GEOTECHNICAL REPORT

TCI MATTSON RD DEVELOPMENT
148 MATTSON RD
CENTRALIA, WA 98531
TAX PARCEL NOS. 023884000000, 023883000000, AND 021970001011

OCTOBER 13, 2025

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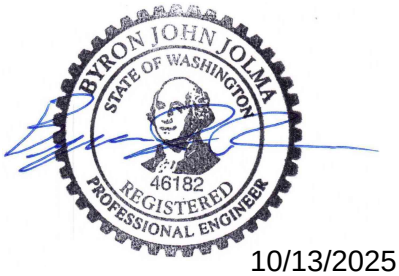
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GEOTECHNICAL REPORT

TCI MATTSON RD DEVELOPMENT

THE MATERIAL AND DATA IN THIS REPORT WERE PREPARED
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JOLMA DESIGN LLC



10/13/2025

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ATTACHMENTS

Attachment 1: NRCS Soils Report
Attachment 2: Seismic Design Data
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ACRONYMS AND ABBREVIATIONS

ac	acre(s)
bgs	below ground surface
BMPs	Best Management Practices
CAVFS	Compost-Amended Vegetated Filter Strip
City	City of Centralia, Washington
County	Lewis County, Washington
DOE	Washington State Department of Ecology
ft	feet, foot
GIS	Geographical Information System
in	inch(es)
in/hr	inches per hour
JD	Jolma Design LLC
pcf	pounds per cubic foot
pci	pounds per cubic inch
psf	pounds per square foot
SWMMWW	2024 Stormwater Management Manual for Western Washington
WSDOT	Washington State Department of Transportation
IBC	International Building Code

DEFINITIONS

Project	Proposed TCI Mattson Rd Development improvements.
Project Site	On- and offsite areas where land-disturbing activities are proposed.
Subject Site	Area within the bounds of Tax Parcels 023884000000, 023883000000, and 021970001011.

1 INTRODUCTION

1.1 Overview

Jolma Design LLC (JD) is pleased to present this report containing geotechnical engineering findings, conclusions, and recommendations related to single-family residential development of 9.81, 28.7, and 11.89-ac parcels at 148 Mattson Rd, Centralia, Washington. For purposes of this report, only the proposed improvements and associated geotechnical-related impacts were evaluated. The evaluation area is referenced herein as the Project Site.

1.2 Scope of Work

The purpose of this study was to evaluate the proposed improvements to determine overall project feasibility and provide geotechnical engineering recommendations regarding onsite soils and proximal geologic hazard areas as defined by Lewis County Code (LCC) 17.38.620. Tasks performed as part of this evaluation include:

- A desk study and review of available site-related information, including GIS data, proposed site improvement drawings, geologic maps, landslide maps, soils maps, soil survey descriptions, existing and finished ground contours, and aerial imagery.
- Geotechnical analysis and preparation of this report presenting findings and recommendations.
- Onsite visual evaluation of near-surface soils.

A comprehensive slope stability analysis, deep subsurface explorations, and full characterization of the onsite geohazard areas is beyond the scope of this work.

1.3 Property Information

Table 1.1: Property Information

Item	Description
Location	Centralia, WA, approximately 0.5 mi northwest of the intersection of Cemetery Rd and SR 505 (see Figure 1).
Parcel Nos.	023884000000 (Lot 1), 023883000000 (Lot 2), and 021970001011 (Lot 3)
Owner	TCI Group LLC
Subject Site Area	9.81, 28.7, and 11.89 ac
Zoning Designation	Rural Development District, 5-acre density (RDD-5)

1.4 Project Description

Our understanding of the project improvements is based on the information provided at the time of this report. The project improvements outlined below are not intended to be used for bidding, design, or construction purposes and are subject to change.

Table 1.2: Project Summary

Item	Description
Overview	Project proposes to divide the existing parcel at 148 Mattson Rd (Lot 1) and construct a single-family residence on the south half of the parcel, single-family residence on the north half of the parcel, and shared access to both new residences and appurtenant improvements. The existing residence will be converted to an ADU. Two additional parcels east of Mattson Rd (Lots 2 and 3) will also be divided.
Buildings	One single-family residence is proposed in the north half of Lot 1, and another is proposed in the south half of Lot 1. See Figure 2 for approximate locations. No specific buildings are proposed at this time for Lots 2 and 3, but they will likely be single-family residences on 5-ac lots at some time after the land division.
Roads	Access will be taken via a new shared driveway with easement off Mattson Rd. Traffic expected to consist primarily of light passenger vehicles.
Grading	Grading improvements include the following: • Clearing, grubbing, and removal of undocumented fill • Earthwork (cut/fill placement) required to bring the site to finished grade

2 SITE CONDITIONS

2.1 Surface Conditions

Table 2.1: Site Information

ITEM	DESCRIPTION
Existing Improvements	The subject property currently has a house, barn, a few sheds, and driveway on Lot 1, and an agricultural building on Lot 2. The remaining parcel is undeveloped. See Figure 2.
Existing Ground Cover	Ground cover primarily consists of grass, with reforesting vegetation on the previously logged slope. See Figure 2.
Existing Topography	Lot 1 is gently to steeply rolling from west to east, flattening along the eastern edge near Mattson Rd. Lots 2 and 3 continue this flat trend beyond Eagle Creek to the base of Cooks Hill near the eastern edge, where the terrain rises.

2.2 Site Geology

Table 2.2: Site Geology

Item	Description
Geologic Units	According to the Washington State Department of Natural Resources Geologic Information Portal (Washington State Department of Natural Resources 2020), Project Site geology in the area of proposed improvements is described as tuffaceous siltstone of the Lincoln Creek Formation (OEm[lc]), Skookumchuck Formation (En[sk]), peat (Qp), and Quaternary alluvium (Qa). See Figure 4. ***Lincoln Creek Formation, Tuffaceous Siltstone (OEm[lc])*** The tuffaceous siltstone of the Lincoln Creek Formation is olive to medium gray and tan to yellowish orange where weathered, and moderately indurated and cemented where fresh. It is commonly moderately to strongly weathered, friable, and clayey. It includes very fine sand to silt, interbeds of basaltic sandstone and siltstone, and common pumice and scoria fragments. The unit is 1,200 to 4,000 ft thick and is interpreted as having been deposited in a marine offshore environment during the Oligocene to early Miocene. ***Skookumchuck Formation (En[sk])*** The Skookumchuck Formation primarily consists of micaceous and carbonaceous gray to brown sandstone to siltstone. The carbonaceous portions are bluish gray with dark gray to black coal beds. The unit is highly friable, weakly to moderately cemented, poorly to mildly indurated, and moderately to strongly weathered to orangish-brown clay and limonite. Particles are medium to very fine grained, subangular to sub-rounded, and moderately to well sorted sand to silt with faint lamination, uncommon trough crossbedding, and abundant iron staining. The unit also includes coal beds and common ash layers altered to bentonite clay lenses. The unit thickness is commonly 2,200 to 3,000 ft and is middle to late Eocene in age.

Item	Description
	Quaternary Bog, Marsh, Swamp, or Lake Deposits (Qp) The bog, marsh, swamp, and lake deposits consist of fine-grained sediments and peat. Peat consists of organics and organic-rich sediment typically found in closed depressions, wetland areas, and flat-bottomed depressions. These deposits are more common in alluvium and in association with standing water along the northern tributaries of the Chehalis River. Mapping of these deposits, including peat, includes areas based on the evaluation of aerial and satellite data. The thickness of these areas is largely unknown. ***Quaternary Alluvium (Qa)*** The Quaternary alluvium is found along stream channels and flood plains. It consists of unconsolidated peat, clay, silt, sand, pebbles, and cobbles that are well-rounded and moderately to well sorted. Sediments in the unit are Holocene and Pleistocene in age.

2.3 Mapped Soil Types

Table 2.3: Mapped Soil Types

Item	Description
Mapped Soils	According to the Natural Resources Conservation Service (NRCS) Web Soil Survey (Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture 2017), Project Site soils primarily consist of Melbourne loam (131), Scamman silty clay loam (194, 195), Buckpeak silt loam (27), and Reed silty clay loam (172). See Figure 3 and Appendix A. ***Melbourne Series*** The Melbourne series generally consists of very deep, well drained soils formed in residuum and colluvium weathered from siltstone and sandstone on foothills with slopes of 0 to 65 percent. Melbourne soils typically have moderately slow permeability, slow to medium runoff, and are classified under Hydrologic Soil Group (HSG) C. ***Scamman Series*** The Scamman series generally consists of deep, somewhat poorly drained soils formed in mixed material weathered from glacial and sedimentary sources on high terraces and footslopes of adjacent hills having slopes of 0 to 70 percent. Scamman soils are classified under Hydrologic Soil Group (HSG) C/D. ***Buckpeak Series*** The Buckpeak series generally consists of very deep, well drained soils formed in residuum and colluvium from siltstone, shale, and fine-grained sandstone on uplands between 200 and 1800 feet with slopes from 8 to 90 percent. 27 soils typically have moderate permeability, medium or rapid runoff, and are classified under HSG B. ***Reed Series*** The Reed series generally consists of deep, poorly drained soils formed in alluvium weathered from shale, sandstone, siltstone, and glacial drift in depressions having 0 to 3 percent slopes on low terraces adjacent to perennial streams. Reed soils are classified under HSG D and are typically hydric, with groundwater table within 6 inches of the surface during winter and early spring.

2.4 Geologic Hazards

The Project Site lies within or near areas mapped in Lewis's GIS database as geologically hazardous as defined in Lewis County Code (LCC) 17.38.620. See Figure 3. Each hazard is described below.

2.4.1 Steep Slopes > 15%

The Subject Site contains areas mapped as having the following conditions outlined in Lewis County Code (LCC) 17.38.650(2)(b):

1. Slopes steeper than 15 percent;
2. Hillside intersecting geologic contacts with permeable sediment overlying a low permeability sediment or bedrock; and
3. Springs or groundwater seepage.

The field reconnaissance confirmed the presence of steep slopes; however, no groundwater seepage or springs were observed within or near the Project Site. Shallow groundwater may exist in the vicinity of Eagle Creek based on soil type and topography, but this was not proven during the site visit.

A comprehensive geotechnical investigation and slope analysis are outside the scope of this work.

2.4.2 Seismic Hazard Areas

The Subject Site contains areas mapped as containing a seismic hazard east of Mattson Rd. These areas are potentially subject to severe risk of damage as a result of earthquake-induced soil liquefaction, ground shaking amplification, slope failure, settlement, or surface faulting. These areas include soil liquefaction hazard, seismic site classification, and active faults. All structures requiring a building permit must be consistent with the design requirements of the D1 seismic site class as specified in the IBC.

3 FIELD EVALUATION

3.1 Typical Subsurface Characteristics

Subsurface conditions within the Project Site were characterized by observing 4 test pits (see Figure 2) excavated on the property. Based on our observations, near-surface soils across the Project Site can be generally described as outlined in the table below.

Table 3.1: Typical Soil Profiles

Test Pit	Depth (in)	Description	Color	Remarks
TP-01, TP-02	0–5	Silty clay loam	Brown	Dry; slightly hard; very friable; sticky; slightly plastic.
	5–32	Silty clay loam	Pale Brown	Dry; hard; friable; very sticky; slightly plastic; moderate mottling.
	32–48	Silty clay	Grayish Brown	Moist; very hard; friable; sticky; plastic; strong mottling.
TP-03, TP-04	0–8	Loam	Brown	Dry; slightly soft; friable; slightly sticky; slightly plastic.
	8–15	Clay loam	Yellowish Brown	Dry; slightly hard; friable; slightly sticky; slightly plastic.
	15–42	Clay	Strong Brown	Moist; hard; friable; moderately sticky; slightly plastic.
Roadside Ditch	0–12	Silty clay	Grayish Brown	Moist; hard; slightly sticky; slightly plastic; prominent mottling.

Photos



Exhibit 3.1: TP-02



Exhibit 3.2: TP-03



Exhibit 3.3: TP-04



Exhibit 3.4: Ditch along Mattson Rd

3.2 Visual Inspection

Ground-level inspections of the Subject Site were performed to identify and evaluate potential areas of concern. The primary features of concern are the slopes and the seismic hazard areas.

3.2.1 Steep Slopes

This evaluation included looking for evidence of historical, ongoing, and potential future slope instability. These indicators include, but are not limited to the following: bowed, bent, or tilted trees; scarps; areas inexplicably denuded of vegetation; and surface cracking. The steepest slopes were observed to be around 30 to 35 percent. **No evidence of slope instability was observed; therefore, we conclude the mapped slope hazard areas are generally stable and proposed improvements can be feasibly constructed as currently proposed.**

3.2.2 Seismic Hazard

Lots 2 and 3 are mapped predominantly as moderate to high liquefaction susceptibility (See Figure 5), seismic site class D to E (See Figure 6), and peat sediments (See Figure 4). The Lincoln Creek Fault, an oblique high-angle right-lateral fault, crosses these parcels as well. It is a short accessory fault that branches off the Scammon Creek Fault, part of the Doty fault zone. Activity on these faults is not known as these faults do not show clear scarps. This may indicate the faults are inactive, although glacial deposits and weathered regolith may not preserve signs of activity.

Signs of fault movement and evidence of the existence of a fault were not observed during the site visit or in aerial imagery. Peat was not observed in test pits or stream banks, although evidence of hydric soils was observed. **Development in seismic hazard areas should meet the requirements pertaining to the D1 seismic site class in the IBC.**

3.3 Groundwater

The Project Site was evaluated for current or historical presence of shallow groundwater and slope face seepage which can be associated with a geologic contact susceptible to relative movement between planes. No slope face seepage or springs were observed within the Project Site or mapped geohazard areas. No seepage or shallow groundwater was observed at the time of the site visit in any of the test pits. Mottling was observed in soils mapped as hydric or potentially hydric, in line with the soil descriptions as mapped.

4 SEISMIC EVALUATION

4.1 Regional Seismicity

The project site lies within an active seismic area, with controlling design parameters based on risks associated with the Cascadia Subduction Zone (CSZ), a fault created by the forcible movement of the Juan de Fuca plate toward, and under, the North American continental plate. Extending from Northern Vancouver Island south to Cape Mendocino, California, the CSZ is a potential source for a "megathrust" earthquake capable of causing major damage and severe loss of life and property.

4.2 Seismic Design Data

Table 4.1 below provides a summary of seismic design parameters obtained from the ASCE (American Society of Civil Engineers) 7 Hazard Tool website (American Society of Civil Engineers 2025). Based on our field observations and experience, we concluded a Site Class B designation was appropriate for Lot 1, and a site class D designation was appropriate for Lots 2 and 3. See Attachment 2 for full reports. Also see Figure 6.

Table 4.1: Seismic Design Criteria

PARAMETER	VALUE	
Site Class	B	D
Short Period Spectral Response Acceleration (S_S)	1.244 g	1.244
1-Second Period Spectral Response Acceleration (S_1)	0.509 g	0.508
5-Percent-Damped Design Spectral Response (S_{DS})	0.746 g	0.831
Site Coefficient, F_a	0.9	1.003
Site Coefficient, F_v	0.8	N/A*

*Site-specific ground motion hazard analysis may be required.

4.3 Liquefaction Potential

Liquefaction occurs when earthquake shaking causes a rapid loss of shear strength within saturated loose, cohesionless soils (e.g., sand, silt with low plasticity). According to the *Liquefaction susceptibility and site class maps of Washington State, by county* (Palmer, et al. 2007), most of Lot 1 is classified as "Bedrock", which displays little to no susceptibility to liquefaction. Lots 2 and 3 are classified as "Moderate to High" susceptibility to liquefaction. See Figure 5.

5 GEOTECHNICAL DESIGN RECOMMENDATIONS

Based on our understanding of the proposed improvements and interpretation of available information, **we conclude the proposed developments are feasible if constructed in accordance with generally accepted good engineering and construction practices and the recommendations contained herein.** Means and methods of construction shall comply with the authority having jurisdiction's code requirements. Unless otherwise noted or approved by JD, in the case of conflicting requirements between regulatory agency and JD recommendations, the more stringent of the two shall apply.

5.1 Setbacks

5.1.1 General Recommendations

JD recommends foundations be constructed such that an imaginary line beginning at the bottom outside corner of the footing and projected down and away at a 2(H):1(V) slope does not daylight. In the event the imaginary line does daylight, the footing shall be set further into the slope and/or installed at a deeper depth until the criterion is met. Existing structures and improvements were not evaluated for compliance with this recommendation. Development in seismic hazard areas should meet the requirements pertaining to the D1 seismic site class in the IBC.

5.1.2 Site-Specific Setback Recommendations

Site-specific setback recommendations are outlined in the table below.

Table 5.1: Minimum Site-Specific Setback Recommendations

Item	Minimum Setbacks (ft)			Remarks
	Slopes ≥ 15% < 33%	Slopes ≥ 33% < 50%	Slopes ≥ 50%	
Buildings	None	See 2018 IBC (1808.7.1 –1808.7.5)	See 2018 IBC (1808.7.1 – 1808.7.5)	Setbacks may be reduced if warranted by further geotechnical evaluation.
Stormwater Facilities	None	20	25	
Septic Systems	None	10	20	
Other	Setbacks for improvements not within the categories outlined above shall be determined by the County, geotechnical engineer, or other qualified soils professional.			

5.2 Earthwork

5.2.1 Subgrade Preparation

Clearing and grubbing should consist of the removal of vegetation such as brush, grass, stumps, trees, roots of trees, and otherwise deleterious natural materials from the areas to be graded. Clearing and grubbing should extend to the limits of areas where grading is proposed. Other unsuitable materials that should be removed include, but may not be limited to dry, loose, soft, wet, organic, or compressible natural soils; peat; fractured, weathered, or soft bedrock; undocumented non-engineered fill; and other deleterious fill materials.

Based on our field observations, the recommended allowable soil bearing capacity for the existing Scamman and Melbourne native soils is 1,800 psf and for the Reed soils, 1,500 psf. These values may be increased by a factor of 1.33 for transient dynamic loads (e.g., wind, seismic).

Exposed subgrade soils should consist of firm, undisturbed native material and inspected by a geotechnical engineer or other qualified soils professional prior to pouring concrete for foundations or placement of structural fill.

JD shall be notified immediately if bedrock or significant quantities of peat are encountered during excavation. Shallow bedrock may indicate the presence of a potential slip plane at the

soil and rock interface; foundations partially constructed on bedrock and partially on near-surface soils have an increased risk of significant differential settlement. Peat is generally unsuitable as a foundation subgrade.

5.2.2 Engineered Fill Materials

Engineered fill soils shall conform to the specifications outlined below.

Table 5.2: Engineered Fill Recommendations

Material Type	Location	Compaction Standard	Minimum Compaction Requirement (%)	Recommended Moisture Content Relative to Optimum Moisture
Load-bearing native subgrade.	All	None[1]	None	None
Structural fill soils generated from onsite excavation or imported from an approved source.	Building envelopes	Modified Proctor (ASTM D1557)	90	±2%
Structural fill soils generated from onsite excavation or imported from an approved source.	Roads and utility trenches within right-of-way	Modified Proctor (ASTM D1557)	92	±2%
Aggregate base.	Concrete footing and slab subgrade	Modified Proctor (ASTM D1557)	92	±2%
Aggregate base.	Road subgrade	Modified Proctor (ASTM D1557)	95	±2%
Non-structural fill. Note that all fill slopes are considered structural, even if within landscape areas.	Landscaped areas	Modified Proctor (ASTM D1557)	85	±5%
Well-drained aggregate.	3 ft behind back of retaining wall	None[2]	N/A	N/A
Granular fill.	Behind retaining wall	Modified Proctor (ASTM D1557)	90	±2%

[1] JD does not recommend compaction testing be performed on native soil; however, if density analysis is required, it should be performed using a non-impactful method (*e.g., nuclear gage*). In no case should a proof roll test be used to evaluate undisturbed native soil.
[2]Care shall be taken not to apply excessive compaction effort within 3 ft of the back of retaining wall. A visual assessment and soil probe evaluation may be used to evaluate compacted fill density.

Additional recommendations associated with placement and compaction of structural fill are as follows:

- Structural fill soils shall be free of organic topsoil, peat, deleterious material, and cobbles larger than 8 in. Representative samples should be collected and analyzed to determine maximum dry density.
- Trench backfill shall be placed and compacted in accordance with the requirements of the jurisdiction having authority, but not less than the requirements outlined in Table 5.2.
- The first loose lift of structural fill placed over undisturbed native should be 12 in thick, and care taken to avoid disturbing the underlying native with the compaction effort. If the total fill thickness is less than 1 ft, a proof roll evaluation may be used in lieu of density testing.
- Structural fill should be placed in horizontal, loose lifts not exceeding 9 in thick and thoroughly compacted. Thinner lifts may be required in areas where a lighter compaction effort is required (*e.g.*, behind retaining walls). These areas should be adequately compacted, but do not need to meet the compaction recommendations outlined in Table 5.2.

5.2.3 Cut and Fill Slopes

- Fill placed on slopes steeper than 5(H):1(V) should be benched horizontally at least 10 ft into the existing slope. Additionally, the toe of fill slopes exceeding 5 ft in height should be keyed vertically into underlying soils.
- Temporary cut slopes should not exceed 1H:1V; unarmored permanent cut slopes should not exceed 2H:1V.
- Cut and fill slopes should be permanently stabilized with hydroseed or other long-term erosion control measures immediately after the site is brought to finished grade.

To the extent practicable, earthwork should take place during the dry season. If grading is scheduled during the wet season, special care should be taken to avoid disturbing native soil and to prevent offsite migration of sediment or sediment-laden stormwater runoff.

5.3 Drainage

Finished grades should slope away from all structures at least 10 feet at a minimum 5 percent slope. Water should not be allowed to pond on or near structures or slopes. If necessary, footing drains and low-point drains should be installed to promote drainage away from structures. Low-point and footing drains should be conveyed separately from roof and other drain lines.

Surface water should not be allowed to pond on site during construction to avoid oversaturating underlying soils. Ponded water should be promptly removed along with softened or disturbed soils.

5.4 Settlement

Two types of settlement generally take place during and after construction: elastic settlement and consolidation settlement.

5.4.1 Elastic Settlement

Elastic settlement occurs as the soil-bearing loads are applied (*i.e.*, during construction) and is more prevalent in sands and unsaturated fine-grained soils. The subject site soils in the area of the two proposed new buildings are not expected to experience significant elastic settlement.

5.4.2 Consolidation Settlement

Prevalent settlement will likely result from consolidation, which occurs over an extended period of time as the soil loading forces pore water out of the voids, transferring stress forces from the water to the soil particles. In certain scenarios, a phenomenon known as rebound, wherein pore water displaces the soil particles, may occur causing soil swell.

5.4.3 Estimated Total Settlement

There is insufficient data to accurately predict total long-term, post-construction settlement, and compiling said data would significantly increase construction costs without substantially mitigating potential risk. We estimate overall post-construction settlement to be less than one inch, and differential settlement less than half an inch. Any settlement that does occur will likely cause minor cracks or gaps or sticky windows/doors. In the event significant settling or subsidence is observed, notify JD or other qualified soils or structural engineering professional immediately. The parcels east of Mattson Rd were not evaluated for settlement.

5.5 Slope Protection

The following guidelines should be used to minimize impacts to cut and fill slopes during construction:

- To the extent practicable, mechanized equipment and construction vehicles should avoid traversing on or within 10 feet of top or toe of slope unless required for constructing improvements, in which case low ground pressure equipment should be used to minimize loading on the underlying soil.
- Notify JD or other qualified soils professional immediately if slope-failure indicators (*e.g.*, sloughing, cracks) are observed any time during or after construction.

5.6 Stormwater Management

Due to the possibility of restrictive and/or hydric soils at shallow depth, we do not recommend the use of infiltration for management of stormwater runoff without further investigation of soil suitability, such as infiltration testing.

5.7 Special Design Considerations

Portions of the Project Site are located in an area mapped by Lewis County and the DNR as having moderate to high liquefaction susceptibility during a seismic event. Site-specific conditions have been evaluated to see if they indicate a significant risk of liquefaction within the area of proposed improvements.

Subsurface explorations and geologic review indicate the following factors that reduce liquefaction potential:

- Groundwater was not encountered within the depth explored (up to 4 feet), although mottling was observed.
- The near-surface soils consist of cohesive silty clays (Reed series) which are generally not susceptible to liquefaction due to their low permeability and plastic behavior.
- No clean, loose, saturated granular layers were identified within the upper 4 feet that would meet typical liquefiable criteria per National Center for Earthquake Engineering Research (NCEER) or Youd et al. (2001) guidelines.
- The Project Site is not located adjacent to free-face conditions (e.g. riverbanks, steep slopes) that could promote lateral spreading. Development within riparian areas will be limited.
- Peat as mapped on the geologic map was not observed on the site, although it may not have been present in the specific locations explored.

Based on these findings, **liquefaction mitigation measures are not recommended for this project.** The soils encountered are expected to perform adequately to protect life safety under anticipated seismic loading without ground movement or specialized foundation systems.

However, it should be noted that some risk may remain in downgradient or low-lying areas where groundwater may be perched or seasonally shallow, particularly near natural drainageways or former floodplain deposits such as in the area of Reed soils. The current recommendation is contingent upon similar subsurface and groundwater conditions being present across the site. If grading or development extends into areas with different geologic or hydrologic conditions, supplemental geotechnical investigation may be warranted.

5.8 Recommended Inspections

Assuming existing and proposed site conditions and building locations remain substantially unchanged from what was evaluated in preparing this report, no further geotechnical-related inspections are recommended. Please notify JD immediately if unexpected conditions (*e.g.,* shallow bedrock, extensive peat) or unusual slope characteristics (*e.g.,* cracking, sloughing) are observed before, during, or after development activities take place.

5.9 Construction Site Safety

Construction site safety, including temporary excavation bracing and shoring, is the sole responsibility of the contractor controlling the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean JD is assuming any responsibility, neither implied nor inferred, for construction site safety or contractor activities.

6 LIMITATIONS

This report was prepared exclusively for TCI Group LLC for construction of two single-family residences and shared access to both new residences and appurtenant improvements on Tax Parcels 023884000000, 023883000000, and 021970001011 in Centralia, Washington. The services undertaken in completing this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in geotechnical standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

7 REFERENCES

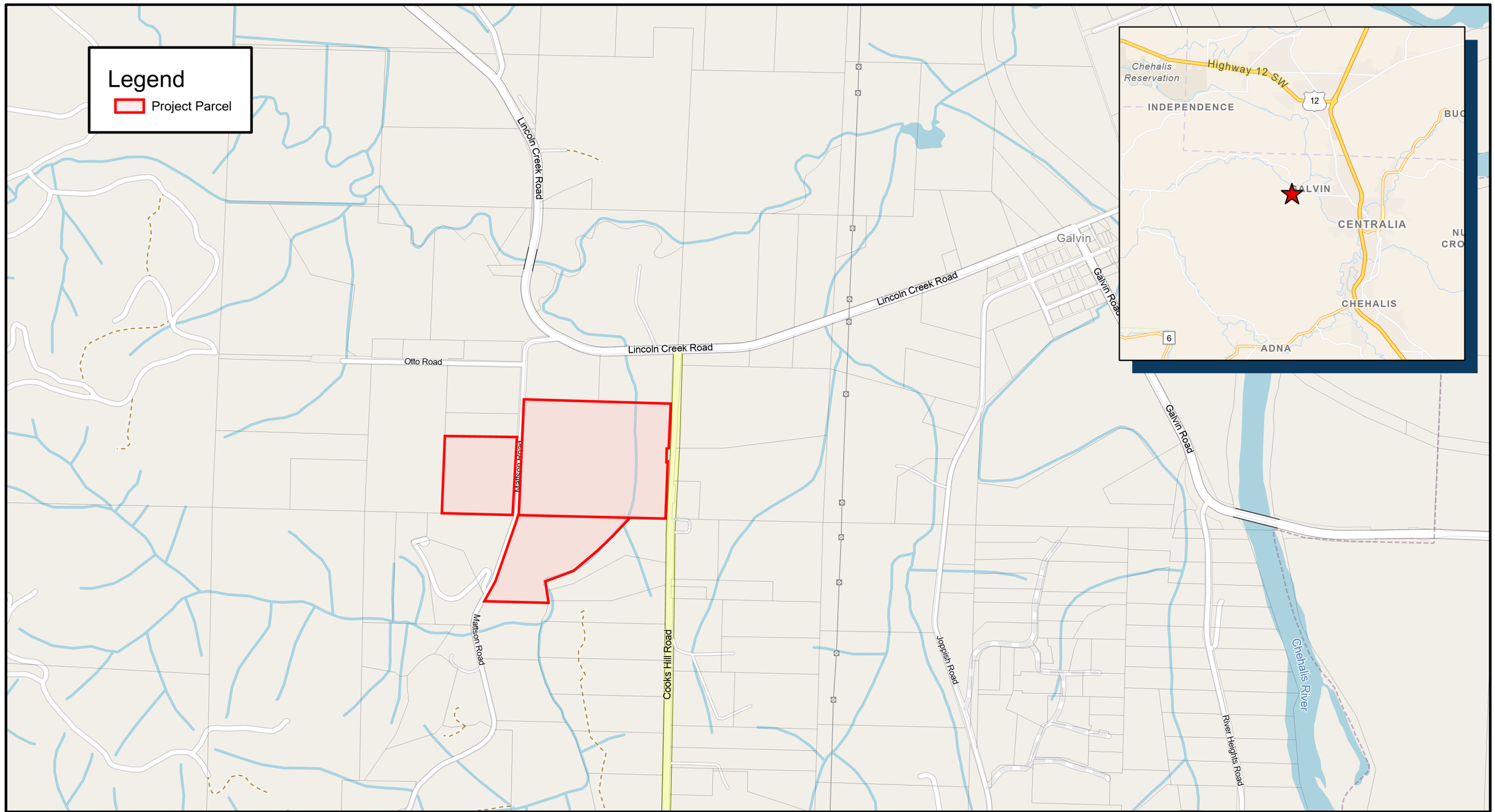
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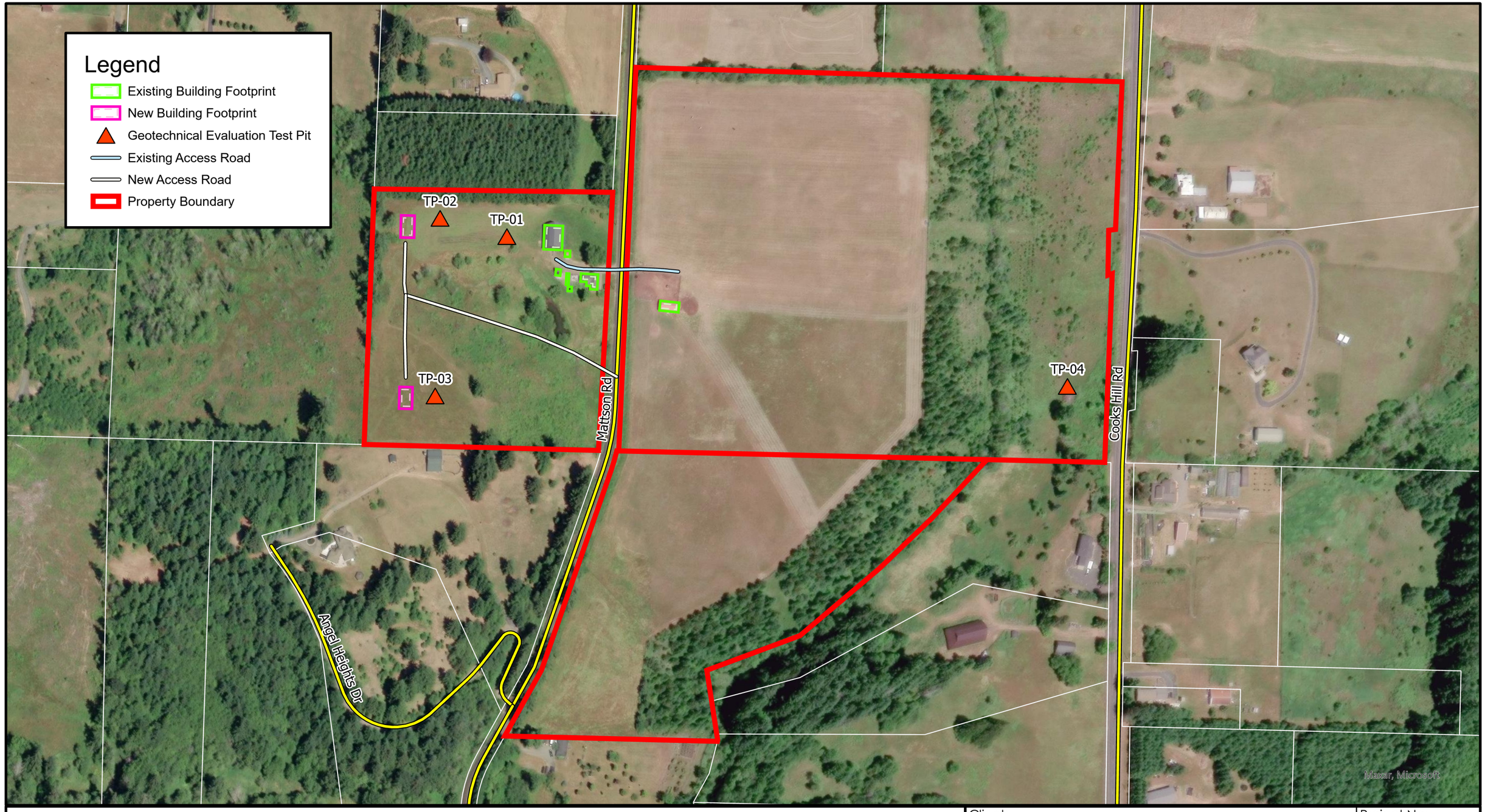
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FIGURES



JOLMA DESIGN, LLC

Client: TCI Group LLC		Project No: 25078
Title: Site Location Map		Date: 10/08/2025
Project: TCI Mattson Rd Development		Figure: 1

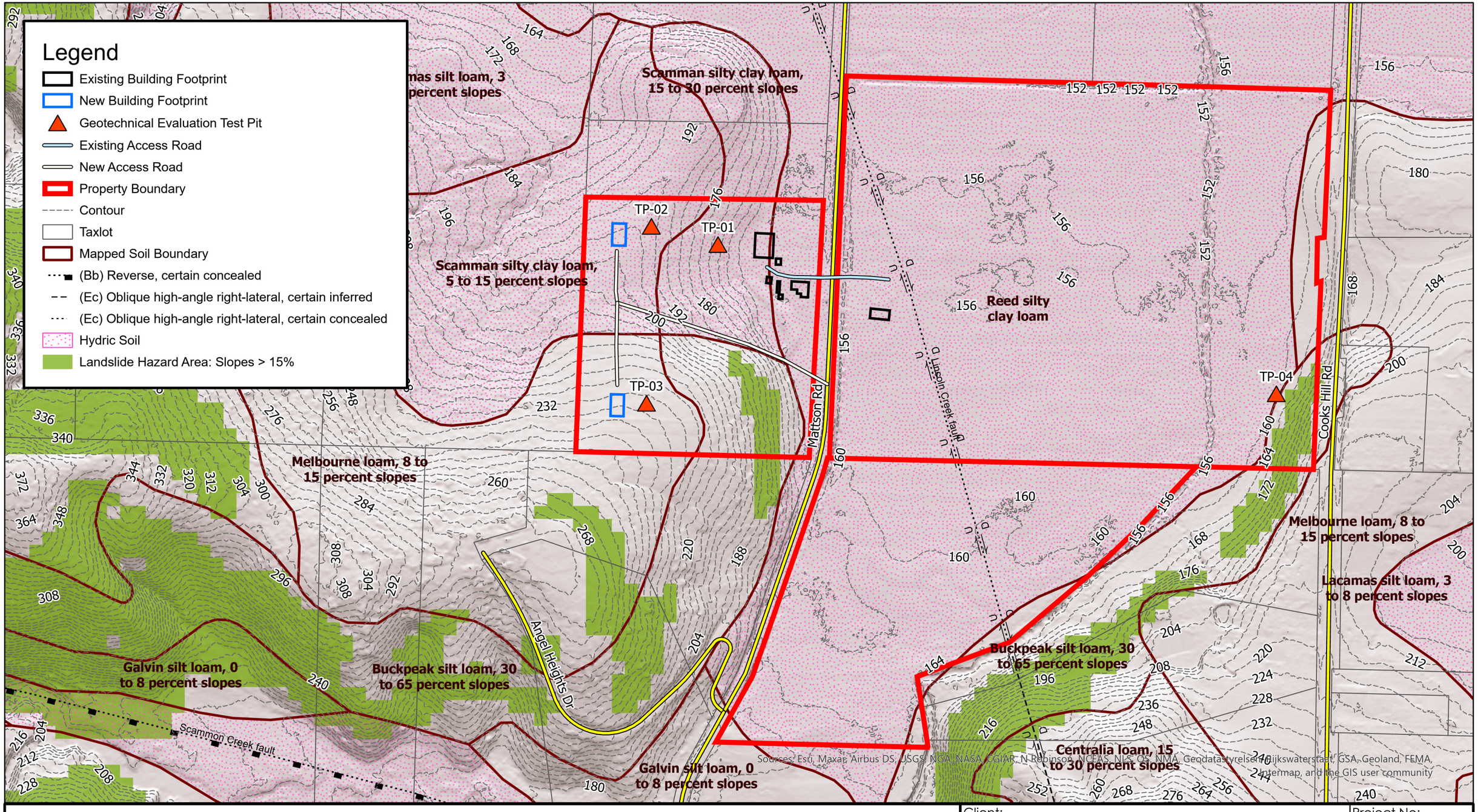


JOLMA DESIGN, LLC

N W E S

240 0 240 480 Feet

Client: TCI Group LLC		Project No: 25078
Title: Site Features Map		Date: 10/08/2025
Project: TCI Mattson Rd Development		Figure: 2

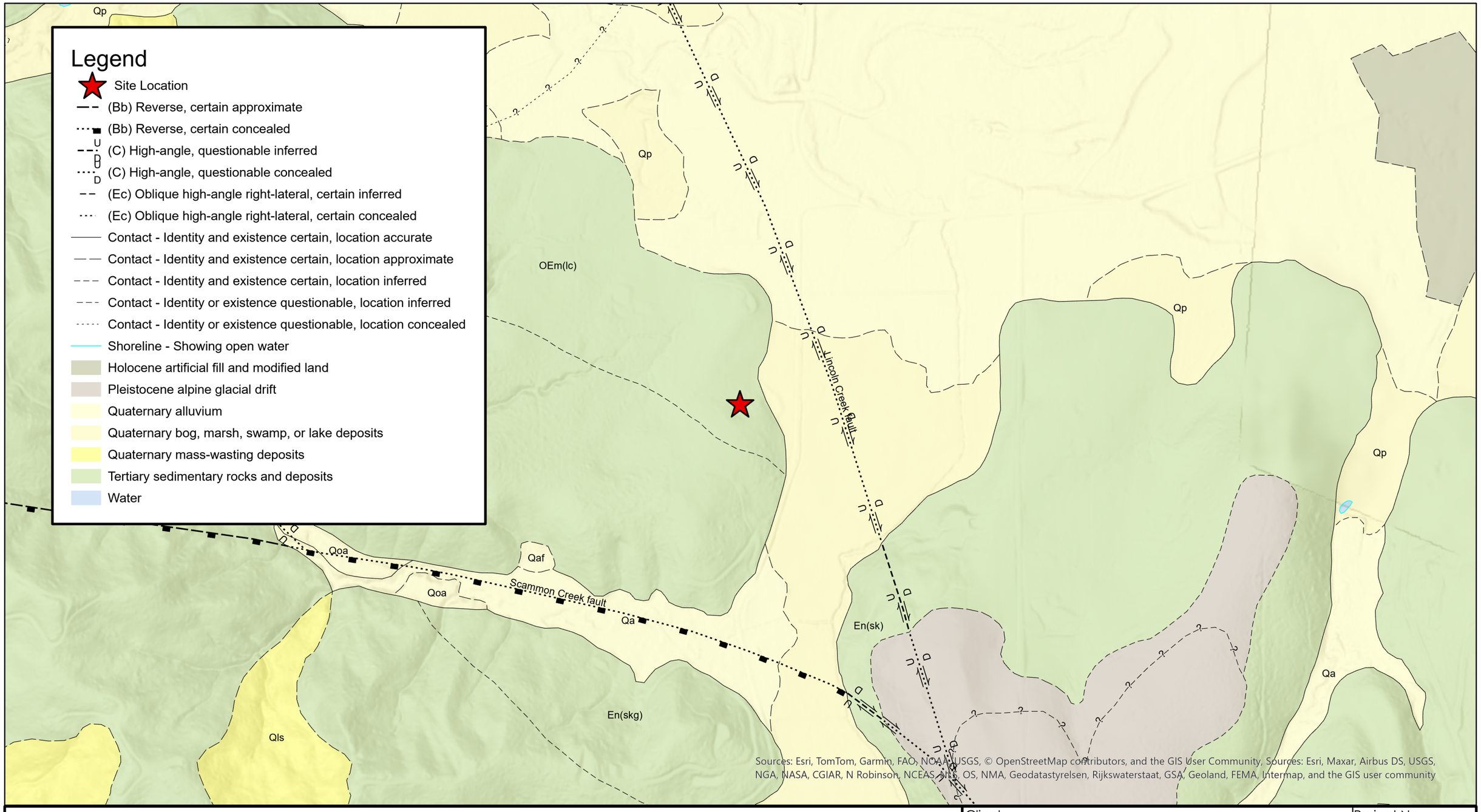


JOLMA DESIGN, LLC

N W E S

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Client: TCI Group LLC	Project No: 25078
Title: Soils & Geohazard Area Map	Date: 10/08/2025
Project: TCI Mattson Rd Development	Figure: 3

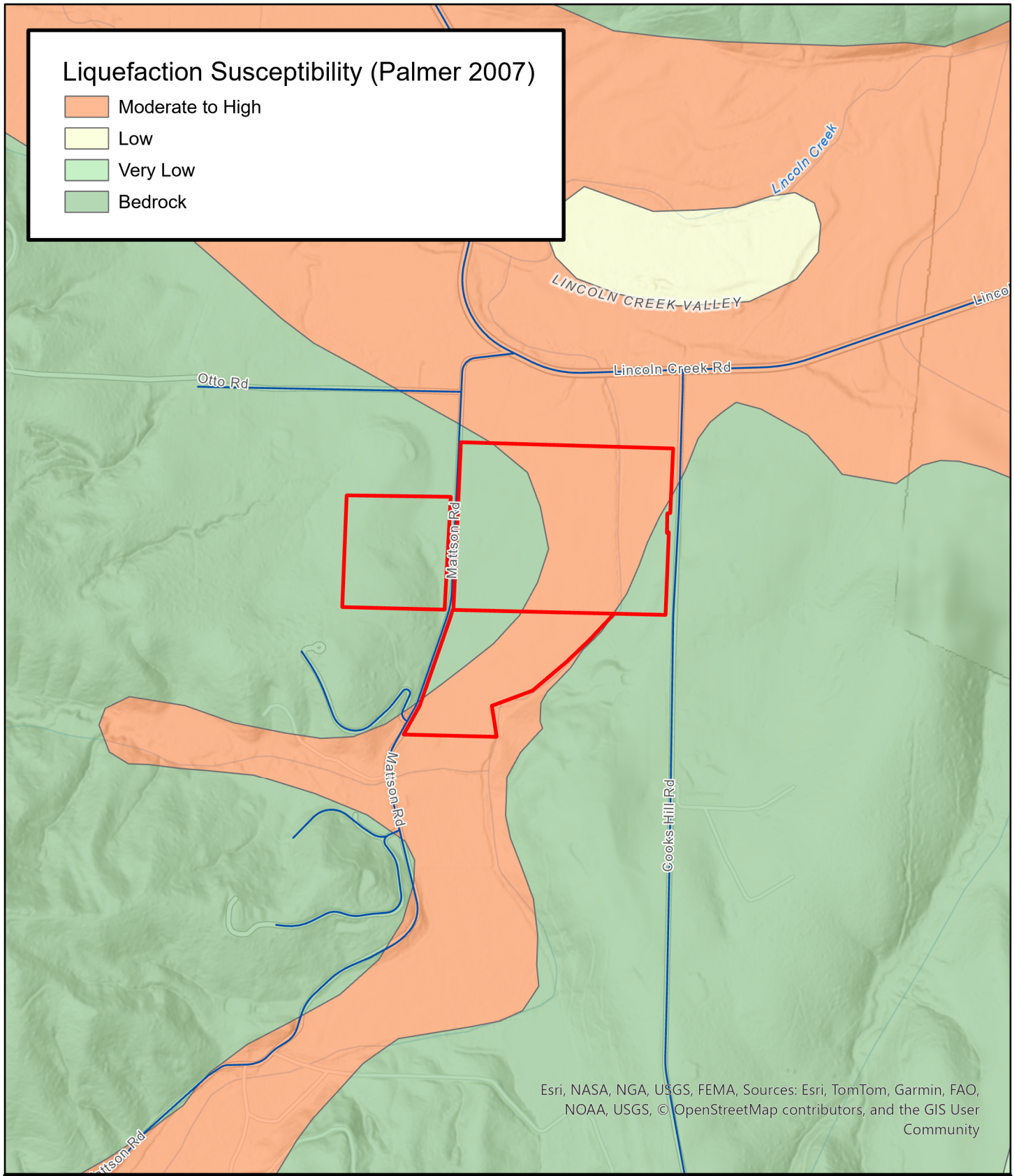


JOLMA DESIGN, LLC

N W E S

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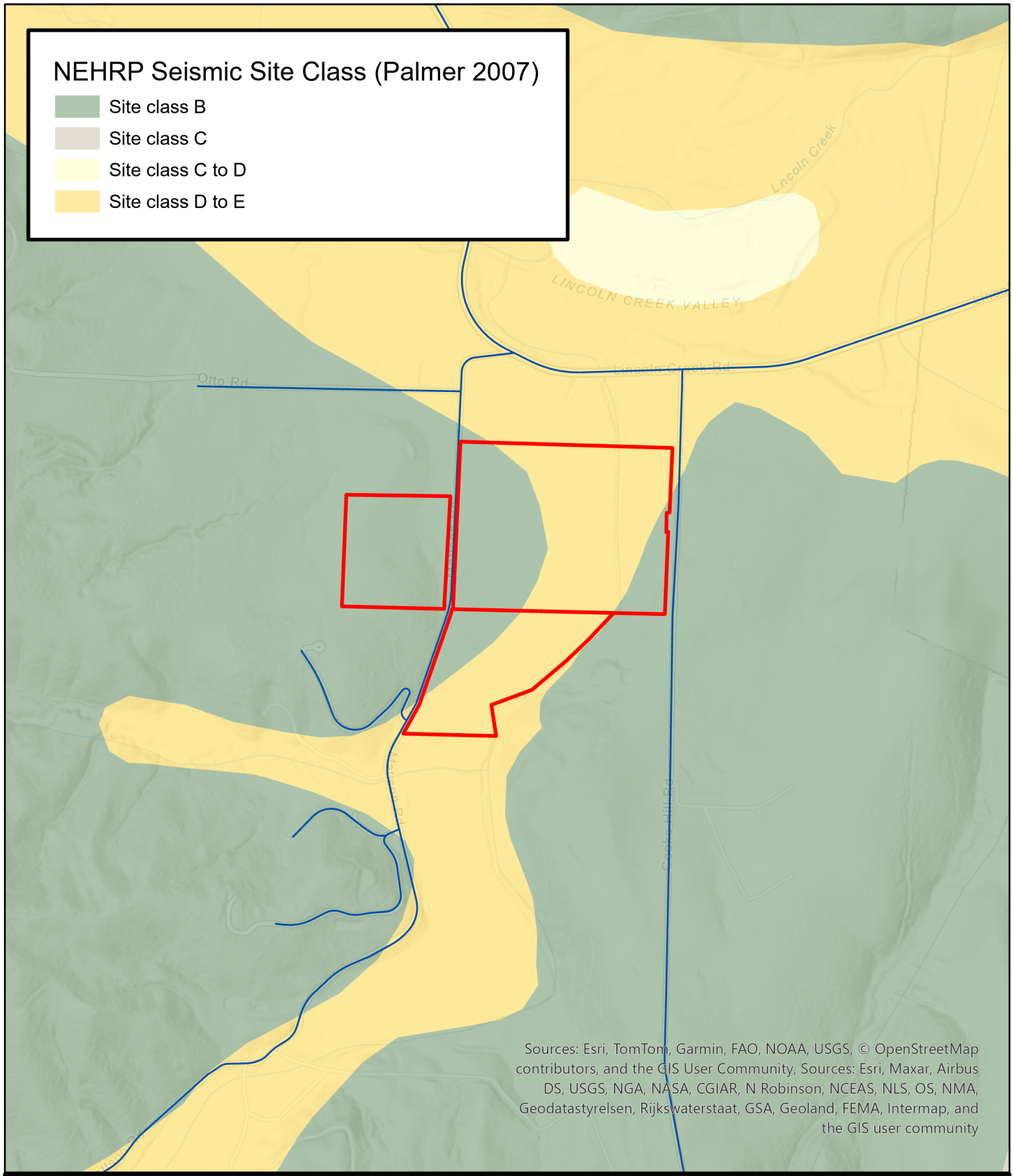
Client: TCI Group LLC		Project No: 25078
Title: Geologic Map		Date: 10/08/2025
Project: TCI Mattson Rd Development		Figure: 4



JOLMA DESIGN, LLC

N W E S

Client: TCI Group LLC		Project No: 25078
Title: Liquefaction Susceptibility Map		Date: 10/08/2025
Project: TCI Mattson Rd Development	Drawing Scale: 1 IN = 800 FT	Figure: 5



JOLMA DESIGN, LLC

N W E S

Client: TCI Group LLC		Project No: 25078
Title: Seismic Site Class Map		Date: 10/08/2025
Project: TCI Mattson Rd Development	Drawing Scale: 1 IN = 800 FT	Figure: 5

ATTACHMENT 1

NRCS SOILS REPORT

United States Department of Agriculture

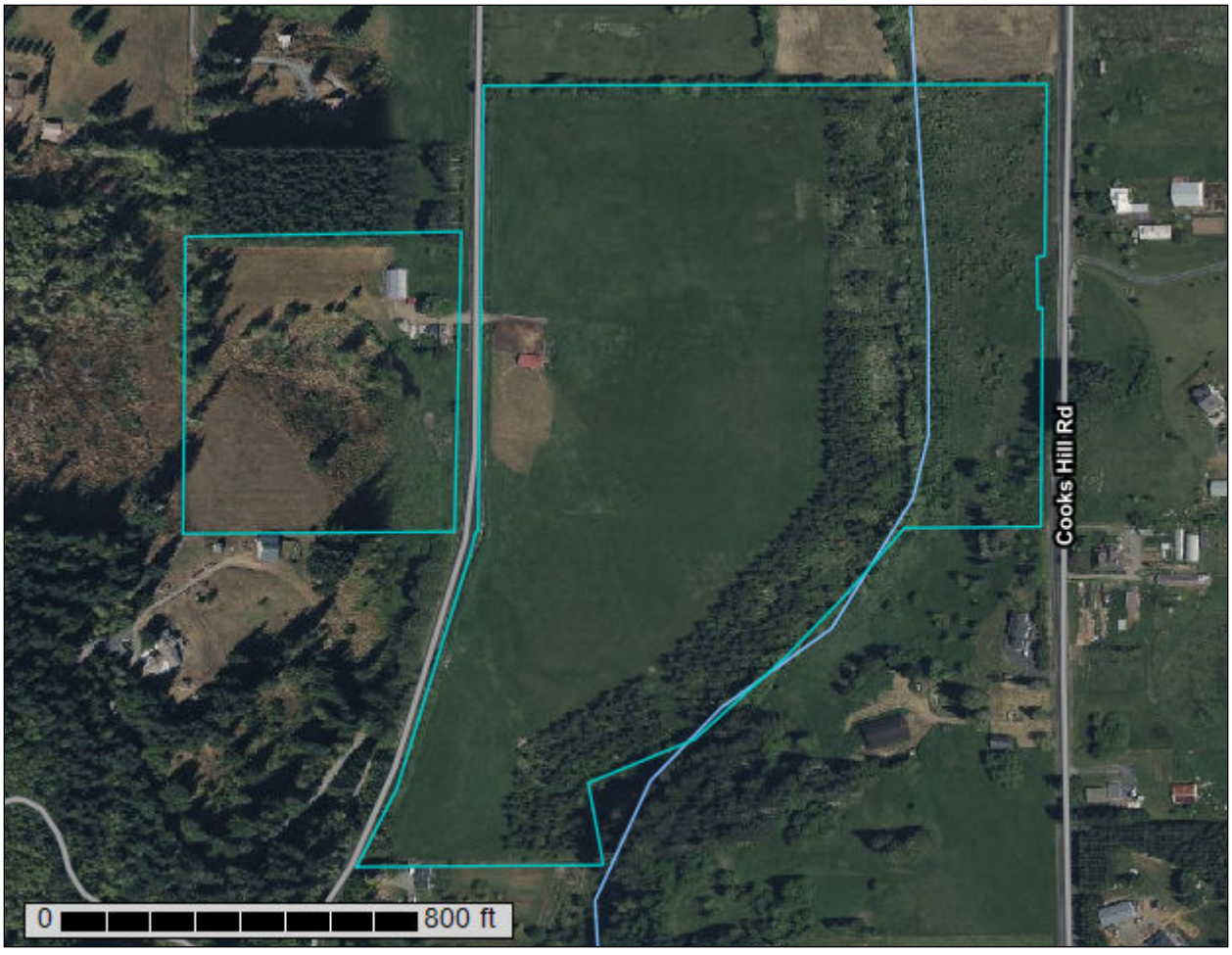
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Lewis County Area, Washington

Mattson Rd Development



October 8, 2025

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

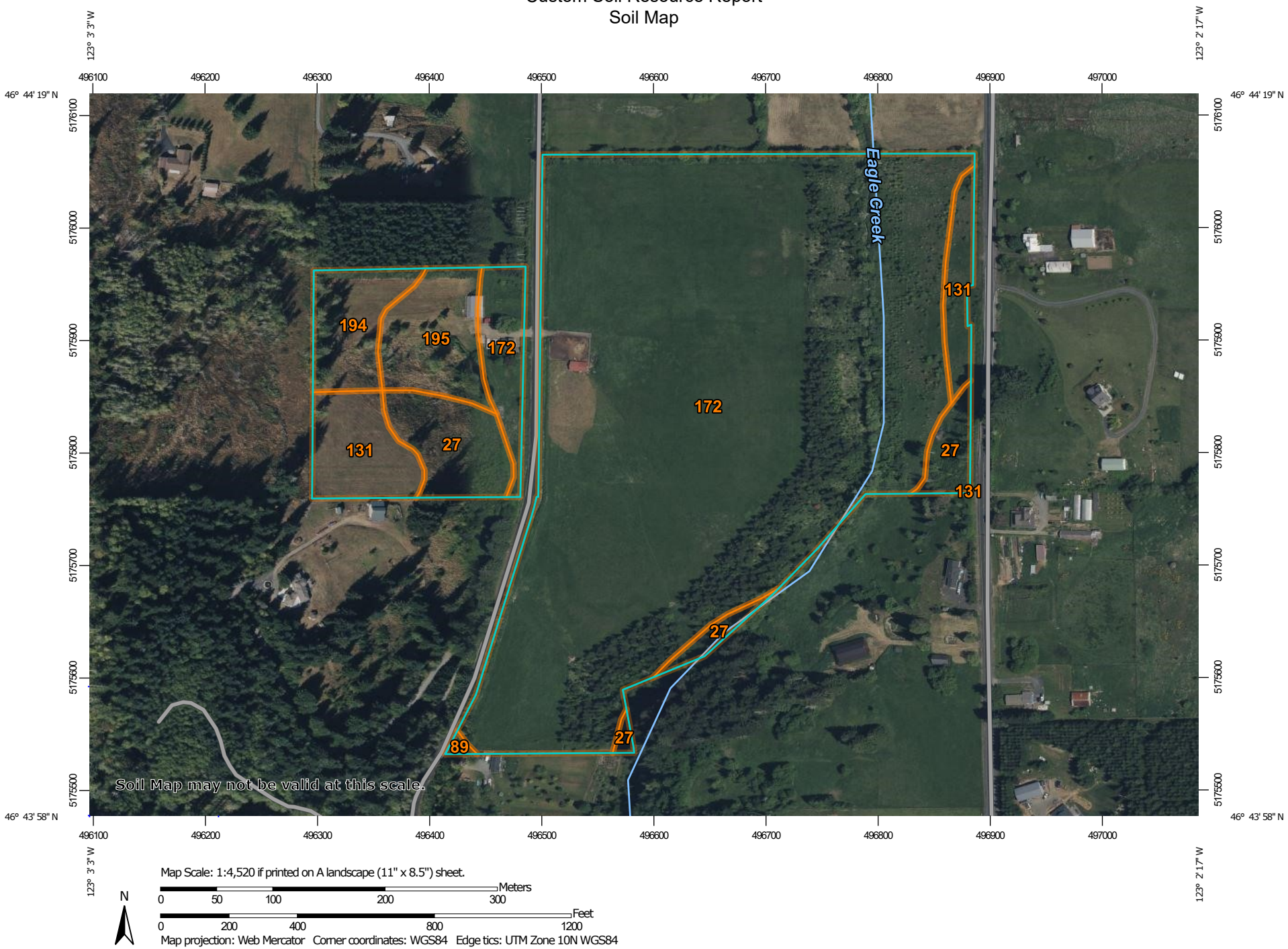
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Lewis County Area, Washington
Survey Area Data: Version 25, Aug 28, 2025

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

Date(s) aerial images were photographed: Sep 8, 2022—Aug 14, 2023

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
27	Buckpeak silt loam, 30 to 65 percent slopes	3.2	6.3%
89	Galvin silt loam, 0 to 8 percent slopes	0.1	0.1%
131	Melbourne loam, 8 to 15 percent slopes	3.0	5.9%
172	Reed silty clay loam	40.1	79.5%
194	Scamman silty clay loam, 5 to 15 percent slopes	1.8	3.6%
195	Scamman silty clay loam, 15 to 30 percent slopes	2.3	4.6%
Totals for Area of Interest		**50.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lewis County Area, Washington

27—Buckpeak silt loam, 30 to 65 percent slopes

Map Unit Setting

National map unit symbol: 2hfl
Elevation: 200 to 1,800 feet
Mean annual precipitation: 60 to 75 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 150 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Buckpeak and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Buckpeak

Setting

Landform: Mountain slopes
Parent material: Residuum and colluvium from sandstone

Typical profile

H1 - 0 to 19 inches: silt loam
H2 - 19 to 44 inches: silty clay loam
H3 - 44 to 60 inches: silty clay loam

Properties and qualities

Slope: 30 to 65 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F002XA005WA - Puget Lowlands Moist Forest
Hydric soil rating: No

89—Galvin silt loam, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2hht
Elevation: 100 to 1,770 feet
Mean annual precipitation: 40 to 70 inches

Mean annual air temperature: 52 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Galvin and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Galvin

Setting

Landform: Alluvial fans
Parent material: Alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 14 inches: silt loam
H2 - 14 to 41 inches: silty clay loam
H3 - 41 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Ecological site: F002XA005WA - Puget Lowlands Moist Forest
Forage suitability group: Seasonally Wet Soils (G001XY202WA)
Other vegetative classification: Seasonally Wet Soils (G001XY202WA)
Hydric soil rating: No

Minor Components

Alvor, undrained

Percent of map unit: 5 percent
Landform: Terraces
Other vegetative classification: Seasonally Wet Soils (G002XV202WA)
Hydric soil rating: Yes

Lacamas, undrained

Percent of map unit: 5 percent
Landform: Terraces
Other vegetative classification: Wet Soils (G002XV102WA)
Hydric soil rating: Yes

Reed, undrained

Percent of map unit: 5 percent
Landform: Flood plains
Other vegetative classification: Wet Soils (G002XV102WA)

Hydric soil rating: Yes

131—Melbourne loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2h92
Elevation: 200 to 1,200 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Melbourne and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Melbourne

Setting

Landform: Mountain slopes, ridges
Parent material: Residuum from siltstone

Typical profile

H1 - 0 to 4 inches: loam
H2 - 4 to 18 inches: clay loam
H3 - 18 to 42 inches: clay
H4 - 42 to 60 inches: clay loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F002XA005WA - Puget Lowlands Moist Forest
Forage suitability group: Soils with Moderate Limitations (G001XF603WA)
Other vegetative classification: Soils with Moderate Limitations (G001XF603WA)
Hydric soil rating: No

Minor Components

Scamman

Percent of map unit: 5 percent
Landform: Terraces
Other vegetative classification: Seasonally Wet Soils (G002XV202WA)
Hydric soil rating: No

172—Reed silty clay loam

Map Unit Setting

National map unit symbol: 2hbk
Elevation: 30 to 500 feet
Mean annual precipitation: 40 to 80 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Prime farmland if protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Reed, drained, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Reed, Drained

Setting

Landform: Flood plains, terraces

Typical profile

H1 - 0 to 6 inches: silty clay loam
H2 - 6 to 14 inches: silty clay loam
H3 - 14 to 60 inches: clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 35 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: F002XA008WA - Puget Lowlands Riparian Forest

Forage suitability group: Seasonally Wet Soils (G002XV202WA)
Other vegetative classification: Seasonally Wet Soils (G002XV202WA)
Hydric soil rating: Yes

Minor Components

Chehalis
Percent of map unit: 5 percent
Hydric soil rating: No

Alvor, undrained
Percent of map unit: 5 percent
Landform: Terraces
Other vegetative classification: Seasonally Wet Soils (G002XV202WA)
Hydric soil rating: Yes

Reed, undrained
Percent of map unit: 5 percent
Landform: Flood plains, terraces
Ecological site: F002XA008WA - Puget Lowlands Riparian Forest
Other vegetative classification: Wet Soils (G002XV102WA)
Hydric soil rating: Yes

194—Scamman silty clay loam, 5 to 15 percent slopes

Map Unit Setting
National map unit symbol: 2hcb
Elevation: 150 to 2,000 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Scamman and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Scamman

Setting
Landform: Terraces
Parent material: Residuum from outwash and sedimentary rocks

Typical profile
H1 - 0 to 6 inches: silty clay loam
H2 - 6 to 13 inches: silty clay loam
H3 - 13 to 23 inches: silty clay loam
H4 - 23 to 60 inches: silty clay

Properties and qualities
Slope: 5 to 15 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Ecological site: F002XA005WA - Puget Lowlands Moist Forest
Forage suitability group: Seasonally Wet Soils (G002XV202WA)
Other vegetative classification: Seasonally Wet Soils (G002XV202WA)
Hydric soil rating: No

Minor Components

Prather

Percent of map unit: 5 percent
Hydric soil rating: No

Lacamas, undrained

Percent of map unit: 5 percent
Landform: Terraces
Other vegetative classification: Wet Soils (G002XV102WA)
Hydric soil rating: Yes

195—Scamman silty clay loam, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2hcc
Elevation: 150 to 2,000 feet
Mean annual precipitation: 40 to 70 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Scamman and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Scamman

Setting

Landform: Ridges, mountain slopes
Parent material: Residuum from outwash and sedimentary rocks

Typical profile

H1 - 0 to 6 inches: silty clay loam
H2 - 6 to 13 inches: silty clay loam
H3 - 13 to 23 inches: silty clay loam
H4 - 23 to 60 inches: silty clay

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Ecological site: F002XA005WA - Puget Lowlands Moist Forest
Hydric soil rating: No

Minor Components

Prather

Percent of map unit: 5 percent
Hydric soil rating: No

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ATTACHMENT 2

SEISMIC DESIGN DATA

ASCE Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-16	**Latitude:**	46.736616
Risk Category:	II	**Longitude:**	-123.047292
Soil Class:	B - Rock	**Elevation:**	177.50924595916706 ft (NAVD 88)





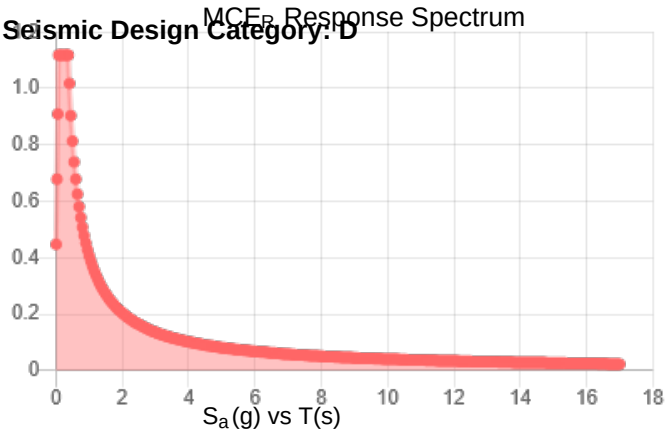
Seismic

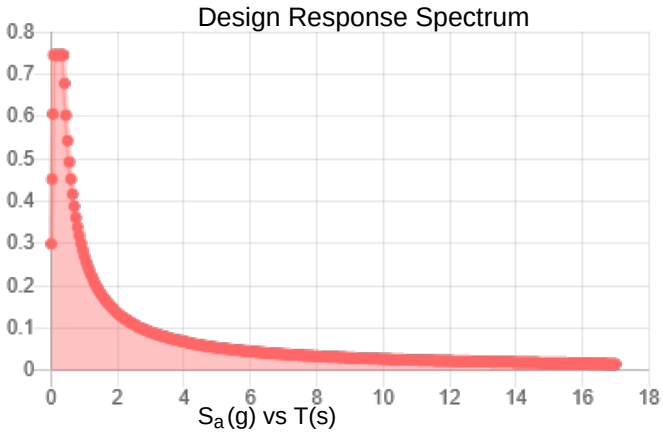
Site Soil Class: B - Rock

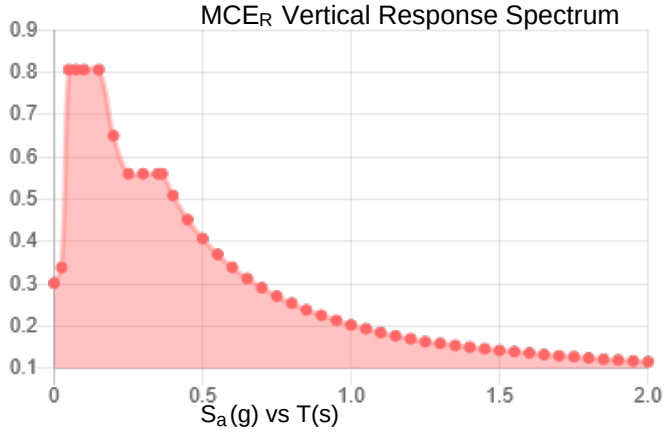
Results:

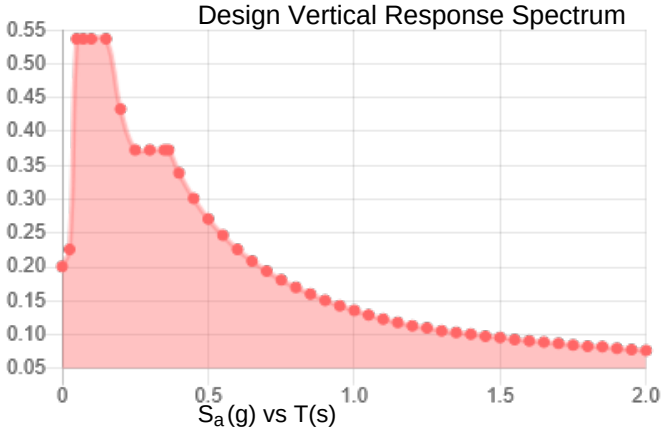
S_S :	1.244	S_{D1} :	0.271
S_1 :	0.509	T_L :	16
F_a :	0.9	PGA :	0.551
F_v :	0.8	PGA_M :	0.496
S_{MS} :	1.119	F_{PGA} :	0.9
S_{M1} :	0.407	I_e :	1
S_{DS} :	0.746	C_v :	0.9

Seismic Design Category: D









Data Accessed: **Wed Oct 08 2025**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE standard.

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ASCE Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-16	**Latitude:**	46.737336
Risk Category:	II	**Longitude:**	-123.042807
Soil Class:	D - Stiff Soil	**Elevation:**	154.76518910931003 ft (NAVD 88)





Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	1.244	S_{D1} :	N/A
S_1 :	0.508	T_L :	16
F_a :	1.003	PGA :	0.551
F_v :	N/A	PGA_M :	0.606
S_{MS} :	1.247	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1
S_{DS} :	0.831	C_v :	1.349

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Wed Oct 08 2025

Date Source: USGS Seismic Design Maps

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE Hazard Tool.

ATTACHMENT 3

DNR LANDSLIDE FACT SHEETS

Protect Your Home and Property

A Homeowner's Guide to Landslides

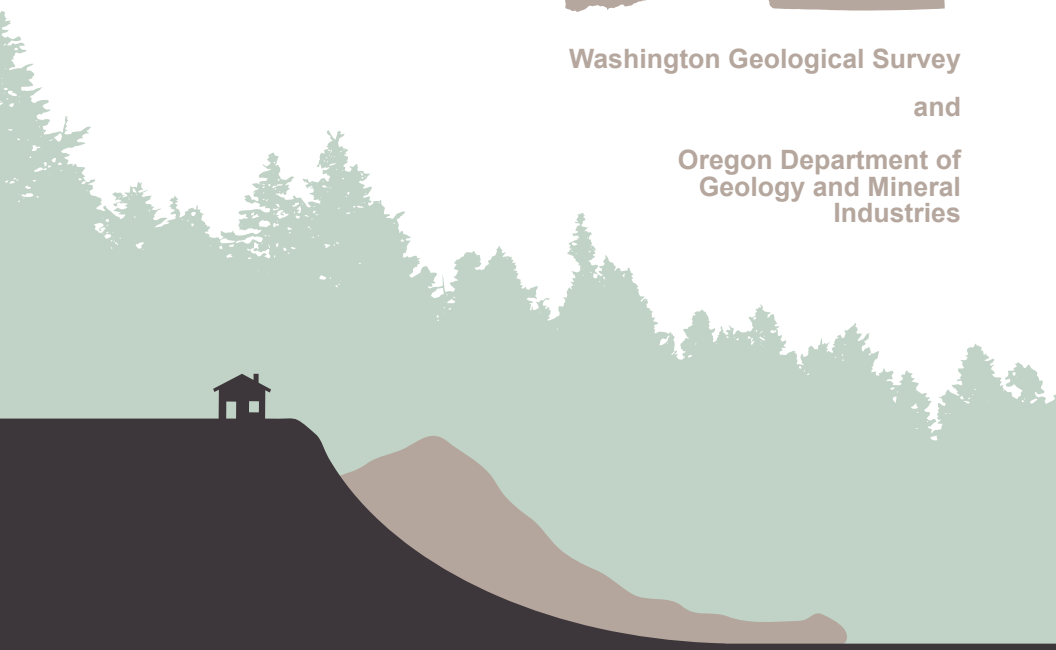
for Washington and Oregon



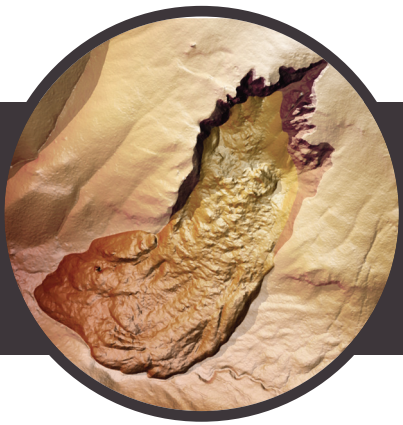
Washington Geological Survey

and

Oregon Department of Geology and Mineral Industries



LANDSLIDES ARE ONE OF THE MOST COMMON AND DEVASTATING NATURAL HAZARDS IN THE PACIFIC NORTHWEST. THE DAMAGE THEY CAUSE IS ALMOST NEVER COVERED BY INSURANCE.



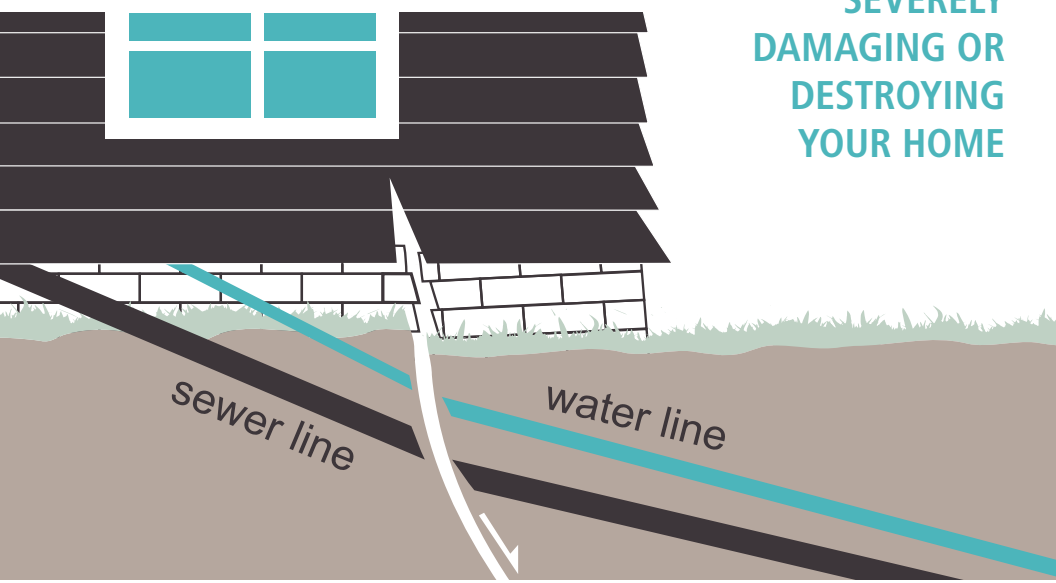
WHAT IS A LANDSLIDE?

A landslide is the downward slope movement of rock, soil, or debris.

Debris flow, earth flow, rock fall, mudflow, mudslide, slide, and slump are also terms for landslide.

WHY SHOULD I CARE?

LANDSLIDES CAN TAKE HUMAN LIFE. HOWEVER, EVEN A FEW INCHES OF SLOPE MOVEMENT CAN DISRUPT SEPTIC, SEWER, AND WATER LINES AND CRACK FOUNDATIONS, SEVERELY DAMAGING OR DESTROYING YOUR HOME



READ ON TO LEARN SEVERAL THINGS YOU CAN DO TO REDUCE YOUR RISK

COMMON TYPES OF LANDSLIDES



Rotational slides occur when rock or earth is transported downslope along a curved surface. This type of landslide can be large and damaging.





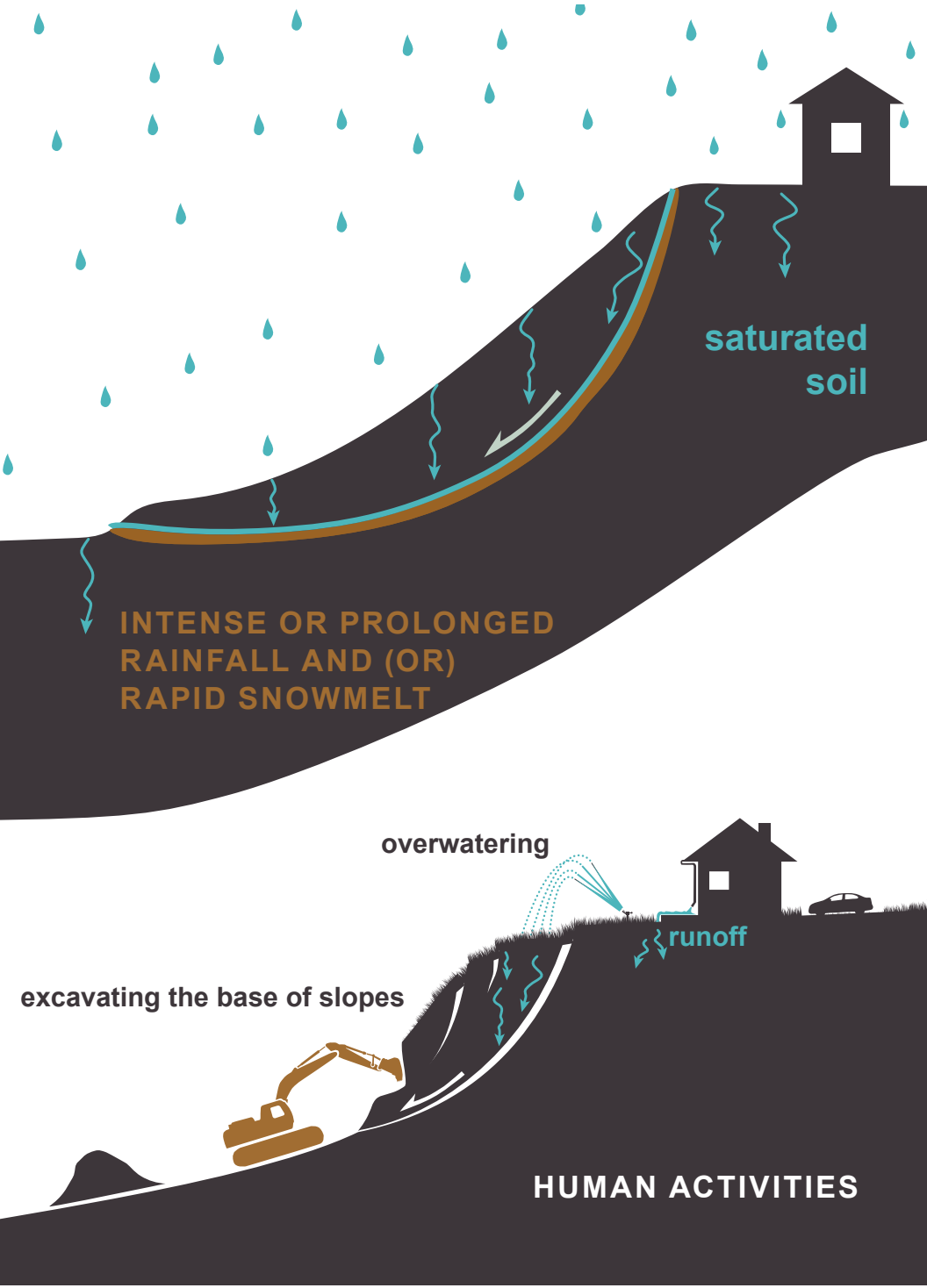
Earthflows and **debris flows** are usually rapid, downward movements of mixtures of water, soil, rock and (or) debris. Flows often occur in either water-saturated slopes or where vegetation has been removed by fire or humans.



LANDSLIDES HAPPEN IN AREAS WITH STEEP SLOPES, AND ARE TYPICALLY TRIGGERED BY EVENTS LIKE THESE

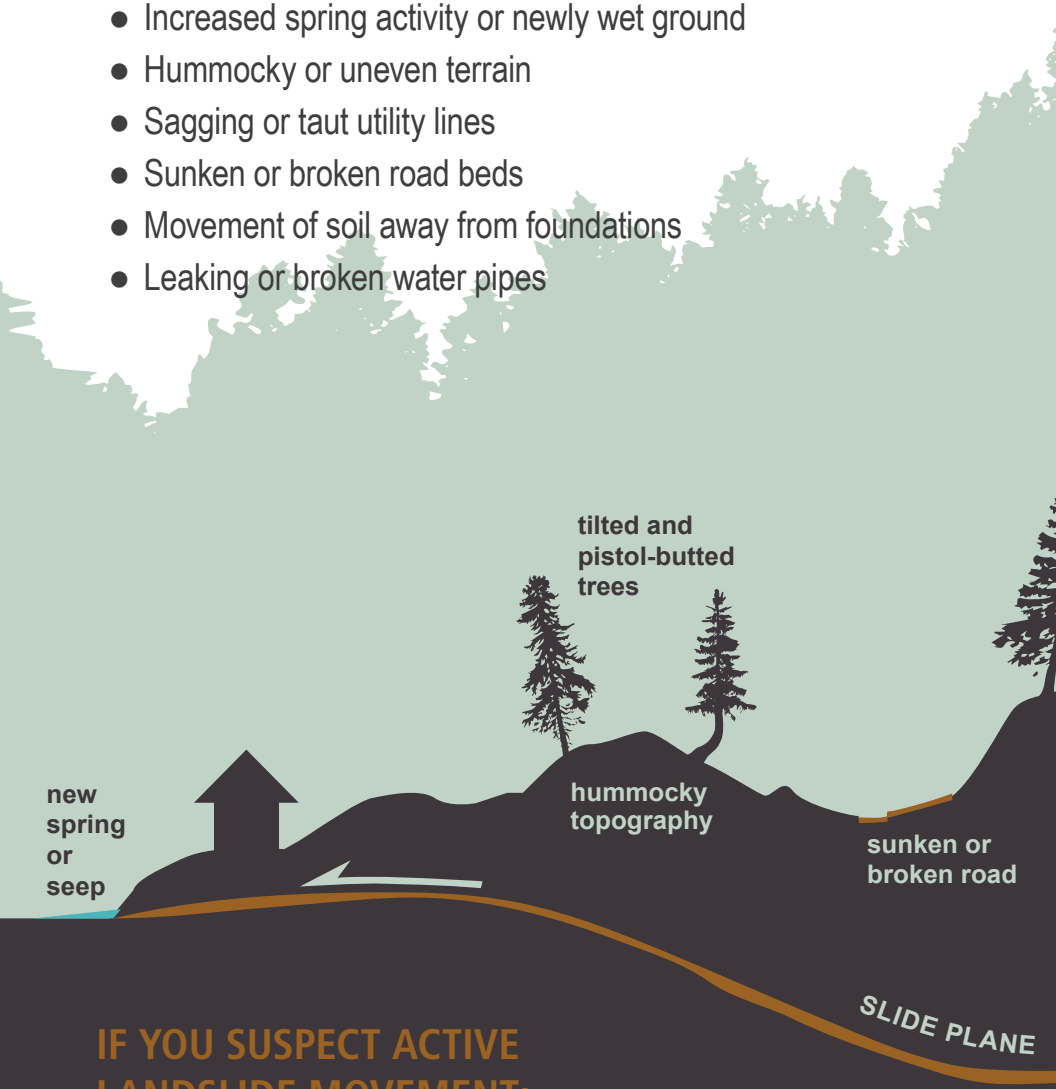





saturated soil
INTENSE OR PROLONGED RAINFALL AND (OR) RAPID SNOWMELT
overwatering
runoff
excavating the base of slopes
HUMAN ACTIVITIES

SIGNS OF LANDSLIDE ACTIVITY:

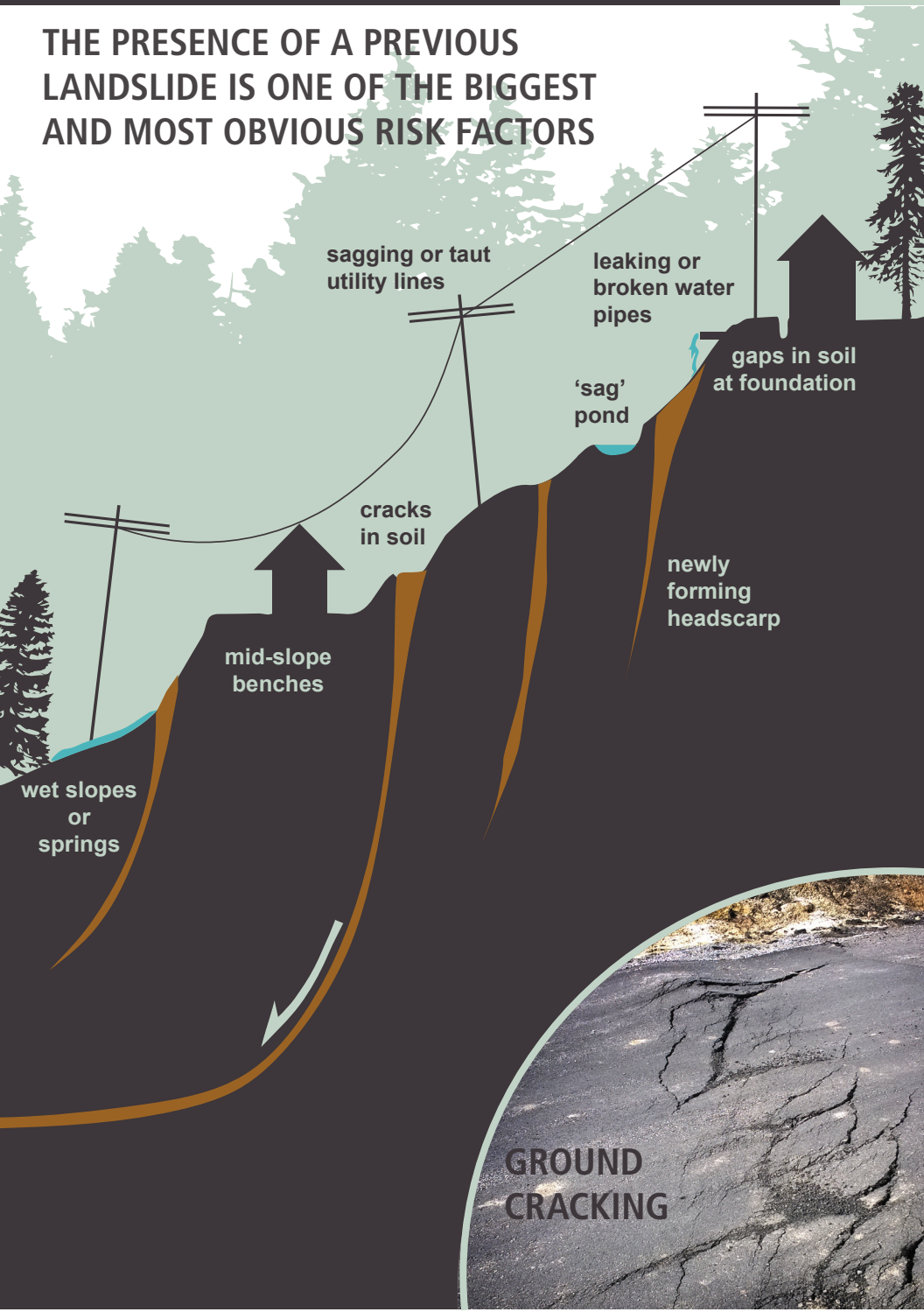
- Cracks in soil
- Tilted or bent trees
- Increased spring activity or newly wet ground
- Hummocky or uneven terrain
- Sagging or taut utility lines
- Sunken or broken road beds
- Movement of soil away from foundations
- Leaking or broken water pipes



IF YOU SUSPECT ACTIVE LANDSLIDE MOVEMENT:

EVACUATE AND CONTACT YOUR LOCAL FIRE, POLICE, EMERGENCY MANAGER, OR PUBLIC WORKS DEPARTMENT

THE PRESENCE OF A PREVIOUS LANDSLIDE IS ONE OF THE BIGGEST AND MOST OBVIOUS RISK FACTORS

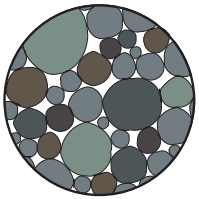


WHY IS WATER IMPORTANT?

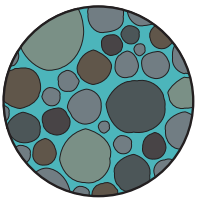
62.3 lbs

One cubic foot (7.5 gallons) of water weighs 62.3 lbs!

When water is added to a slope the weight increases the downward force, putting surrounding homes at risk



Dry soil
grains touch, increasing soil strength



Wet soil
grains pushed apart reducing soil strength

REDUCE WATER ON SLOPES:

- Maintain healthy vegetation
- Use drought-resistant plantings
- Fix leaking plumbing immediately
- Direct downspout runoff well away from slopes
- Plant trees and shrubs, which uptake water more efficiently than lawns

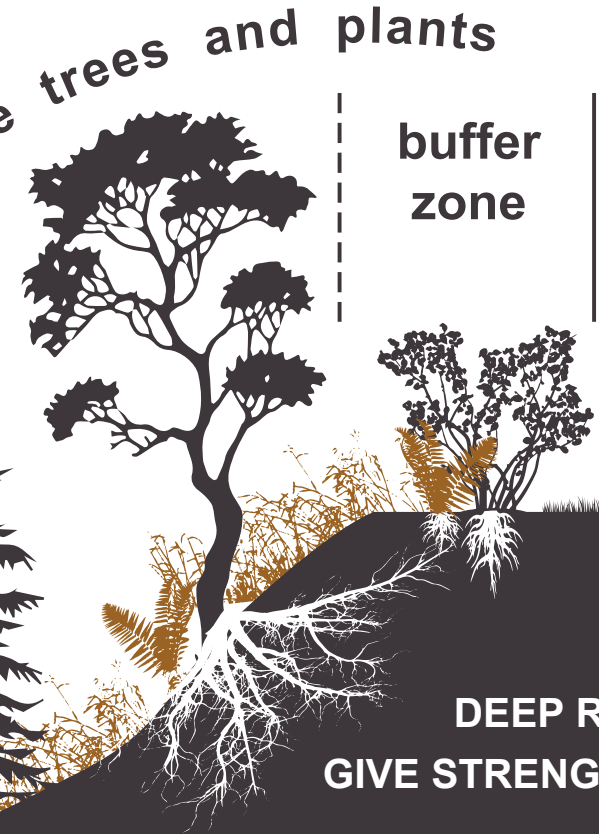


PLANT ROOTS ARE VITAL

Live tree roots strengthen slopes. After a tree is cut down, it takes between 5 and 8 years for the roots below to lose their strength.



MAINTAIN A BUFFER OF NATIVE PLANTS BETWEEN YOUR HOUSE AND THE EDGES OF STEEP SLOPES



DEEP ROOT SYSTEMS GIVE STRENGTH TO SLOPES

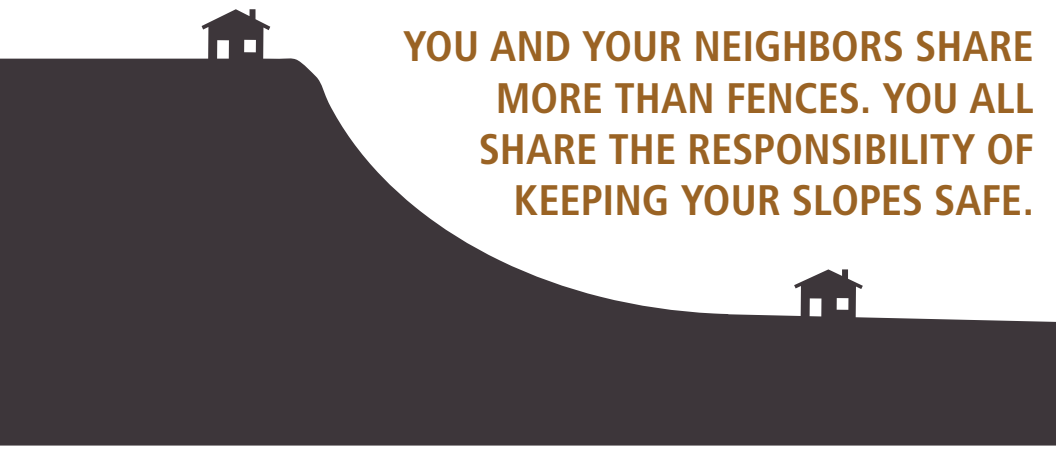
THERE ARE ACTIONS YOU CAN TAKE AS A HOMEOWNER TO REDUCE THE CHANCES OF A LANDSLIDE AFFECTING YOUR PROPERTY:

DO

- Drain water from surface runoff, downspouts, and driveways well away from slopes
- Plant native ground cover on slopes
- Consult with a professional before significantly altering existing slopes uphill or downslope of your home
- If you suspect you are on a landslide, contact a licensed engineering geologist or a geotechnical engineer for an evaluation
- Check online maps, such as SLIDO (Oregon) or the Washington Geologic Information Portal to see if you might live in a landslide area

DO NOT

- Do not add water to steep slopes
- Avoid placing fill soil on or near steep slopes
- Avoid placing yard waste or debris on steep slopes
- Avoid excavating on or at the base of steep slopes



YOU AND YOUR NEIGHBORS SHARE MORE THAN FENCES. YOU ALL SHARE THE RESPONSIBILITY OF KEEPING YOUR SLOPES SAFE.

LOOK FOR WARNING SIGNS ON YOUR PROPERTY

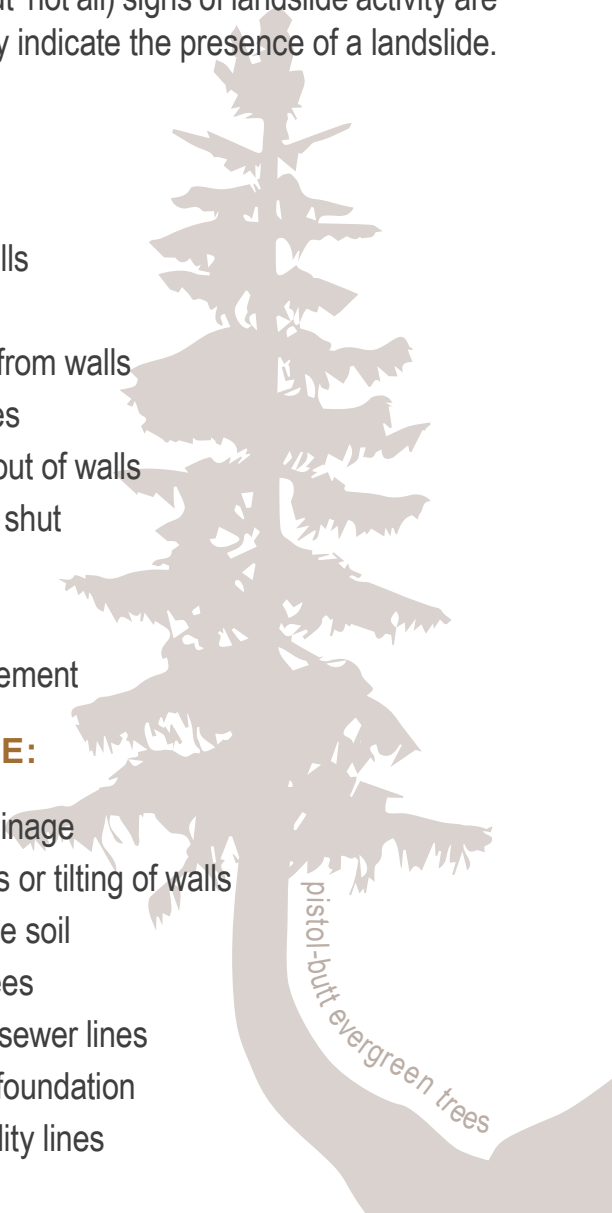
If you live on or near a steep slope, evaluate your property for signs of landslide movement. Many (but not all) signs of landslide activity are listed below. A high score may indicate the presence of a landslide.

INSIDE YOUR HOME:

- ☐ Cracks in walls
- ☐ Nails popping out of walls
- ☐ Bulging walls
- ☐ Separation of chimney from walls
- ☐ Creaking/popping noises
- ☐ Light switches coming out of walls
- ☐ Doors/windows hard to shut
- ☐ Twisted beams
- ☐ Cracks in floors
- ☐ Water seeping into basement

OUTSIDE YOUR HOME:

- ☐ Changes in surface drainage
- ☐ Bulges in retaining walls or tilting of walls
- ☐ Cracks developing in the soil
- ☐ Pistol-butted or bent trees
- ☐ Broken water, utility, or sewer lines
- ☐ Cracks in sidewalks or foundation
- ☐ Stretched or leaning utility lines

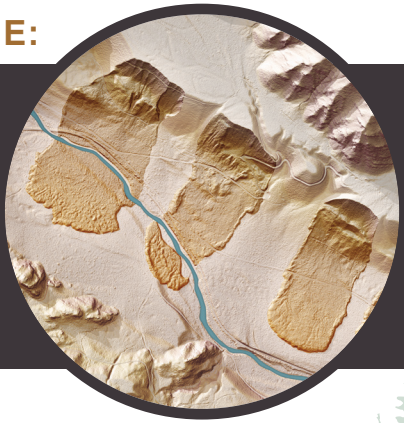


CONSULT A PROFESSIONAL BEFORE PURCHASING PROPERTY IN SLOPING AREAS

For More Information

IF YOU ARE IMPACTED BY OR SUSPECT AN ACTIVE LANDSLIDE:

- Evacuate
- Contact your local fire, police, emergency manager, or public works department
- Contact a licensed professional



LANDSLIDE RESOURCES

OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

SLIDO Landslide Information Database

www.oregongeology.org/sub/slido

WASHINGTON GEOLOGICAL SURVEY

Washington Geologic Information Portal

www.dnr.wa.gov/geologyportal

U.S. GEOLOGICAL SURVEY

Landslide Hazards Program

landslides.usgs.gov

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Slope Stabilization and Erosion Control Using Vegetation

www.ecy.wa.gov/programs/sea/pubs/93-30

THIS PAMPHLET WAS MADE IN COOPERATION WITH

Oregon Department of Geology and Mineral Industries

WASHINGTON STATE DEPT OF NATURAL RESOURCES

This pamphlet offers some general guidance a homeowner should consider regarding their home and property. Landslide conditions vary from site to site—if you are concerned about your property, it is always best to consult a professional.