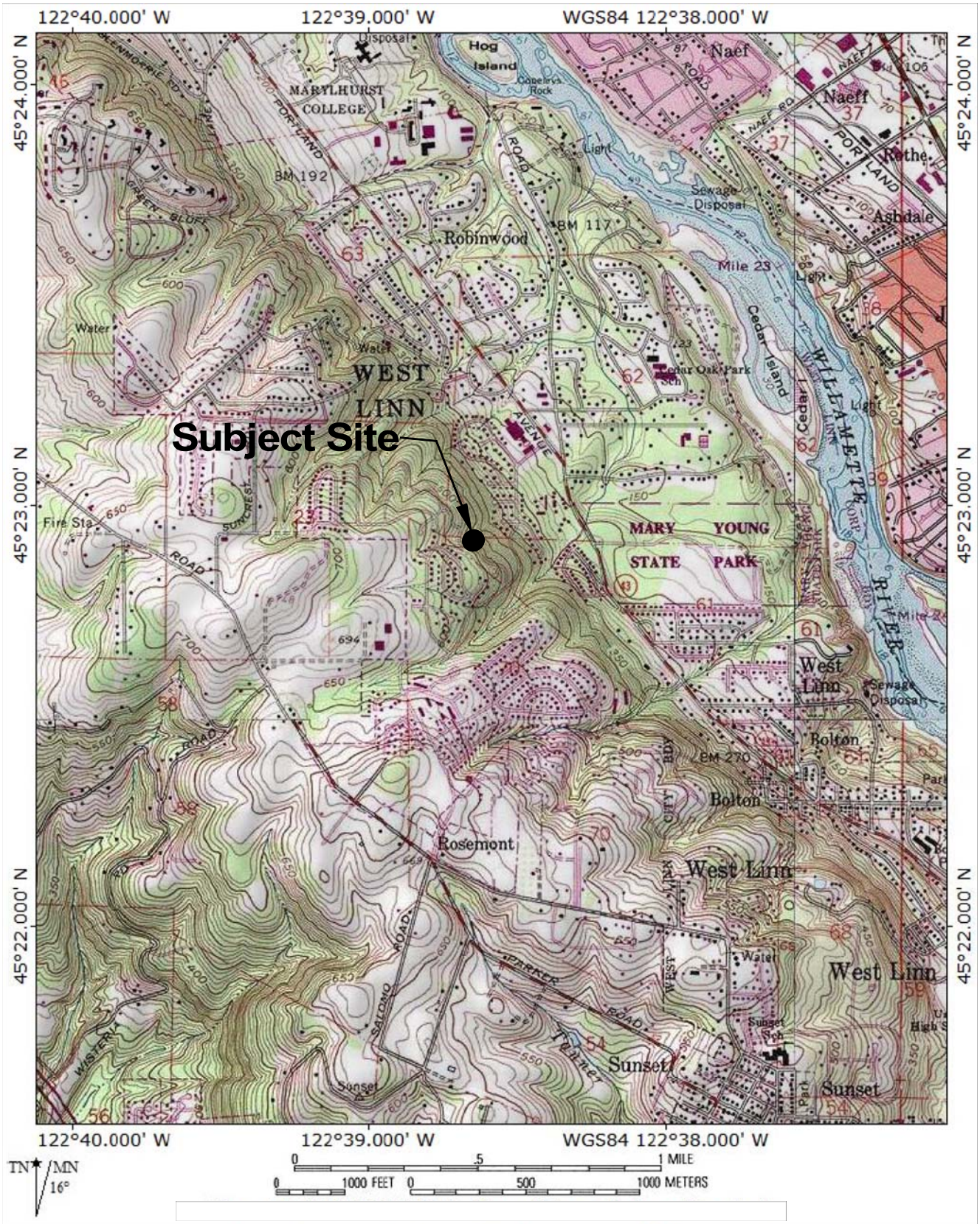
Respectfully submitted,

H.G. SCHLICKER AND ASSOCIATES, INC.

EXPIRES: 11/01/2018

J. Douglas Gless, MSc, RG, CEG, LHG
President/Principal Engineering Geologist

JDG:mgb



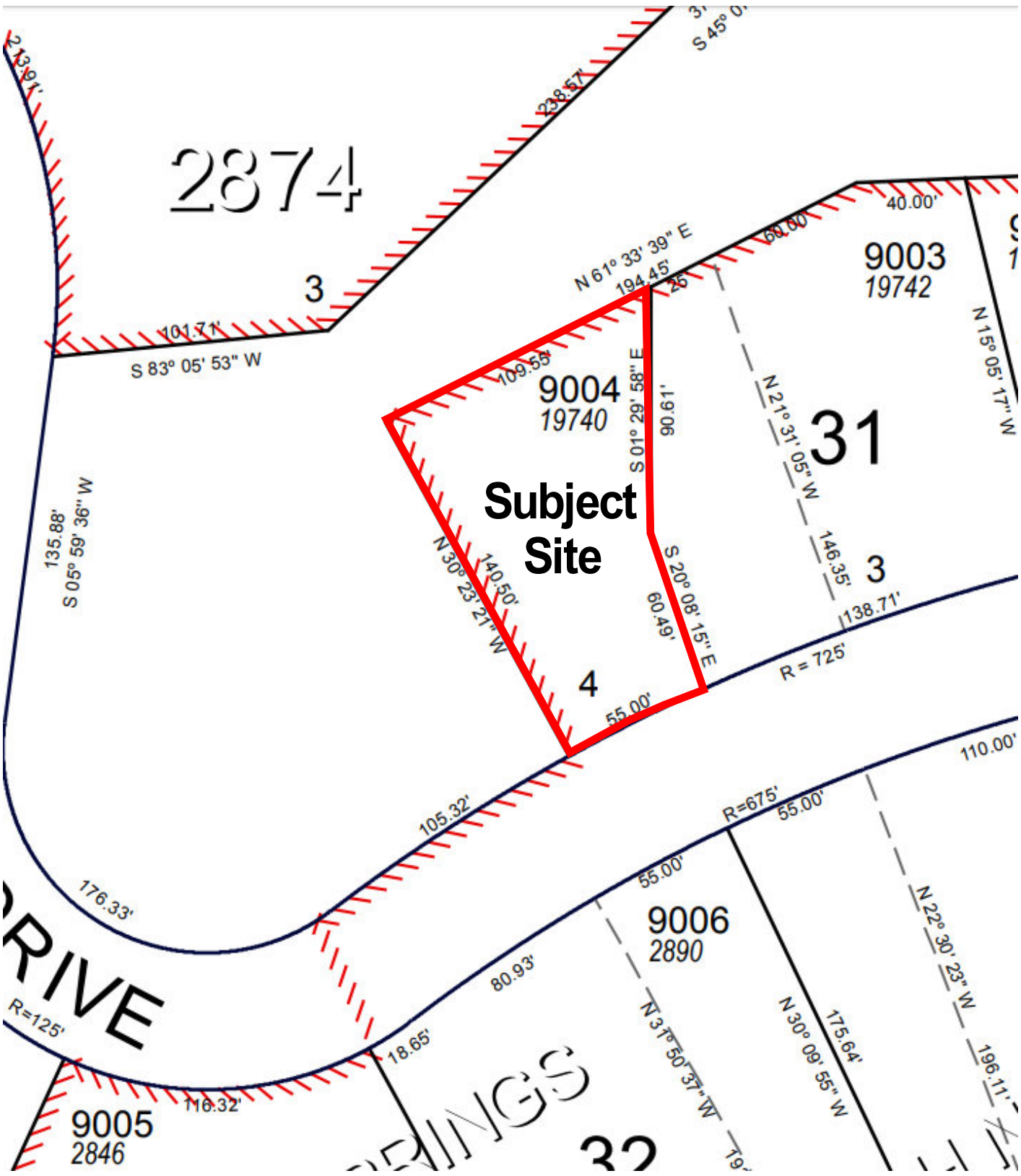
N

Date: 07/19/2018 Scale: 1" = 2,000'	**Project #Y184154**	Prepared by: MGB Approved by: JDG

Location Map
Tax Lot 9004, Map 2-1E-23AC
19738 Wildwood Drive, West Linn, Oregon

H.G. Schlicker & Associates, Inc.

Figure 1



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Modified from the Clackamas County assessor's plat, 2-1E-23AC

All locations and dimensions are approximate.

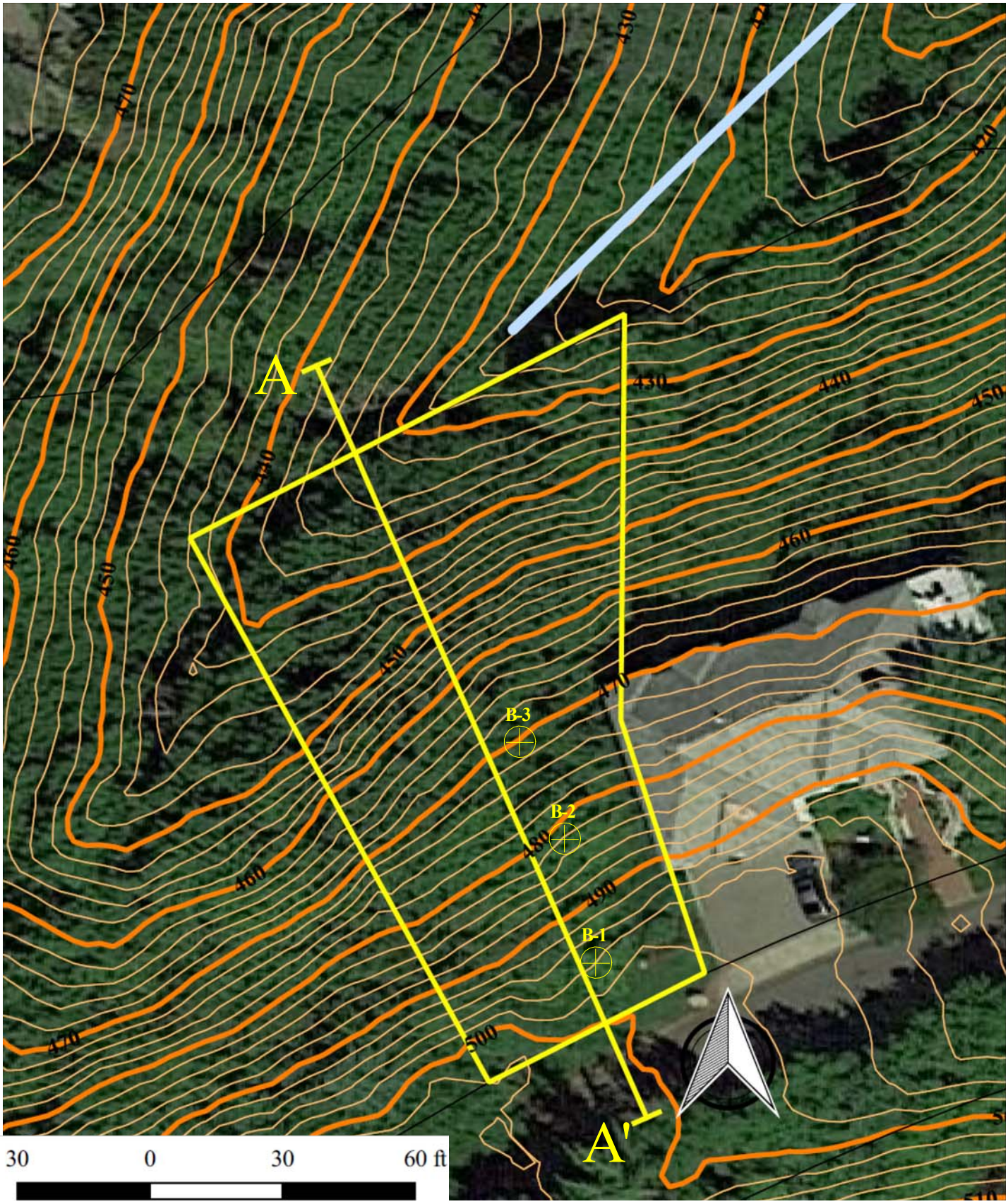
Date: 07/19//2018	**Project #Y184154**	Prepared by: MGB
Scale: 1" = 50'		Approved by: JDG

Plat Map

Tax Lot 9004, Map 2-1E-23AC
19738 Wildwood Drive, West Linn, Oregon

H.G. Schlicker & Associates, Inc.

Figure 2



B-2
= Approximate location of hand boring

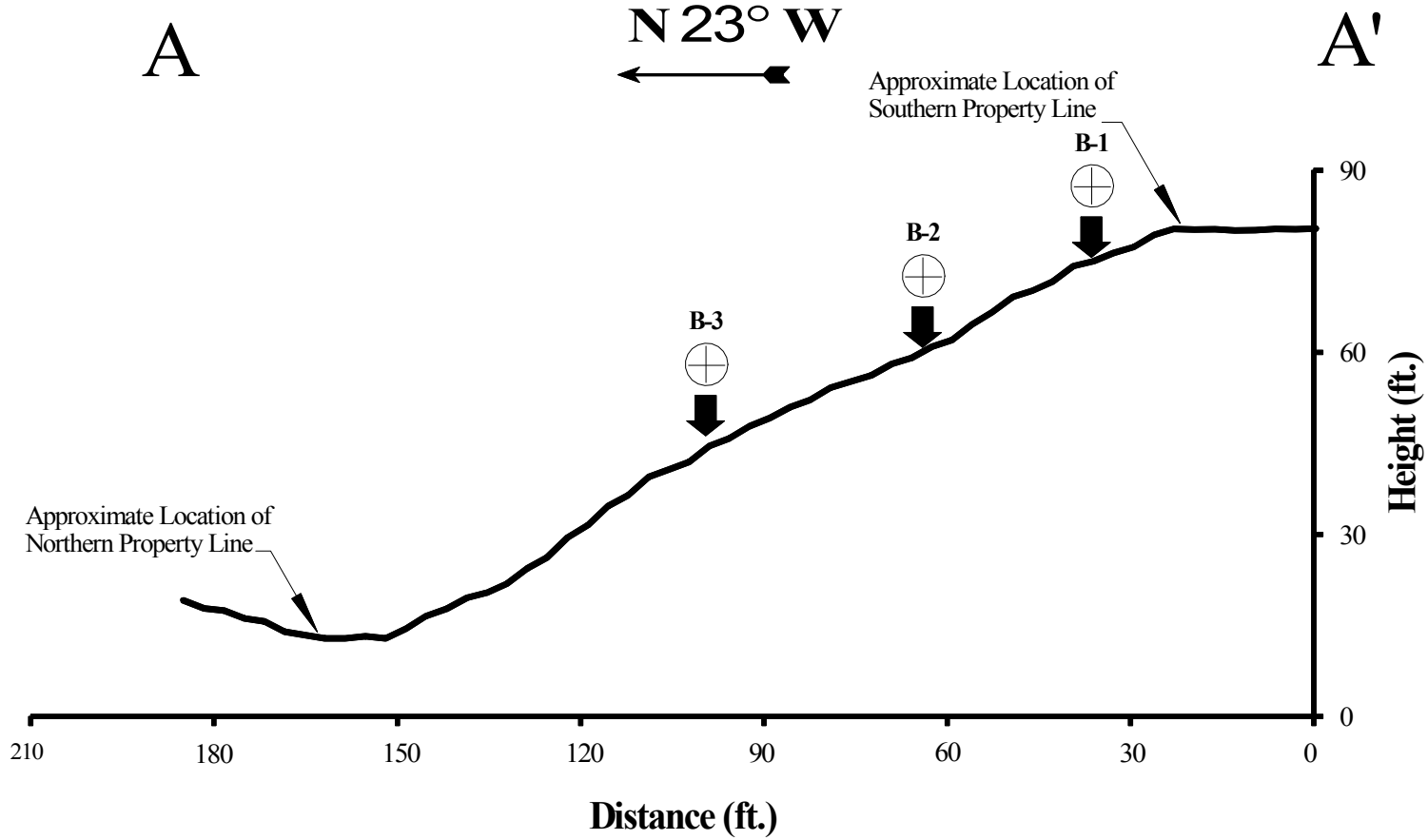
Imagery provide by GOOGLE
Topography derived from 2014 OLC METRO by DOGAMI
Streams Layer derived from Clackamas County GIS Data Portal
All locations and dimensions are approximate.

Date: 07/18//2018	**Project #Y184154**	Prepared by: MGB
Scale: 1" = 30'		Approved by: JDG

Site Topographic Map with Profile line
Tax Lot 9004, Map 2-1E-23AC
19738 Wildwood Drive, West Linn, Oregon

H.G. Schlicker & Associates, Inc.

Figure 3



B-2 = Approximate location of hand boring

All locations and dimensions are approximate.

Date: 07/19/2018	**Project #Y184154**	Prepared by: MGB
Scale: 1" = 30'		Approved by: JDG

Slope Profile A-A'
Tax Lot 9004, Map 2-1E-23AC
19738 Wildwood Drive, West Linn, Oregon

H.G. Schlicker & Associates, Inc.

Figure 4

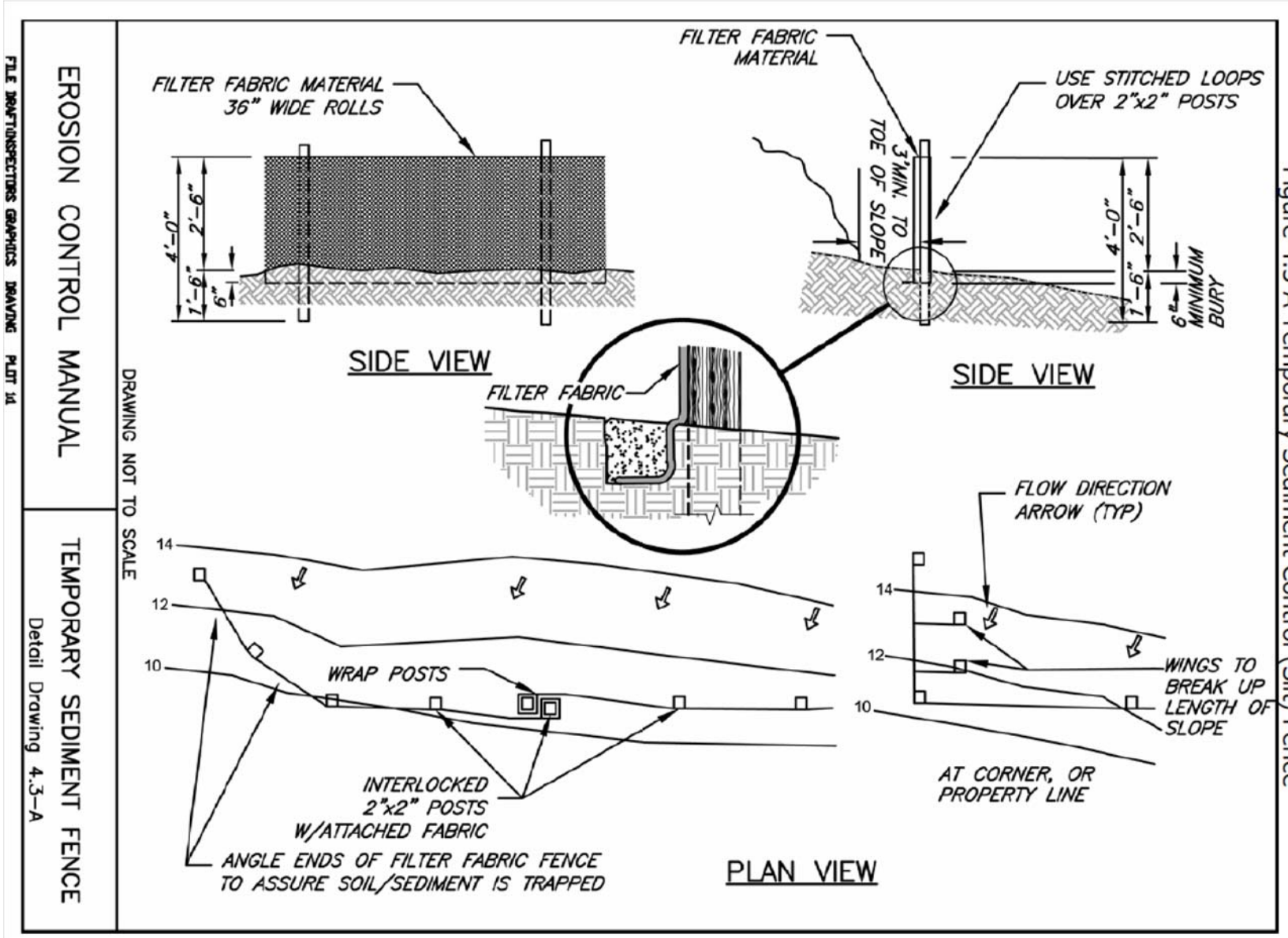


Figure 4.3-A Temporary Sediment Control (Silt) Fence

Date: 07/19/2018	**Project #Y184154**	Prepared by: MGB
Scale: As Shown		Approved by: JDG

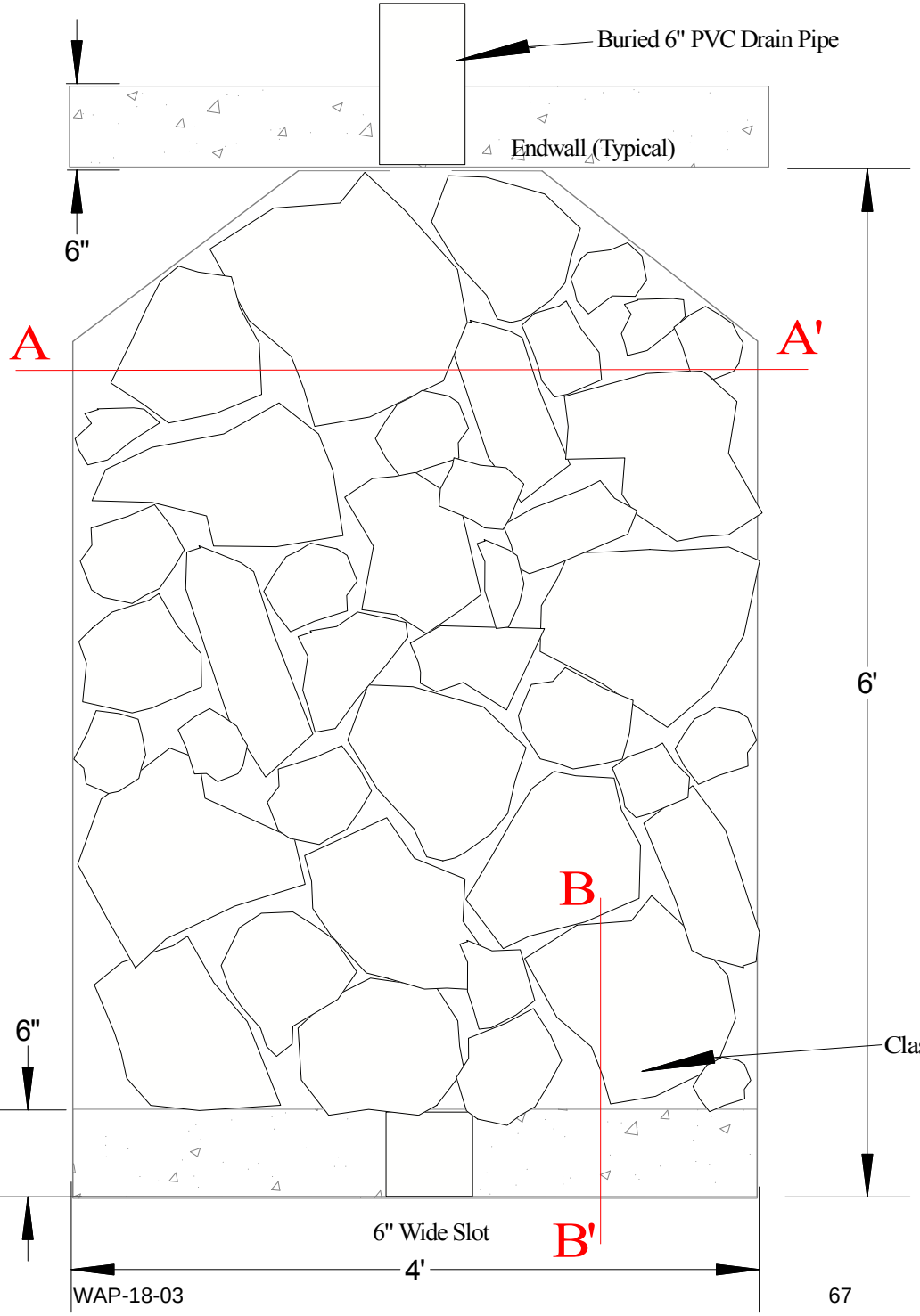
Sediment Fence Detail

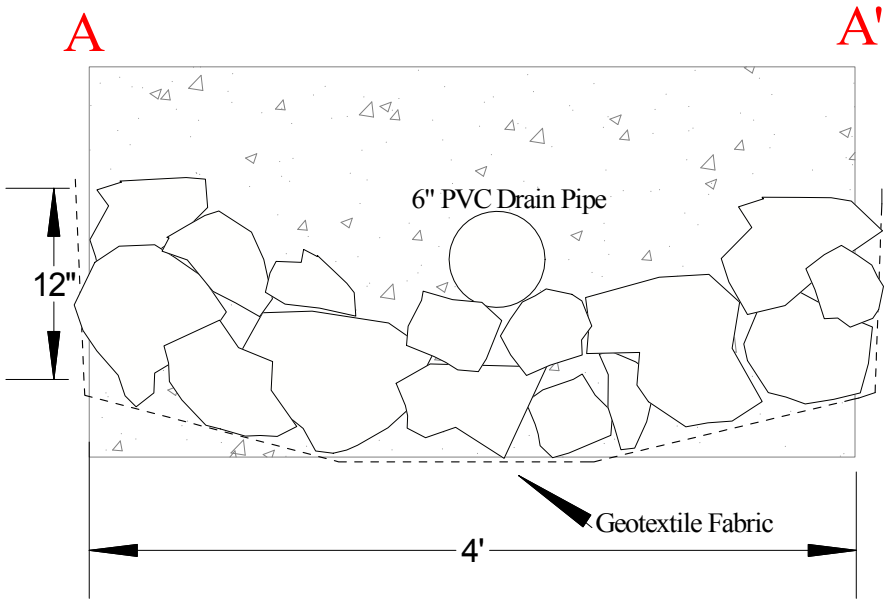
Tax Lot 9004, Map # 2-1E-23AC
19738 Wildwood Drive, West Linn, Oregon

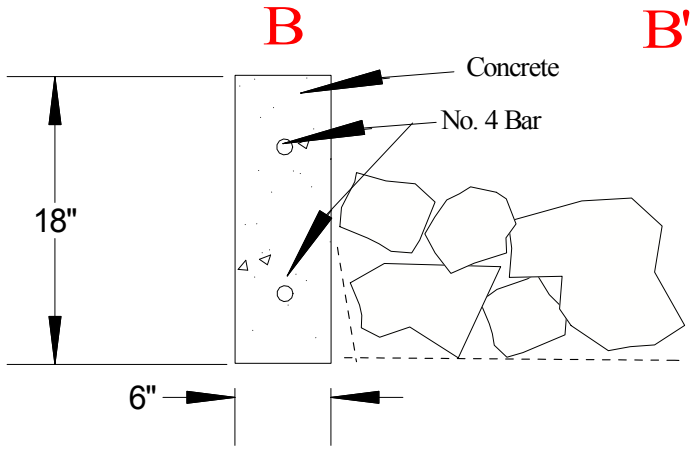
H.G. Schlicker & Associates, Inc.

Figure 5

Drawing modified from Erosion and Sediment Control Manual,
City of Portland Bureau of Environmental Services, 2008.
Refer to Original Source for Design Criteria/ Specifications







Date: 07/19/2018	**Project #Y184154**	Prepared by: MGB
Scale: As shown		Approved by: JDG

Stormwater Outfall Detail

Tax Lot 9004, Map # 2-1E-23AC
19738 Wildwood Drive, West Linn, Oregon

H.G. Schlicker & Associates, Inc.

Figure 6

WAP-18-03

Appendix A
- Site Photographs -

Photo 1 – Northeasterly view of the site from across Wildwood Drive.


Photo 2 – Downslope view towards the tributary of Robin Creek.

Photo 3 – Southeasterly view looking upslope from the creek bed.

Photo 4 – Westerly view of the site taken at approximately midslope

Photo 5 – Downslope view of home to the west of the site.

Photo 6 – View of concrete stormwater outflow structure at head of the creek near the site.

Photo 7 – View of creek bottom near the northwest portion of the site. Note that at the time of our site visit the creek had no flowing water.

Photo 8 – Close-up view of a tire and pipe observed in the creek bottom near the site.

Photo 9 – Easterly view of the top of the slope, near the southern boundary of the site. Note that disturbed fill was observed here.

Photo 10 – Close-up view of weathered and partially buried concrete blocks observed near the southern portion of the site.

Photo 11 – Close-up view partially buried brick fragments observed near the southern portion of the site.

Photo 12 – View of cracking in surface of Wildwood Drive near site.

Appendix B
- Checklist of Recommended Plan Reviews and Site Observations -

APPENDIX B
Checklist of Recommended Plan Reviews and Site Observations
To Be Completed by a Representative of H.G. Schlicker & Associates, Inc.

Item No.	Date Done	Procedure	Timing
1*		Review site development, foundation, drainage, grading and erosion control plans.	Prior to construction.
2*		Observe foundation excavations.	Following excavation of foundations, and prior to placing fill, forming and pouring. **
3*		Review Proctor (ASTM D1557) and field density test results for all fills placed at the site.	During construction.

* There will be additional charges for these services.
** Please provide us with at least 5 days' notice prior to all site observations.

AKS ENGINEERING & FORESTRY

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9600 NE 126th Avenue, Suite 2520
Vancouver, WA 98682
(360) 882-0419

www.aks-eng.com

Wildwood Drive Natural Resource Assessment

Date: 9/4/2018
To: City of West Linn Planning Department
From: Stacey Reed, PWS, Senior Wetland Scientist
Project: 19738 Wildwood Drive Single Family Residence on Lot of Record
Subject: WRA Permit and Hardship Variance
Site Location: T2S, R1E, Section 23AC, Tax Lot 9004
West Linn, Clackamas County, Oregon

Introduction

AKS Engineering & Forestry, LLC (AKS) conducted a natural resource assessment for 19738 Wildwood Drive, West Linn, Clackamas County, Oregon (Tax Lot 9004 of Assessor's Tax Map 2S 1E 23AC). The study area is shown on attached Figures 1-2. An unnamed tributary to Robin Creek is mapped on the City of West Linn's Water Resource Area (WRA) map flowing northeasterly through the northwest corner of the site. The tributary is located at the bottom of a ravine with no distinct top of slope for at least 150 feet, requiring a 200 foot wide WRA buffer. The WRA buffer consumes the entire site.

This memorandum describes the results of the natural resource assessment and requests a hardship variance approval for a single-family home within the outer edges of the WRA buffer. This memo documents the project meets all of the hardship provisions described in Section 32.110 of City of West Linn Community Development Code (CDC) Chapter 32 Water Resource Area Protection.

Existing Conditions and Background Mapping

The project site consists of an undeveloped property located within the Hidden Springs residential neighborhood of West Linn. The project site is generally dominated with Douglas fir (*Pseudotsuga menziesii*), bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), and pineland swordfern (*Polystichum munitum*) with Himalayan blackberry (*Rubus armeniacus*) along the edges near Wildwood Drive. The topography on the site slopes northerly toward the tributary that flows through the northern portion of the site. Topography is steep, with greater than 25 percent slopes throughout.

According to the Natural Resources Conservation Service (NRCS) soil survey map for Clackamas County, Oregon Area soil survey and the Clackamas County hydric soil list Saum silt loam with 30%-60% slopes are mapped extending throughout the entire site (Figures 3). Saum silt loams are not listed as hydric, nor do they have any hydric inclusions.

The City of West Linn has an Oregon Department of State Lands (DSL) approved Local Wetland Inventory (LWI) map (Figure 4). The LWI map has an unnamed drainage mapped within the project site. Our study confirmed a portion of the drainage is located within the site. According to the City's WRA map, an unnamed tributary to Robin Creek is mapped in the northwest portion of the site (Figure 5). According to the WRA map, no Significant Riparian Corridors are mapped on the site.

On-Site Protected Water Resource

AKS Senior Wetland Scientist, Stacey Reed, PWS, conducted site visits on May 9 and 14, 2018 to evaluate site conditions and determine whether the flow regime within the on-site portions of the tributary was ephemeral or intermittent. The channel daylights approximately 50 feet off-site to the west from a large diameter culvert that passes flow under Wildwood Drive. On-site, the channel is narrow averaging approximately 3 foot wide channel bed with 1 foot tall banks. The dominant streambed substrate is silt loam with scattered gravels and cobbles. The on-site portion of the channel contained approximately 1/2-inch deep continuous flow during the May 9, 2018 site visit. However, according to the National Weather Service (NWS) Portland station, approximately 0.25-inch of rainfall was received within the 3 days prior to the May 9, 2018 site visit. Therefore, a follow up site visit was conducted a week later on May 14, 2018. The on-site upper portions of the channel were dry (lacked flow) during the May 14, 2018 site visit, but the lower half of the channel contained approximately ¼-inch deep continuous flow. Since portions of the channel still contained flow, we determined the on-site portions of the channel to be intermittent. Intermittent drainages mapped on West Linn's WRA map are considered a Protected Water Feature requiring a WRA buffer.

The ordinary high water mark (OHWM) for the on-site portion of drainage was professionally land surveyed by Andy Paris and Associates, Inc. The Existing Conditions Map depicting the surveyed water boundaries and adjacent topography is included as Figure 6. Representative site photographs are attached for reference.

Extent of the Water Resource Area (WRA)

The slopes within the first 50 feet from the OHWM of the tributary are greater than 25%, with no distinct top of bank until Wildwood Drive. Therefore, according to Table 32-2 *Required Width of WRA* of Chapter 32.030 of the City's CDC, the width of a WRA for the on-site tributary extends 200 feet, which consumes the entire site (0.24 acres of on-site WRA). The extent of WRA and slope measurements are shown on the attached Existing Conditions Map (Figure 6).

Existing Conditions 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 was determined to be in *good* condition due to having a dense native tree canopy and native understory. The entire site is under native tree canopy (red alder, bigleaf maple, and Douglas-fir trees). The understory was primarily dominated by pineland sword fern and vine maple, generally lacking any non-native invasive plants. Only a few Himalayan blackberry thickets were observed near the edge of the property, near Wildwood Drive.

Hardship Provision Compliance

The project will consist of a single-family 3-story home within WRA. No impacts will occur within the Water Resource (drainage). The total area of the home is +/-3,000 square feet, with each story +/-1,000 square feet. The home is situated as far away from the on-site drainage as possible, near the top of the slope adjacent to Wildwood Drive. A geotechnical investigation was completed to confirm slope stability for the project. The geotechnical report prepared by H.G. Schlicker & Associates is attached. The site plan figures are included as Figures 7 and 7A. Figure 7 shows the full build out of the bottom story, along with the location for the fireplace. Figure 7A shows site erosion and control measures (construction management plan per Section 32.050.G)

Stormwater Management: Stormwater will be collected from roof drains and the driveway and directed downslope via a pipe to discharge into a City of West Linn Infiltration Rain Garden, Type 1 (see attached typical detail) for treatment prior to discharge into a riprap energy dissipation pad. The rain garden and riprap pad will be located above the delineated OHWM of the tributary. No work or disturbance will occur within the stream channel. The approximately location for the rain garden is shown on the attached Site Plan, Figure 7. According to

Table 32-5 MDA Calculation Summary of West Linn CDC, rain gardens are allowed within the WRA buffer and their footprint does not count towards the project's MDA calculation. No native trees with greater than 6-inch DBH will be removed for the installation of the rain garden. The rain garden will be planted with native vegetation per the attached detail.

The riprap energy dissipation pad will be approximately 10 square feet (5 foot by 5 foot) and will be placed within the WRA, at least 5 feet upslope from the OHWM of the drainage (approximate location shown on attached Figure 7). The location of the energy dissipater is not expected to have an erosive effect on the tributary or diminish the stability of the slope. According to Table 32-1 of West Linn CDC, the energy dissipater can occur within the WRA if no reasonable alternative exists. Since the entire site is within WRA, there are no alternatives to avoiding impact.

The stormwater discharge pipe leading to the rain garden will require +/- 60 square feet of temporary WRA disturbance. The Temporarily Disturbed Area (TDA) will be seeded with native erosion control grass seed mixture and planted with native pineland sword fern.

Tree Preservation: Figure 6 illustrates the surveyed location of all trees on the site. Figure 7A illustrates planned tree removal and preservation. A total of only 8 trees will be removed from the site for the project. The project preserves 9 trees, including the larger diameter trees on the site. The trees to be removed are smaller diameter, with the largest being a 12-inch diameter Douglas fir and a 15-inch diameter bigleaf maple. Of the 8 trees to be removed, only 2 bigleaf maple trees with greater than 12-inch DBH will be removed.

The project site is an established lot of record with the Assessor's office before January 1, 2006, meeting the hardship provision criteria under CDC 32.110.A.

The project will only require a total of 2,510 square feet of maximum disturbed area (MDA), consisting of home, deck, driveway and energy dissipation pad, meeting the hardship provision criteria under CDC 32.110.B.

Impact Evaluation Per CDC 32.110.C.

The entire site is located with WRA buffer. Therefore, impacts to WRA are unavoidable. The project consists of relatively small impact to the buffer, resulting in under 5,000 square feet of MDA (impervious surfaces). The MDA encroachment is the least amount of square footage necessary to develop a single-family home compatible with the surrounding neighborhood. Therefore, the project meets criteria listed under CDC 32.110.C.1.

The home is approximately 85 feet from the edge of the drainage (at closest extent), and avoids impacts to the drainage. The home will not have a functional loss on the intermittent drainage. An 85 foot wide protective buffer between the home and the seasonal drainage is adequate to protect the stream functions. A total of 9 trees and dense native vegetation will remain between the home and the drainage; therefore, the project meets criteria listed under CDC 32.110.C.2.

The development will occur greater than 15 feet from the water resource, meeting criteria listed under CDC 32.110.C.3.

The access driveway is approximately 17-feet wide, with the home being situated as close to Wildwood Drive as possible; therefore, the project meets criteria listed under CDC 32.110.C.4.

Temporary disturbed areas (TDA) adjacent to the development area will be restored to pre-construction conditions and planted with native pineland sword fern.

Mitigation

The project results in a total of 2,510 square feet of MDA. Permanent encroachment will be mitigated off-site through payment in lieu to the City of West Linn Parks Department. The remaining portions of the on-site WRA can be described as being in *good* condition. There are no non-native invasive plants to remove within remaining WRA and no opportunity to install additional plants as the remaining WRA is densely vegetated with native pineland sword fern and dense canopy of bigleaf maple trees. Off-site mitigation is the most practical approach for this project.

According to Section 32.090, off-site mitigation is allowed if there is not sufficient on-site area. According to Section 32.090.C, off-site mitigation ratios are 2:1; therefore, the project requires 5,020 square feet of off-site credits.

Please do not hesitate to contact me regarding this memorandum.

Stacey Reed

Stacey Reed, PWS
Senior Wetland Scientist

List of Figures

Figure 1. USGS Vicinity Map
Figure 2. Tax Map (2S 1E 23AC)
Figure 3. NRCS Soil Survey Map
Figure 4. Local Wetland Inventory (LWI) Map
Figure 5. West Linn Water Resource Area (WRA) Map
Figure 6. Existing Conditions Map
Figure 7 and 7A. Site and Erosion Control Figures

List of Attachments

Representative Site Photographs
Geotech Report prepared by H.G. Schlicker & Associates
City of West Linn Infiltration Rain Garden Type 1

USGS 7.5' TOPOGRAPHIC SERIES
QUADRANGLE: LAKE OSWEGO, OR (2017)

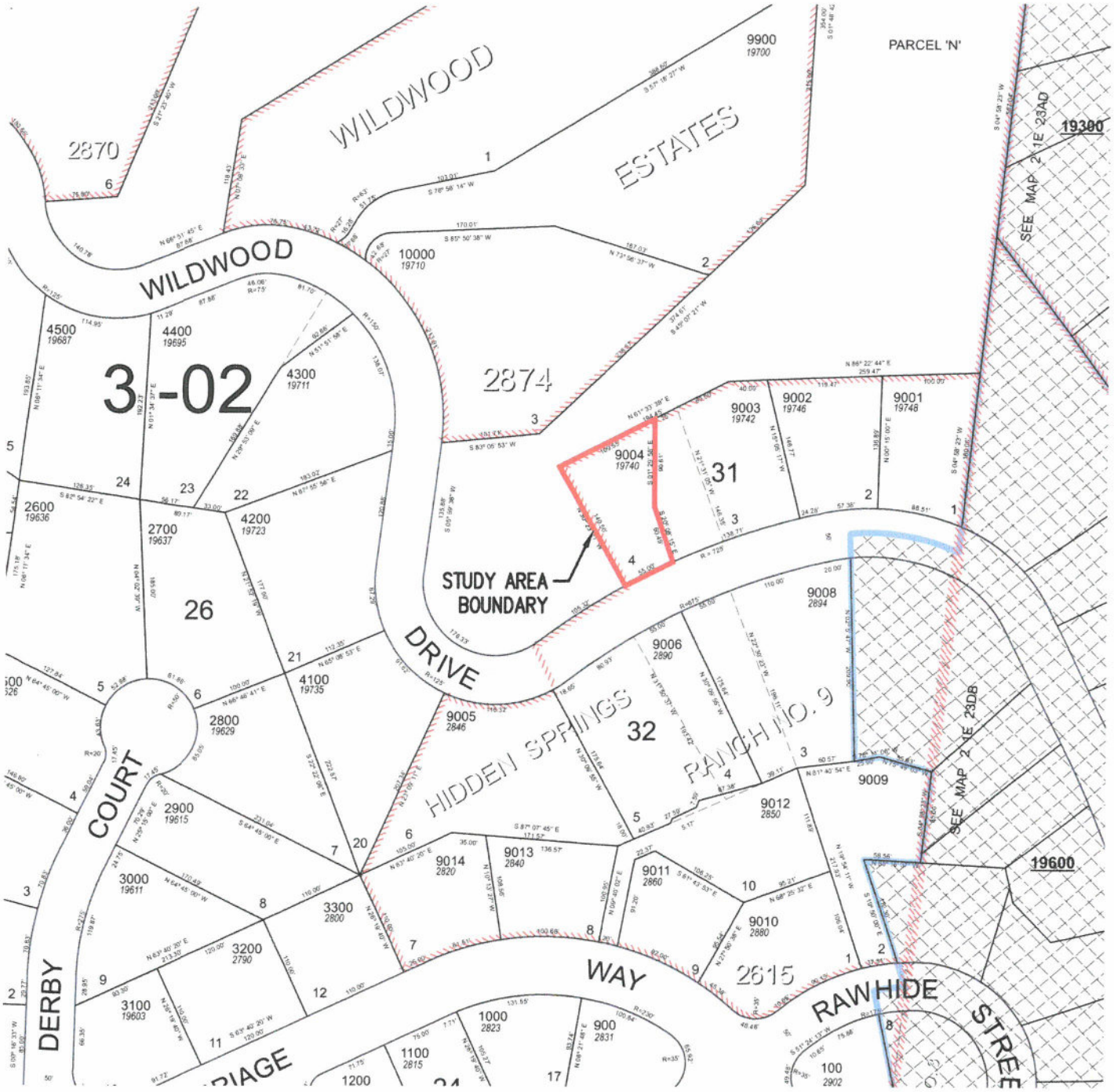
SCALE: 1"= 2000 FEET

2000 0 800 1200 1600 2000

DATE: 06/22/2018

USGS VICINITY MAP WILDWOOD DRIVE WEST LINN NATURAL RESOURCE ASSESSMENT MEMO	FIGURE 1
AKS ENGINEERING & FORESTRY, LLC 12965 SW HERMAN RD SUITE 100 TUALATIN, OR 97062 www.aks-eng.com PHONE: 503.563.6151 FAX: 503.563.6152	DRWN: KMK CHKD: HS AKS JOB: 6786

DWG: 6786 NRA FIGURES 1-4 | FIGURE 1



CLACKAMAS COUNTY
TAX LOT 9004
TAX MAP 2 1 E 23AC

N

SCALE: 1"=150 FEET

150 0 60 90 120 150

DATE: 06/22/2018

TAX MAP (MAP 2 1E 23AC) WILDWOOD DRIVE WEST LINN NATURAL RESOURCE ASSESSMENT MEMO	FIGURE 2
AKS ENGINEERING & FORESTRY, LLC 12965 SW HERMAN RD SUITE 100 TUALATIN, OR 97062 www.aks-eng.com PHONE: 503.563.6151 FAX: 503.563.6152	DRWN: KMK CHKD: HS AKS JOB: 6786

DWG: 6786 NRA FIGURES 1-4 | FIGURE 2

MAP UNIT SYMBOL	MAP UNIT NAME
78E	SAUM SILT LOAM, 30% TO 60% SLOPES; NON-HYDRIC

NRCS WEB SOIL SURVEY FOR
CLACKAMAS COUNTY

N

SCALE: 1"= 80 FEET

80 0 32 48 64 80

DATE: 06/22/2018

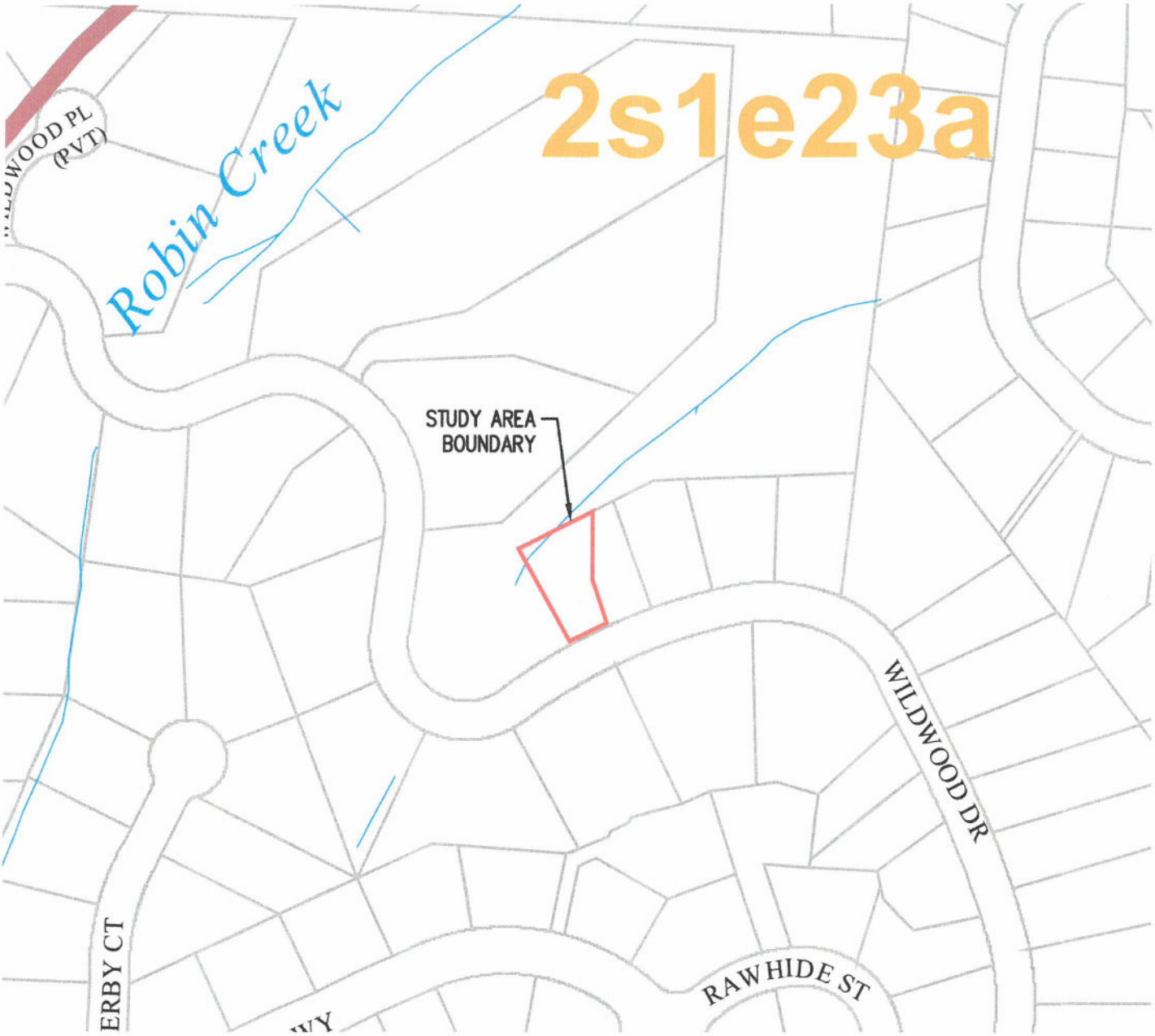
NRCS SOIL SURVEY MAP
WILDWOOD DRIVE WEST LINN NATURAL RESOURCE ASSESSMENT MEMO

FIGURE 3

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD SUITE 100
TUALATIN, OR 97062 www.aks-eng.com
PHONE: 503.563.6151 FAX: 503.563.6152

DRWN: KMK
CHKD: HS
AKS JOB: 6786

DWG: 6786 NRA FIGURES 1-4 | FIGURE 3



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"= 200 FEET

200 0 80 120 160 200

DATE: 06/22/2018

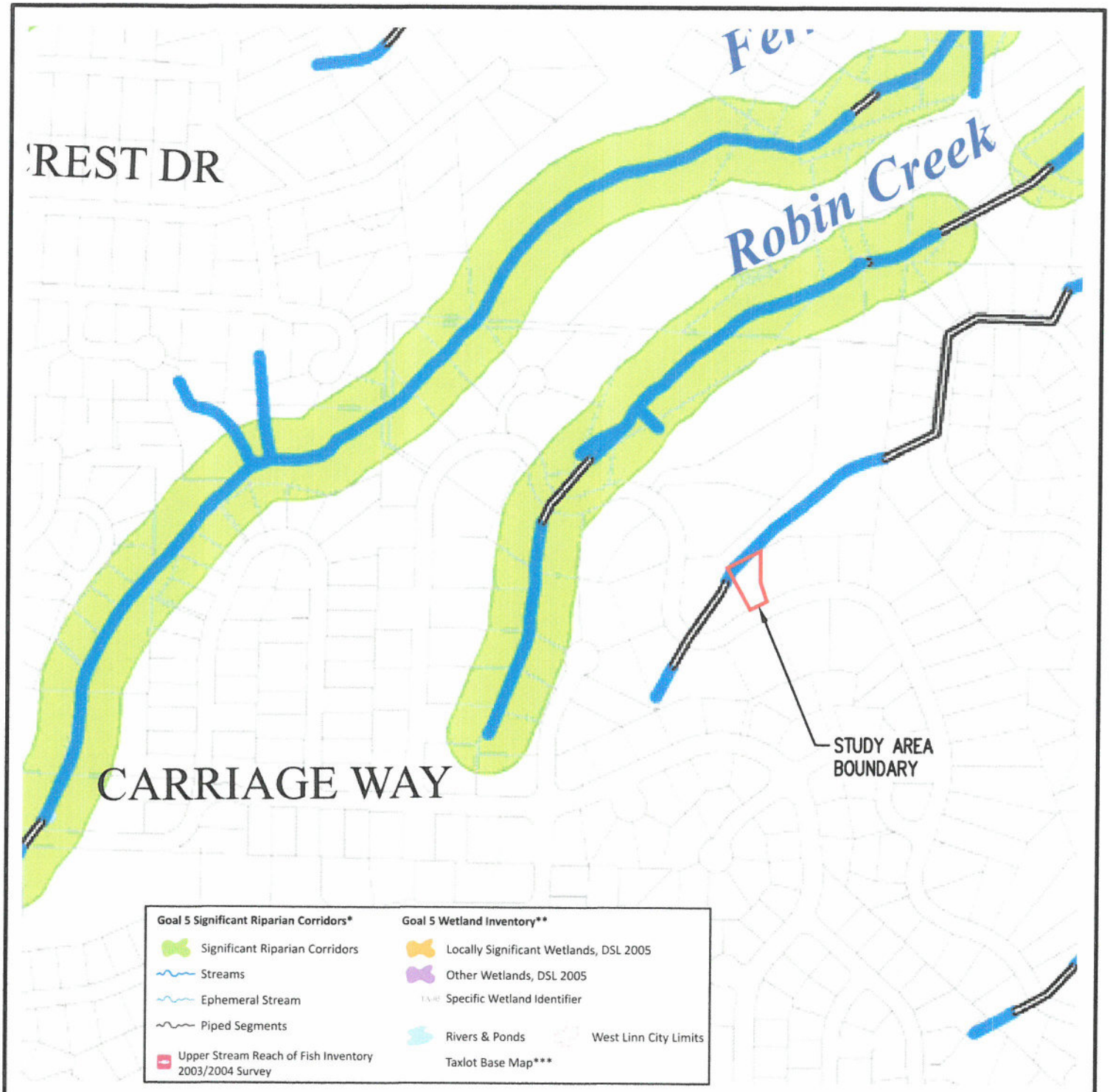
LOCAL WETLAND INVENTORY MAP
WILDWOOD DRIVE WEST LINN NATURAL RESOURCE ASSESSMENT MEMO

FIGURE 4

AKS ENGINEERING & FORESTRY, LLC
12965 SW HERMAN RD SUITE 100
TUALATIN, OR 97062 www.aks-eng.com
PHONE: 503.563.6151 FAX: 503.563.6152

DRWN: KMK
CHKD: HS
AKS JOB: 6786

DWG: 6786 NRA FIGURES 1-4 | FIGURE 4



WEST LINN PLANNING DEPARTMENT AND GIS
(MAY, 2014)

N

SCALE: 1"= 400 FEET

400 0 160 240 320 400

DATE: 07/17/2018

WEST LINN WATER RESOURCE AREA (WRA) MAP WILDWOOD DRIVE WEST LINN NATURAL RESOURCE ASSESSMENT MEMO	FIGURE 5
AKS ENGINEERING & FORESTRY, LLC 12965 SW HERMAN RD SUITE 100 TUALATIN, OR 97062 www.aks-eng.com PHONE: 503.563.6151 FAX: 503.563.6152	DRWN: JRI CHKD: SAR AKS JOB: 6786

DWG: 6786 NRA FIGURES 1-4 | FIGURE 5

ECKELMAN RESIDENCE: NEW HOME

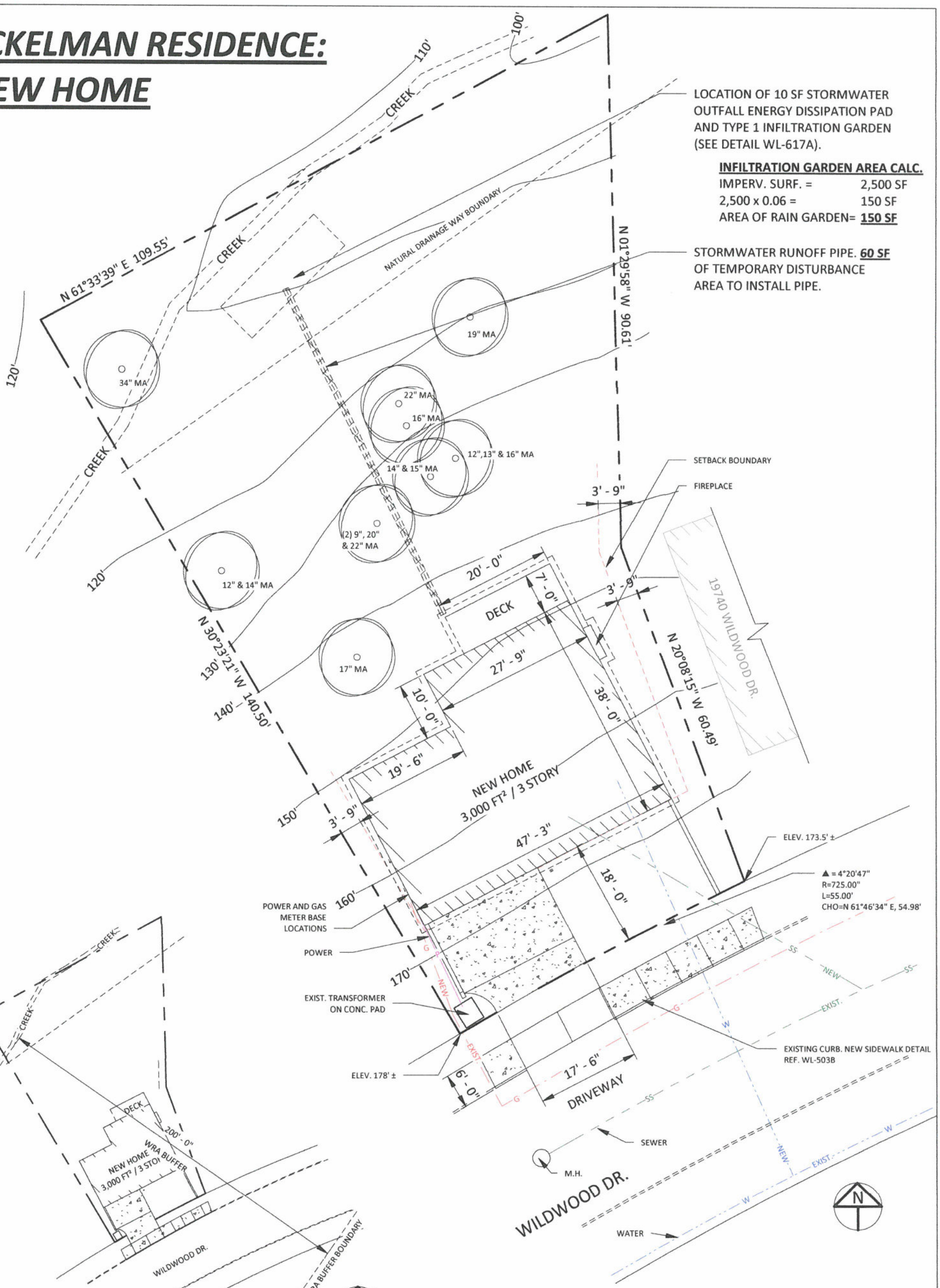
WAP-18-03

LOCATION OF 10 SF STORMWATER OUTFALL ENERGY DISSIPATION PAD AND TYPE 1 INFILTRATION GARDEN (SEE DETAIL WL-617A).

INFILTRATION GARDEN AREA CALC.

IMPERV. SURF. =	2,500 SF
2,500 x 0.06 =	150 SF
AREA OF RAIN GARDEN=	**150 SF**

STORMWATER RUNOFF PIPE. **60 SF** OF TEMPORARY DISTURBANCE AREA TO INSTALL PIPE.



1 SITE PLAN
1/16" = 1'-0"

2 WRA BUFFER ZONE
1" = 50'-0"

PERMANENT DISTURBANCE AREA WITHIN WRA BUFFER ZONE: 2,500 FT²
(BUILDING FOOTPRINT, CONCRETE DRIVEWAY AREA, NEWLY GRADED LANDSCAPED AREA, ETC.)

APPLICANT:
MAX ECKELMAN
509 WASHINGTON ST.
OREGON CITY, OR 97045
(503) 572-0239

ECKELMAN
GARY ECKELMAN, ARCHITECT
4529 SE 67TH AVE. PORTLAND, OR 97206
P. (503) 572-1247

ECKELMAN - NEW SINGLE FAMILY HOME
19738 WILDWOOD DR, WEST LINN, OR 97068

WRA - SITE PLAN

Project number	18-102
Date	9/4/2018
Drawn by	CE
Checked by	GE

A1
FIGURE 7
Scale As indicated
9/4/2018 9:38:08 AM

WAP-18-03

LOCATION OF 10 SF STORMWATER OUTFALL ENERGY DISSIPATION PAD AND TYPE 1 INFILTRATION GARDEN (SEE DETAIL WL-617A).

INFILTRATION GARDEN AREA CALC.

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STORMWATER RUNOFF PIPE. **60 SF** OF TEMPORARY DISTURBANCE AREA TO INSTALL PIPE.

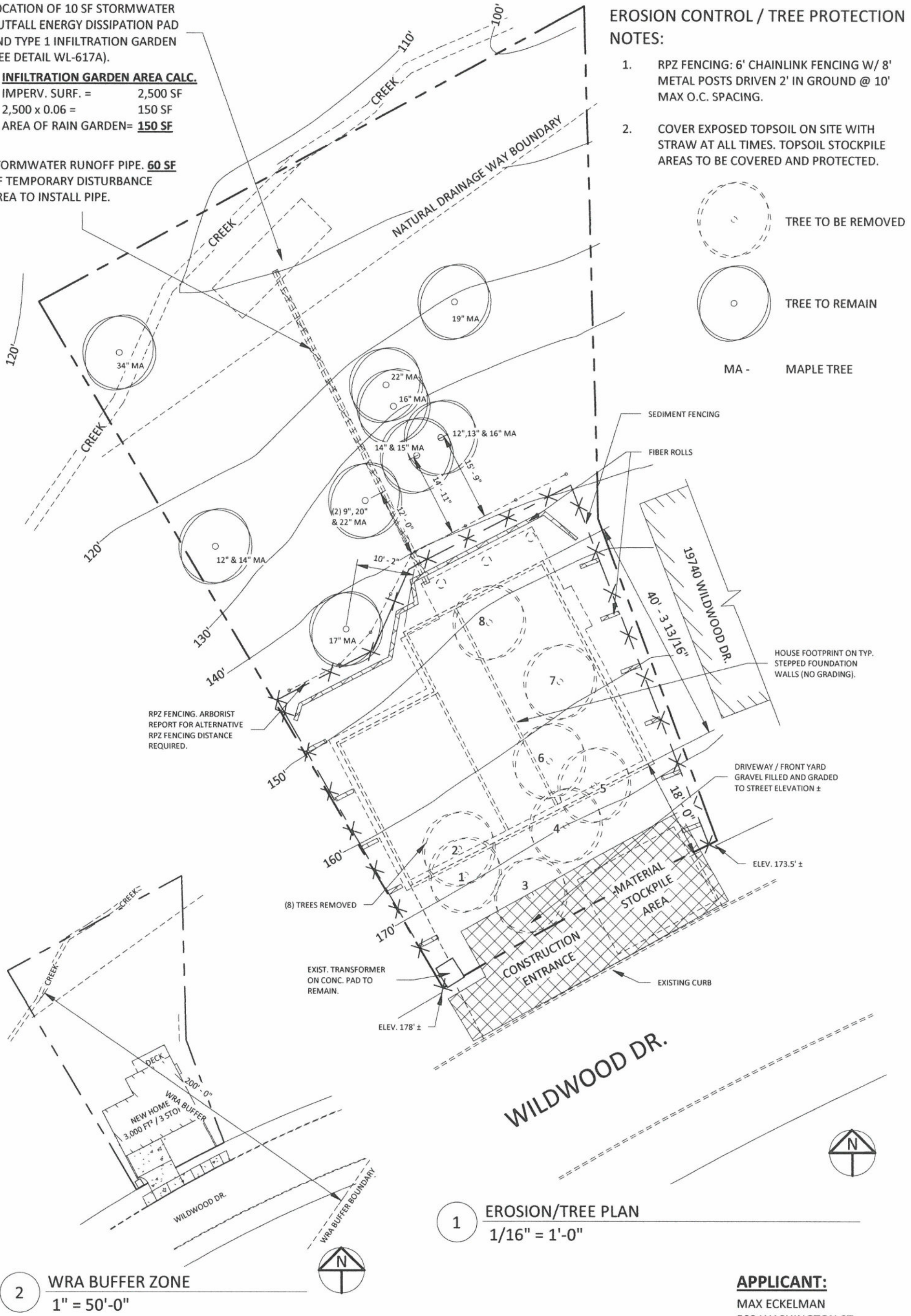
EROSION CONTROL / TREE PROTECTION NOTES:

1. RPZ FENCING: 6' CHAINLINK FENCING W/ 8' METAL POSTS DRIVEN 2' IN GROUND @ 10' MAX O.C. SPACING.
2. COVER EXPOSED TOPSOIL ON SITE WITH STRAW AT ALL TIMES. TOPSOIL STOCKPILE AREAS TO BE COVERED AND PROTECTED.

TREE TO BE REMOVED

TREE TO REMAIN

MA - MAPLE TREE



1 EROSION/TREE PLAN
1/16" = 1'-0"

2 WRA BUFFER ZONE
1" = 50'-0"

PERMANENT DISTURBANCE AREA WITHIN WRA BUFFER ZONE: 2,500 FT²
(BUILDING FOOTPRINT, CONCRETE DRIVEWAY AREA, NEWLY GRADED LANDSCAPED AREA, ETC.)

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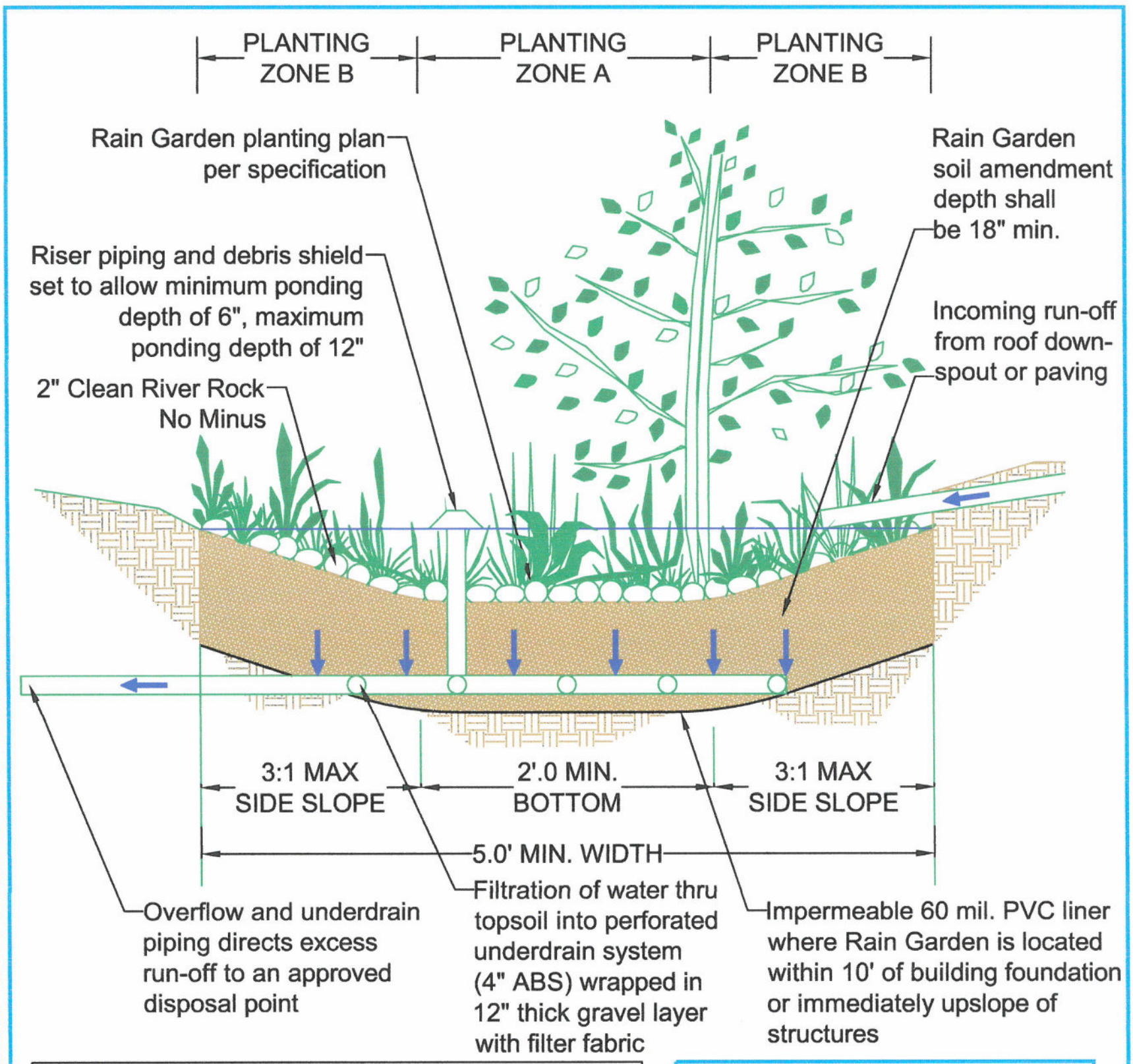
WRA - EROSION/TREE PLAN

Project number	18-102
Date	9/4/2018
Drawn by	CE
Checked by	GE

A2

FIGURE 7A

Scale As indicated
9/4/2018 9:38:08 AM



RAIN GARDEN PLANTS		
ZONE	BOTANICAL NAME	COMMON NAME
A	CAREX APERTA	COLUMBIA SEDGE
A	CAREX DENSA	DENSE SEDGE
A	CAREX PANSA	SANDDUNE SEDGE
A	CAREX TESTACAE	NEW ZEALAND ORANGE SEDGE
A	CAREX TUMILICOLA	FOOTHILL SEDGE
A	DESCHAMSIA CAESPITOSA	TUFTED HAIR GRASS
A	ELEOCHARIS PALUSTRIS	CREEPING SPIKE RUSH
A	JUNCUS BALTICUS	BALTIC RUSH
A	JUNCUS EFFUSUS "CARMEN'S JAPANESE"	COMMON RUSH
A	JUNCUS EFFUSUS "GOLD STRIKE"	COMMON RUSH
A	JUNCUS EFFUSUS "CARMAN'S GRAY"	COMMON RUSH
A	JUNCUS PATENS	SPREADING RUSH
B	ARCTOSTAPHYLLOS UVA-URSI	KINNIKINNICK
B	BLECHNUM SPICANT	DEER FERN
B	CORNUS SERICEA VAR. KELSEY II	DWARF REDTWIG DOGWOOD
B	LIRIOPE MUSCARI "BIG BLUE"	BIG BLUE LILY TURF
B	GAUTHERIA SHALLON	SALAL
B	MAHONIA NERVOSA	LOW OREGON GRAPE
B	MAHONIA REPENS	CREEPING OREGON GRAPE

RAIN GARDEN SURFACE AREA = TOTAL IMPERVIOUS AREA x 0.06

NOTE:

PLANT 1 GALLON POTS 18" O.C. IN EACH ZONE. A MINIMUM OF 3 SPECIES SHALL BE USED IN EACH ZONE.

INFILTRATION RAIN GARDEN TYPE 1

City of West Linn

DATE: 2010

DRAWING NO. WL-617A

FILE NO.

MAINTENANCE AGREEMENT SHALL BE REQUIRED AND BE RECORDED WITH THE CITY