



ENGINEERING NORTHWEST PLLC

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CRITICAL AREA REPORT FOR

PARCEL # 253124-000

**Submitted to:
City of Camas**

FOR:

Camvest GM LLC

7905 NE 173rd Ave

Vancouver WA 98682

GENERAL PROJECT INFORMATION

Property Owners: Camvest GM LLC
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Vancouver WA 98682

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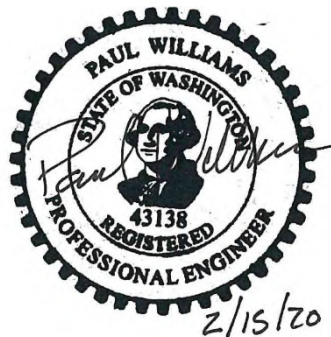


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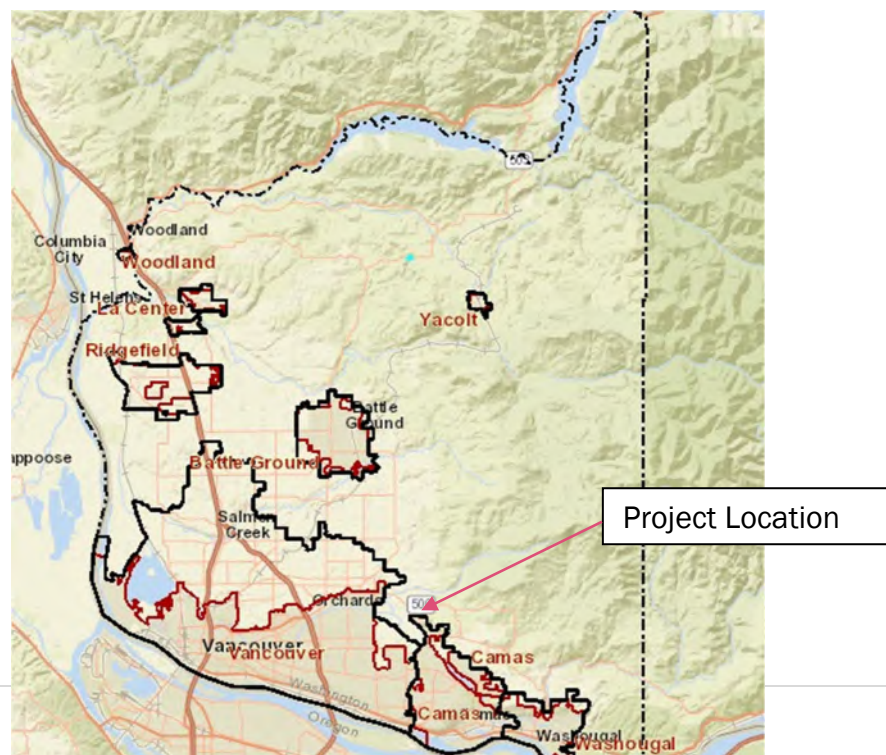
To the best of my knowledge and understanding, all information required by the City of Camas Critical Areas 16.59 and IRC 2003, and IBC 2012 is included in this submittal and the proposed project compliances with Critical Areas Protection ordinances and standards

Introduction

Engineering Northwest has prepared a geological hazard assessment report for parcel number 986043-773 in the City of Camas, Washington. The purpose of this report is to address City of Camas assessment for potential geological hazards on site and within 100 feet of the proposed home and stormwater system located within the proposed subdivision. This report is based on visual observation and review of available geologic and property information. Subsurface soil exploration was not conducted onsite. The geological hazard site investigation was conducted on November 15, 2019

Site Characteristic and Location

The parcel is located on the Southwest quarter of Section 27, Township 2 North, Range 3 East, Willamette Meridian. The parcel is identified as serial number 986043773. The site consists of approximately 7.61-acre however approximately 1.1-acre is located within a BPA easement. BPA will not allow homes to be built within BPA easement. The project is located east side of NE Ingle Road in the City of Camas, Washington. The highest ground within the parcel is located 100-feet from the southeast property corner along the east boundary line at 336 feet above mean sea level (amsl). The lowest ground within the parcel area, is located southwest corner of the property boundary line (adjacent to Ingle Road) at 260 feet above mean sea level (amsl). The approximate elevation difference between the highest elevation point and the lowest elevation point on the parcel, equates to an approximate average slope of 14.5%. Historically the parcel has large trees. As of today, parcel has good vegetation with tree growth on the parcel excluding BPA easement. The owner is proposing to construct a 14-lot subdivision.



Site Specific Soil Conditions

According to the Soils Conservation Service (SCS) manual, the soils on the site are identified below.

Symbols	Soil Name	USDA Texture
OmE	Olympic	Clay Loam

Clark County GIS indicates the site consist of mostly Olympic type of soil, which is deep, well- drained, gently sloping to very steep soils underlain by basalt bedrock. These are moderately fine textured soils that formed on mountainous foot slopes in weather igneous lava flows.

Regional Geology

Geologic Unit Age: Pleistocene

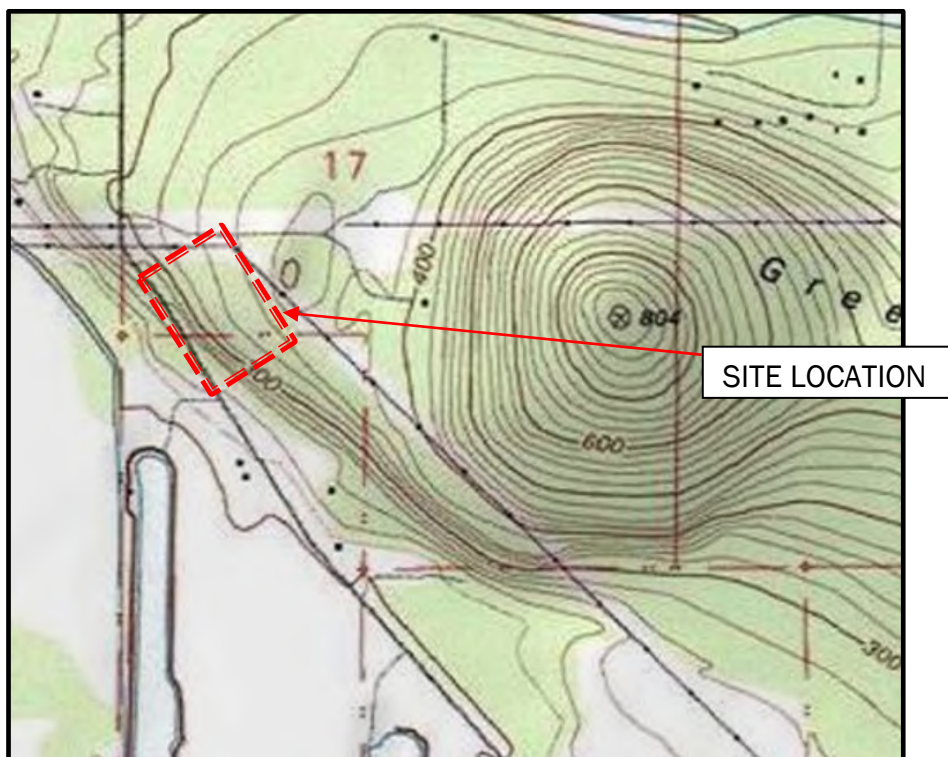
Geologic Unit Name: Basaltic andesite of Green Mountain

Unit Description: Olivine phyric basaltic andesite erupted from cinder cone at west end of Green Mountain. Light-gray, microvesicular, generally platy lava flow, extending about 1 km to northwest of Green Mountain, consists of olivine phenocrysts (2-4 percent; 0.5 to 3 mm across; contains inclusions of chromian spinel; rims variably replaced by iddingsite) in a fine-grained trachytic groundmass of plagioclase, clinopyroxene, orthopyroxene, and Fe-Ti oxide; locally contains quartzite pebbles and small, dark, fine-grained clots that may be sedimentary xenoliths, both presumably derived from underlying gravels (units QTc and Ttfc). Conical hill at west end of Green Mountain consists largely of deeply weathered basaltic ash; platy basaltic andesite lava crops out at summit and presumably fills vent. Lava flow has normal magnetic polarity (J.T. Hagstrum, written commun., 1999) and yielded an $^{40}\text{Ar}/^{39}\text{Ar}$ age of 575 ± 7 ka (table 2)

Age-Lithology: Quaternary volcanic rocks



<https://geologyportal.dnr.wa.gov/>



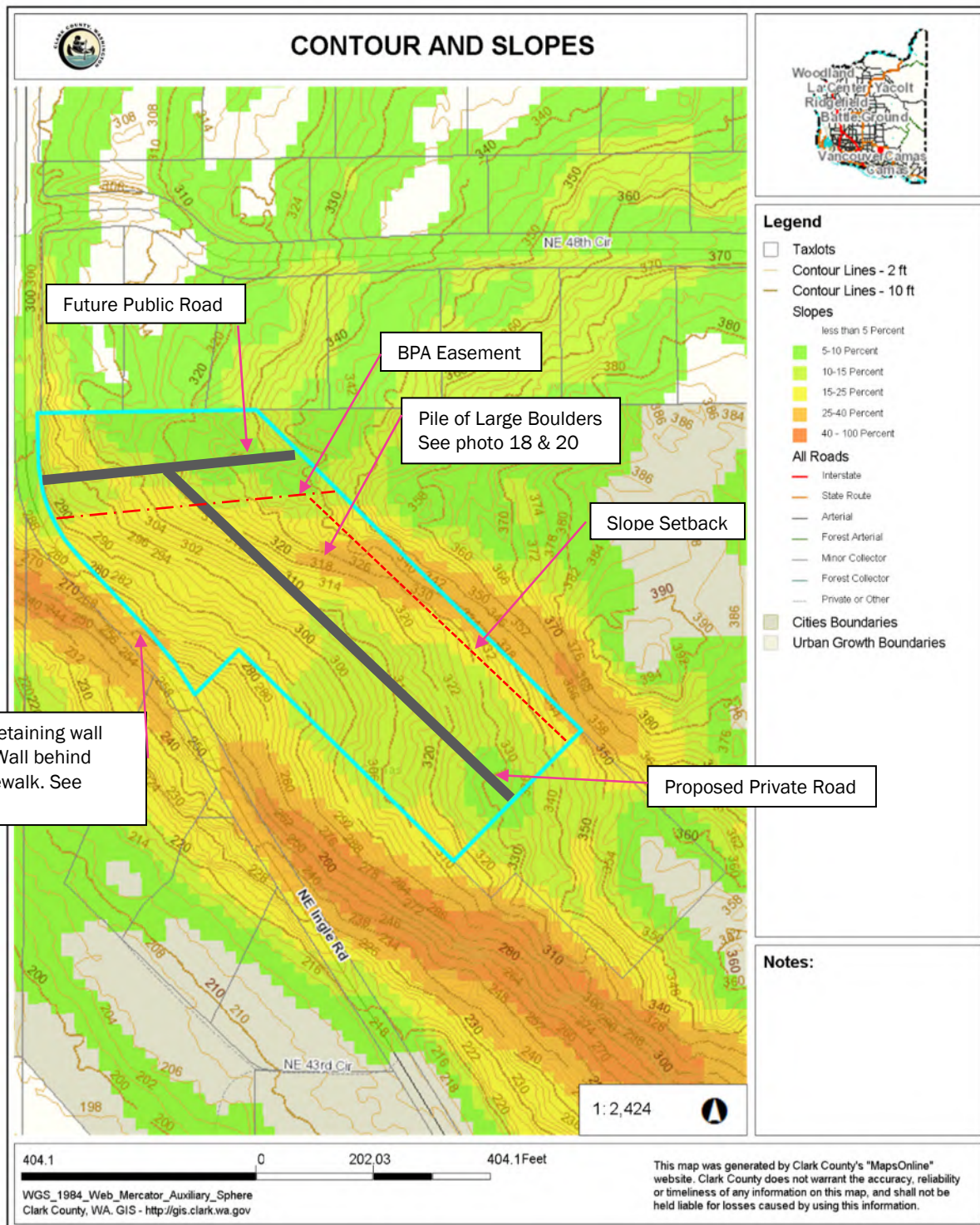
USGS National Map

Site Investigation

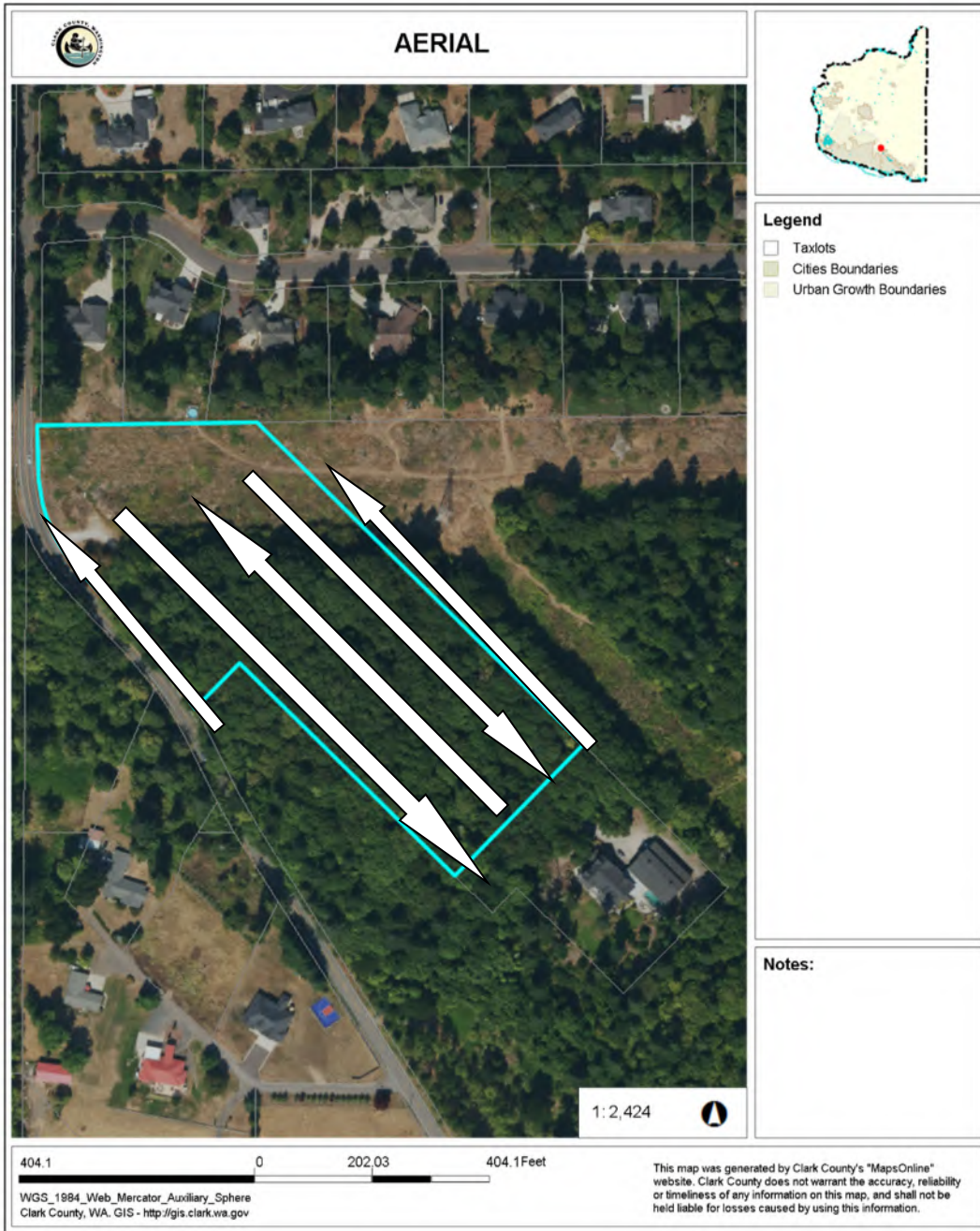
Engineering Northwest, PLLC conducted a site visit on November 15, 2019 to characterize the potential geological hazard areas on site. The proposed homes within the subdivision will set on a descending section of the parcel with a slope of 5% to 20% slope within 100 feet of the proposed home and septic system. The descending hill to the north and east of the proposed home and septic system shows no signs of movement. The parcel show NO signs of ground water seeping or running off the property line. According to Clark County GIS mapping information, the site is mapped as containing areas with slopes greater than a 15% grade. Clark County GIS does not indicate any areas on the parcel as a historical or active landslide.

Site investigation performed, included measuring the slope and reviewed the topographic survey provided by Clark County GIS. Field investigation found slope grades to the east of the proposed home site to be approximately 20% at a distance of 100' east. The slopes along the proposed structure supports vegetation consisting of young established trees and mixed understory bushes, grasses, ferns, and shrubs. No shallow groundwater seepage and no surface water was observed along the slope during the site investigation.

The proposed home and septic system will be built on an area containing 8% slopes. The slopes 100 feet down hill of the proposed home and septic system is based on filed measurements. The slope on the subject site range from more than 5% (green) to greater than 40% (dark orange) with the intermediate slope broken into categories including 5-10% (green), 10-15% (yellow-green) 15-25% (yellow) and 25-40% (light-orange).



GIS Contour and Slope Map



16.59.020 Designation of Specific Hazard Areas

- A. Erosion Hazard Areas. Erosion hazard areas are areas where there is not a mapped or designated landslide hazard, but where there are steep slopes equal to or greater than forty percent slope. Steep slopes which are less than ten feet in vertical height and not part of a larger steep slope system, and steep slopes created through previous legal grading activity are not regulated steep slope hazard areas.

The project is located within a erosion hazard Engineering Northwest PLLC recommends construction erosion control plan be submitted to the City of Vancouver for review and approval before the start of construction.

- B. Landslide Hazard Areas. Landslide hazard areas are areas potentially subject to landslides based on a combination of geologic, topographic, and hydrologic factors. They include areas susceptible because of any combination of bedrock, soil, slope (gradient), slope aspect, structure, hydrology, or other factors. Examples of these may include, but are not limited to the following:

1. Areas of previous slope failures including areas of unstable old or recent landslides;
During the field visit no visible signs of areas of unstable old or recent landslides.

2. Areas with all three of the following characteristics:

- a) Slopes steeper than fifteen percent,

The parcel does have areas of slopes greater than 15%.

- b) Hillsides intersecting geologic contacts with permeable sediment overlying a low permeability sediment or bedrock, and

- c) Any springs or ground water seepage;

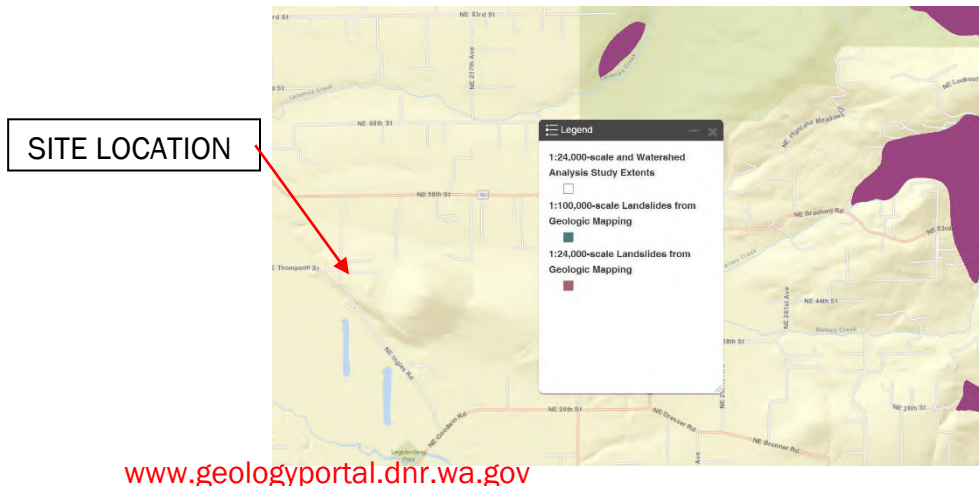
During the field visit no visible signs of springs or ground water seepage.

3. Slopes that are parallel or sub-parallel to planes of weakness, such as bedding planes, joint systems and fault planes in subsurface materials;

No subsurface investigation along the east property line to determine parallel or sub-parallel to planes of weakness. Because no subsurface investigation was conducted Engineering Northwest PLLC recommends a 15-foot setback from the project east property line. However, City of Camas zoning requires 30-foot rear setback, the future home will be located 30-feet from the project east property line. Engineering

Northwest recommends that the slope setback be 30-feet to avoid confusion with the zoning setback.

4. Areas mapped by:
- a) Washington Department of Natural Resources Open File Report: Slope Stability of Clark County, 1975, as having potential instability, historical or active landslides, or as older landslide debris, and



There are no potential instability, historical or active landslides on the parcel. The nearest known landslide area is located 1.5 miles to the east of the project site.

- b) The Washington Department of Natural Resources Open File Report Geologic Map of the Vancouver Quadrangle, Washington and Oregon, 1987, as landslides; **see above**

5. Slopes greater than eighty percent, subject to rock fall during earthquake shaking;

No slopes on the parcel are greater than 80%.

6. Areas potentially unstable as a result of rapid stream incision, stream bank erosion, and stream undercutting the toe of a slope;

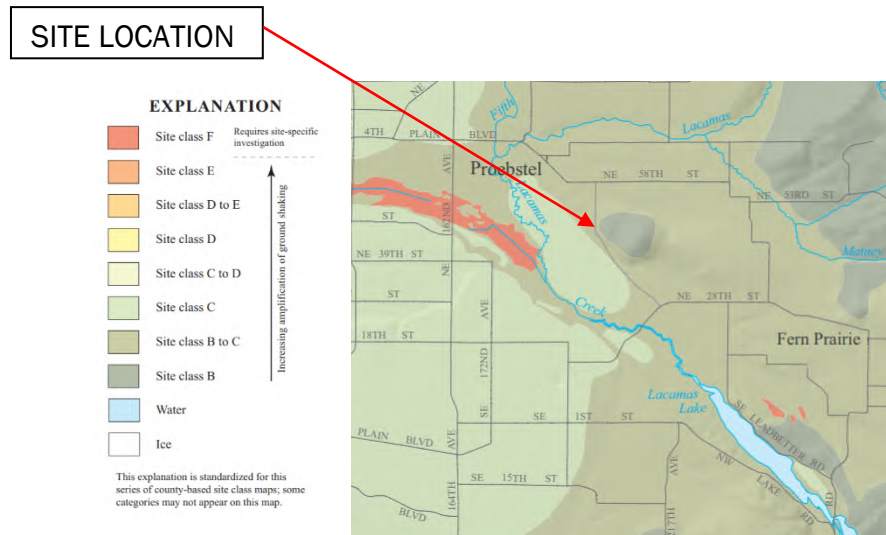
The project is not located within an area of potentially unstable as a result of rapid stream incision, stream bank erosion and stream undercutting the toe of a slope.

7. Areas located in a canyon or on an active alluvial fan, presently or potentially subject to inundation by debris flows, debris torrents or catastrophic flooding.

The project area is no located with a canyon or on an active alluvial fan.

- C. "Seismic hazard area" means an area subject to severe risk of damage as a result of earthquake-induced soil liquefaction, ground shaking amplification, slope failure, settlement, or surface faulting. Relative seismic hazard is mapped on the NEHRP site class map of Clark County, published by the Washington Department of Natural Resources.

Site class map of Clark County Washington indicated is project is located within site class B to C.



- D. Other Hazard Areas. Geologically hazardous areas shall also include areas determined by the city to be susceptible to other geological events, including mass wasting, debris flows, rock falls, and differential settlement.

The city of Camas has not indicated any additional geological hazard on the project site.

Erosion Hazard Area Assessment

Clark County GIS mapping does indicate that parcel 986043-773 contains areas identified as a severe erosion hazard area. During construction of the proposed subdivision the potential for erosion is increased. For flat to shallow-gradient portions of the site, the erosion hazard is typically low. Erosion potential generally increases in sloped areas. Soil is prone to erosion if unprotected and non-vegetated during periods of increased precipitation. Additionally, concentrated drainage or water flow over the face of slopes should be prohibited, and adequate protection against erosion is required. The following text describes erosion control measures for construction activities. Erosion can be minimized by performing construction activities during dry summer months. Site-specific erosion control measures should be implemented to address the maintenance of exposed areas. This may include silt fence, biofilter bags, straw wattles, or other suitable methods. During construction activities, all exposed areas should be well compacted and protected from erosion with visqueen, surface tactifier, or other means, as appropriate. Temporary slopes or exposed areas may be covered with straw, crushed aggregate, or riprap in localized areas to minimize erosion. Erosion and water runoff during wet weather environments may be controlled by application of strategically placed channels and small detention depressions with overflow pipe, or rock weirs.

After grading, re-distribution or replacement of organic soils stripped during construction may be used to provide a medium for re-vegetation. Once established, vegetation should be properly maintained. Disturbance to existing native vegetation and surrounding organic soil should be minimized during construction activities.

A site-specific erosion control plan, drainage plan, and BMPs should be utilized to reduce potential impacts on site soils during construction. The erosion and drainage plan recommendations should be adhered to during all construction activities. Provided the recommendations above are followed, it is our opinion that the potential for a site erosion hazard is low.

Based on reviewing the parcel, the project will need to prepare construction erosion control plan.

IBC 2012

1808.7.1 Building clearance from ascending slopes.

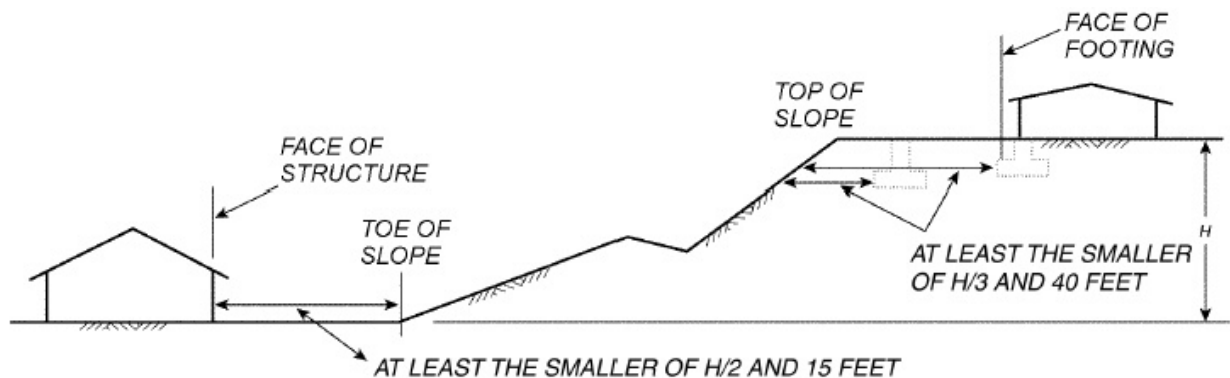
In general, buildings below slopes shall be set a sufficient distance from the slope to provide protection from slope drainage, erosion and shallow failures. Except as provided in [Section 1808.7.5](#) and Figure 1808.7.1, the following criteria will be assumed to provide this protection. Where the existing slope is steeper than one unit vertical in one unit horizontal (100-percent slope), the toe of the slope shall be assumed to be at the intersection of a

horizontal plane drawn from the top of the foundation and a plane drawn tangent to the slope at an angle of **45 degrees** (0.79 rad) to the horizontal. Where a retaining wall is constructed at the toe of the slope, the height of the slope shall be measured from the top of the wall to the top of the slope.

Based on reviewing the proposed plot plan, no additional setbacks are warranted.

1808.7.2 Foundation setback from descending slope surface.

Foundations on or adjacent to slope surfaces shall be founded in firm material with an embedment and set back from the slope surface sufficient to provide vertical and lateral support for the foundation without detrimental settlement. Except as provided for in [Section 1808.7.5](#) and Figure 1808.7.1, the following setback is deemed adequate to meet the criteria. Where the slope is steeper than 1 unit vertical in 1 unit horizontal (100-percent slope), the required setback shall be measured from an imaginary plane 45 degrees (0.79 rad) to the horizontal, projected upward from the toe of the slope.



Based on reviewing the proposed subdivision plan, Engineering Northwest PLLC recommends rear slope setback of 15-feet for lot 9 thru lot 14.

Engineering Northwest PLLC appreciates this opportunity to provide geotechnical services. Please call me at 360-931-3122 if you have any questions or need additional information.

References:

Fiksdal, A. J., 1975, Slope stability of Clark County, Washington: Washington Division of Geology and Earth Resources Open File Report 75-10, 4 p., 1 plate, scale 1:62,500.

[http://www.dnr.wa.gov/publications/ger_ofr75-10_slope_stability_clark_co_62k.pdf]

Mabey, Matthew A.; Madin, Ian P.; Palmer, Stephen P., 1994, Relative earthquake hazard map for the Vancouver, Washington, urban region: Washington Division of Geology and Earth Resources Geologic Map GM-42, 2 sheets, scale 1:24,000, with 5 p. text.

[http://www.dnr.wa.gov/publications/ger_gm42_eq_haz_urban_vancouver_24k.pdf]

Smith, Mackey, 1975, Earthquake hazards of Clark County, Washington: Washington Division of Geology and Earth Resources Open File Report 75-12, 2 p., 1 plate, scale 1:63,360.

[http://www.dnr.wa.gov/publications/ger_ofr75-12_earthquake_hazards_clark_co_62k.pdf]

Clark County GIS <http://gis.clark.wa.gov/mapsonline/?site=GeoHazards&ext=1>

International Building Code (IBC), 2012, International Code Council.

The Washington State Geologic Portal (<https://fortress.wa.gov/dnr/geology/?Site=wigm>)





PHOTO 1



PHOTO 2



PHOTO 3



PHOTO 4



PHOTO 5



PHOTO 6



PHOTO 7



PHOTO 8



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