November 21, 2022

Mr. Austin Fuller
Whipple Consulting Engineers, Inc.
21 South Pines Road
Spokane Valley, Washington 99206

RE: Geohazard Evaluation
Proposed Qualchan View Estates Plat
Spokane County Parcel Nos. 34061.0036, 34061.0038, 34061.0045, 34061.0050 (5708 South Meadow Lane), 34064.0031, 34064.0041, 34064.0046
Spokane, Washington 99224
ALLWEST Project No. 222-305G

Mr. Fuller:

ALLWEST has completed a geohazard evaluation for the Qualchan View Estates Plat in Spokane, Washington. We understand the City of Spokane considers the property to be within a geologically hazardous area. The purpose of the assessment was to address the concerns of the City of Spokane. This report presents the results of our geotechnical and geological analyses and recommendations.

Geologically hazardous areas are defined as those areas having the potential for landslide and/or erosion hazards. For a site to be classified as a geologically hazardous area, it must contain at least one of the following characteristics:

- Slopes of 30 percent or greater.
- Soils identified by the NRCS as having a severe potential for erosion.
- Existing hydraulic conditions that create a severe potential for erosion or landslide hazard.
- Anticipated changes to hydraulic conditions triggered by the proposed development that create a severe potential for erosion or landslide hazard.
- Areas historically prone to land sliding or are underlain by alluvium, landslide deposits or Latah Formation.
- Areas of uncompacted fill.
- Areas that are unstable due to stream bank erosion.

Based on review of the plat map provided to us by Whipple Consulting Engineers, Inc., it appears the City of Spokane considers the property to be in a geologically hazardous area due to the presence of slopes of 30 percent or greater and/or erodible soils. The City of Spokane requires these conditions be addressed in accordance with the Spokane County Critical Areas Ordinance (CAO) and section 17E.040 of the Spokane Municipal Code. This report presents the results of our geotechnical and geological analyses and our recommendations.
PROJECT DOCUMENTS
The following documents were provided to and reviewed by ALLWEST to help develop our understanding of the planned development. They are attached to this report.

- Preliminary Plat, Qualchan View Estates, sheets PP1, PP2, PP3, PP4, PP5, and PP6, prepared by Whipple Consulting Engineers, dated October 25, 2022.

PROJECT DESCRIPTION
The proposed development consists of subdividing seven adjacent parcels, totaling approximately 58.07 acres into 160 single-family residential lots. Specifically, the project site consists of the following Spokane County parcel numbers: 34061.0036, 34061.0038, 34061.0045, 34064.0050, 34064.0031, 34064.0041 and 34064.0046. The project site currently includes one existing single-family residential structure located on the east side of Spokane County Parcel number 34061.0050 (5708 South Meadow Lane Road). The remainder of the site consists of undeveloped, forested land.

Site development will include construction of local access roads, utility infrastructure, and stormwater management facilities. The proposed “Preliminary Plat Qualchan View Estates” plan provided by Whipple Consulting Engineers, Inc. is attached to this report.

SITE DESCRIPTION
The preliminary plat map indicates the project site is situated on a generally east facing, forested slope located in the northeast ¼ of Section 6, Township 24 North, Range 43 East of the Willamette Meridian in Spokane County. The approximate location is shown on the attached Vicinity Map (Figure 1). Approximately 50 to 60 percent of the proposed construction area is heavily forested with slopes on the order of 30 percent or more.

The property is bordered to the north, south and west by single-family residential developments. Adjacent to the east, there are three single-family residential structures, a church, and a par 3 golf course.

PUBLISHED GEOLOGIC AND SOIL CONDITIONS
The geologic conditions in the vicinity of the site are mapped on the Geologic map of the Spokane Southwest 7.5-minute quadrangle, Spokane County, Washington, by M.M. Hamilton, R.E. Derkey and D.F. Stradling, 2004. The project site is mapped as Pleistocene epoch Glacial flood deposits, predominantly gravel on the lower east half of the site and Glacial flood deposits, predominately sand on the upper west half of the site. Glacial flood deposits, predominantly gravel is described as a thick-bedded to massive mixture of boulders, cobbles, gravel and sand with localized silt beds and lenses. Glacial flood deposits, predominately sand is described as a fine to coarse sand deposit with occasional gravel, cobbles, and boulders and includes localized beds and lenses of gravel.

The USDA Natural Resources Conservation Service (NRCS) has mapped four soil types on and around the site in the Soil Survey of Spokane County:

- Marble loamy sand, 15 to 30 percent slopes
• Speigle-Rubble land-Rock outcrop complex, 30 to 90 percent slopes
• Klickson-Speigle complex, mass wasted, 15 to 30 percent slopes

The majority of north half of the project site is mapped as Marble loamy sand, 15 to 30 percent slopes. Marble loamy sand is described as a well-drained, sandy glaciofluvial deposit. The soil profile in the upper five feet is described as a loamy sand grading to sand.

Speigle-Rubble land-Rock outcrop complex, 30 to 90 percent slopes is mapped in the northeast corner and along the west side of the project site, predominately in the upper elevations. Speigle soil is described as a well-drained loess deposit mixed with volcanic ash and colluvium. The soil profile in the upper five feet is described as cobbly ashy loam grading to extremely cobbly sandy loam.

Klickson-Spiegle complex, mass wasted is mapped across the majority of the south part of the project site. Klickson, Mass Wasted and Speigle, Mass Wasted soils are both described as well-drained loess deposits mixed with minor amounts of volcanic ash over colluvium derived from basalt. The soil profile in the upper five feet is described as gravelly ashy silt loam grading to extremely cobbly loam.

All three soil types are categorized by NRCS as having a severe potential for slope erodibility. The exposed soils observed at the site appear to be consistent with the soil mapping.

SITE OBSERVATIONS
A staff geologist from our office visited the site on November 4, 2022, to observe site conditions relative to the geohazard scope of services. The geologist walked and viewed portions of the site to observe topographic and geologic features, including soil exposures.

The site is comprised of numerous valleys and ridges with slopes varying from 10 to more than 30 percent, generally sloping to the east. Total elevation change across the site is on the order of 320 feet. The site topography includes several draws predominately located in the south half of the project site. We did not observe running or standing water at the time of our site visit; however, the draws may conduct surface water during wetter times of the year.

The site is heavily forested with mature coniferous trees, deciduous trees and shrubs, and native grasses and weeds except in the middle of the north half of the site where there are sparse trees and shrubs. Minor to moderate pistol butting of some trees was observed on the west side of the project site, where the slope angles were the steepest. Multiple surficial basalt bedrock outcroppings were observed at various locations throughout the site. Surficial boulders that may have been transported during earlier mass masting events were observed at some locations.

Soil exposure was observed along road cuts and at several viewpoints throughout the site. The exposed soil consisted predominantly of silty sands. Based on our observations and review of the geologic literature, the soils appear to be correctly mapped and described by the NRCS.

CONCLUSIONS AND RECOMMENDATIONS
Slope Stability and Erosion Potential
Based on our site observations and review of the available geologic data, it is our opinion construction of the proposed development is feasible from a geohazard standpoint. It is our opinion the erosion potential at the site is moderate, with higher potential on the steeper slopes and in the draws. We did not observe signs of significant large-scale erosion of the observable soils on the site.
however, the site is well vegetated with trees, bushes, and grasses. We did not observe evidence of landslides or tension cracks on or nearby the site. The slopes appear to be stable in their current condition.

Based on observations made on site, provided plans and maps of the area, the following geohazards were identified in accordance with the Spokane Municipal Code 17E.040.030 and the Spokane County CAO:

- Slopes of 30 percent or greater. (Spokane Municipal Code 17E.040.030.B.2)
- Soils identified by the NRCS as having a severe potential for erosion. (Spokane Municipal Code 17E.040.030.A)
- Anticipated changes to hydraulic conditions triggered by the proposed development that create a severe potential for erosion or landslide hazard. (Spokane County CAO)

**Erosion and Sediment Control**

Soils exposed at the surface during the site walk consisted of loess soils which are considered to have a moderate to severe potential of erosion. Disturbance of the soils from construction activities will increase the potential for erosion. We recommend silt fence, erosion control berms, proper grading, and/or rapid establishment of new vegetation be installed or placed prior to start of any construction activities at the site. Establishment of new vegetation on exposed soils will likely be the most effective measure to reduce erosion potential during and after development.

We recommend a civil engineer be contracted to provide temporary and permanent erosion and sediment control recommendations and prepare plans. We recommend site grading be performed during the drier part of the year (summer to early fall) to reduce the potential for erosion, especially rill and gully erosion, due to stormwater events.

**Slopes**

The existing slopes showed no signs of movement (i.e. tension cracking, pistol butting or sloughing) or erosion. We recommend slopes be designed in accordance International Building Code (IBC) section 1808.7 and Appendix J and a geotechnical engineer be retained to provide recommendations for permanent slopes and setback requirements for structures.

Following the recommendations of this report and the forthcoming geotechnical recommendations will be critical to maintaining stable slopes and reducing the potential for structural damage to infrastructure and homes.

**Hydraulic Conditions**

The proposed development will affect the current hydraulic condition by concentrating runoff to swales and/or ponds, increasing the potential for erosion. A civil and/or geotechnical engineer should be retained to provide recommendations for mitigating temporary and permanent erosion potential.
REPORT LIMITATIONS

This report has been prepared to address potential geologic hazards for the proposed Qualchan View Estates preliminary plat located on Spokane County parcel numbers 34061.0036, 34061.0038, 34061.0045, 34061.0050, 34064.0031, 34064.0041 and 34064.0046 in Spokane, Washington. Our services consist of professional opinions and conclusions made in accordance with generally accepted geological engineering principles and practices in the local area at the time this report was prepared. This acknowledgement is in lieu of all warranties either expressed or implied.

REMARKS

We appreciate the opportunity to be of service on this project. If you have any questions or require additional information, please do not hesitate to contact us at (509) 534-4411.

Sincerely,

Prepared by: Ashleigh Gertsch, G.I.T.
Staff Geologist

Reviewed by: Scott Fraser, P.E.
Engineering Services Manager

Attachments:
- Figure 1, Site Location Map
- Figure 2, Viewpoint Location Map
- Figure 3, NRCS Soil Map
- Preliminary Plat Map
- Photo Log

11/21/2022
FIGURE A-1: VICINITY MAP

PROJECT: 222-305G QUALCHAN VIEW ESTATES
LOCATION: 5078 SOUTH MEADOW LANE ROAD, SPOKANE, WA
CLIENT: WHIPPLE CONSULTING ENGINEERS
DATE: NOVEMBER 2022
SCALE: 1-IN = 2,000 FT

BASEMAP SOURCE: USGS TOPOGRAPHIC MAP, SPOKANE SW QUADRANGLE
WASHINGTON-SPOKANE COUNTY, 7.5-MINUTE SERIES, DATED 2020
FIGURE A-2: EXPLORATION LOCATION MAP

PROJECT: 222-305G QUALCHAN VIEW ESTATES
LOCATION: 5078 SOUTH MEADOW LANE ROAD, SPOKANE, WA
CLIENT: WHIPPLE CONSULTING ENGINEERS
DATE: NOVEMBER 2022
SCALE: AS SHOWN
LEGEND:
2043  KLICKSON-SPEIGLE COMPLEX, MASS WASTED, 15 TO 30% SLOPES
2054  SPIEGLE-RUBBLE LAND- ROCK OUTCROP COMPLEX, 30 TO 90% SLOPES
3122  MARBLE LOAMY SAND, 15 TO 30% SLOPES

BASEMAP SOURCE:  NRCS SOIL SURVEY

FIGURE A-3: NRCS SOIL SURVEY MAP

PROJECT:  222-305G QUALCHAN VIEW ESTATES
LOCATION:  5078 SOUTH MEADOW LANE ROAD, SPOKANE, WA
CLIENT:  WHIPPLE CONSULTING ENGINEERS
DATE:  NOVEMBER 2022
SCALE:  AS SHOWN

ALLWEST
16617 E. Euclid Ave., Bldg A
Spokane Valley, Washington
(509) 534-4411
www.allwesttesting.com
Site Photographs
Site Name: Qualchan View Estates
ALLWEST Project No. 222-305G
Date Taken: November 4, 2022

Photo #1  View of the project site, along the side of the private roadway. (VP-1, facing northwest)

Photo #2  View of the private drive through the site, with up to 20% slope angle. (VP-2, facing northwest)

Photo #3  View of the developed property located at 5708 South Meadow Lane Road. (VP-3, facing east)

Photo #4  View of a relic demolished structure on project site. (VP-4)
Site Name: Qualchan View Estates
ALLWEST Project No. 222-305G
Date Taken: November 4, 2022

Photo #5  View of the portion of Spokane County parcel number 34061.0045, that is mostly devoid of trees. Slopes are approximately 5-10%. (VP-5, facing south)

Photo #6  View of the portion of Spokane County parcel number 34061.0045, that is mostly devoid of any trees. Slopes are approximately 5-10%. (VP-5, facing east)

Photo #7  View of forested slope along western property boundary. Slope ranges up to 50% along the ridge. (VP- 6, facing northeast)

Photo #8  View of a valley, sloping in the east direction. (VP- 7, facing west)
Site Photographs
Site Name: Qualchan View Estates
ALLWEST Project No. 222-305G
Date Taken: November 4, 2022

Photo #9  View of slopes, approximately 20%. (VP-6, facing south)

Photo #10  View of slopes, approximately 20-25%. (VP-8, facing south)

Photo #11  View of forested slopes, approximately 10% slope angle. (VP-9, facing southeast)

Photo #12  View of slope on parcel 34061.0050. (VP-8, facing east)
Site Photographs
Site Name: Qualchan View Estates
ALLWEST Project No. 222-305G
Date Taken: November 4, 2022

Photo #13  View of slopes along western property boundary. (VP- 10, facing north)

Photo #14  View of slopes along western property boundary. (VP- 6, facing north)

Photo #15  View of slopes along western property boundary. (VP- 11, facing south)

Photo #16  View of slopes along western property boundary. (VP- 10, facing northeast)
Site Photographs
Site Name: Qualchan View Estates
ALLWEST Project No. 222-305G
Date Taken: November 4, 2022

Photo #17  View of slope (VP- 12, facing north)

Photo #18  View of slopes (VP- 11, facing south)

Photo #19  Exposed fine-grained soil (VP- 13)

Photo #20  Exposed fine-grained soil (VP- 14)
Site Photographs
Site Name: Qualchan View Estates
ALLWEST Project No. 222-305G
Date Taken: November 4, 2022

Photo #21  View of exposed soil near relic demolished structure (VP- 6)

Photo #22  Exposed fine-grained soil (VP-15)

Photo #23  View of colluvial material along road cut. (VP- 15, facing northwest)

Photo #24  View of a colluvial deposit. (VP-16)
Photo #25  View of a colluvial deposit (VP-17)

Photo #26  View of a colluvial deposit (VP-12)

Photo #27  View of a surficial basalt haystack along western property boundary. (VP-18, facing south)

Photo #28  View of an exposed basalt outcrop, with dip oriented towards the slope. (VP-8, facing north)
Site Photographs  
Site Name: Qualchan View Estates  
ALLWEST Project No. 222-305G  
Date Taken: November 4, 2022

Photo #29  View of surficial basalt haystack, along western property boundary. (VP-11, facing north)

Photo #30  View of trees with curved trunks. (VP-18)

Photo #31  View of trees with curved trunks (VP-17)

Photo #32  Trees. (VP-10, facing north)
**Site Name:** Qualchan View Estates  
**ALLWEST Project No.** 222-305G  
**Date Taken:** November 4, 2022

**Photo #33** View of northern adjoining residential properties. (VP-19, facing northeast)

**Photo #34** View of northern adjoining residential properties. (VP-19, facing north)

**Photo #35** View of the eastern adjoining property, known as Eagle Ridge Golf Course. (VP-20, facing southwest)

**Photo #36** View of vacant field located at the eastern adjoining property, located at 5702 South Meadow Lane Road. (VP-21, facing north)
Site Photographs
Site Name: Qualchan View Estates
ALLWEST Project No. 222-305G
Date Taken: November 4, 2022

Photo #37  View of northeastern adjoining property, located at 5408 South Inland Empire Way (VP-22, facing west)

Photo #38  View of eastern adjoining property, known as St. John’s Evangelical Lutheran Church (VP-20, facing northwest)

Photo #39  View of southern adjoining residential properties. (VP-23, facing southwest)

Photo #40  View of the southern adjoining residential properties. (VP-24, facing south)
Site Photographs
Site Name: Qualchan View Estates
ALLWEST Project No. 222-305G
Date Taken: November 4, 2022

Photo #41  View of the southern adjoining residential properties (VP-25, facing south)

Photo #42  View of the western adjoining residential properties. (VP-26, facing northwest)

Photo #43  View of the western adjoining residential properties. (VP-27, facing northwest)