# Geologically Hazardous Areas Report

Eagle Bluff Subdivision

Prepared For:
**Harley C. Douglass, Inc.**

Prepared By:
**Inland Empire Geotech, LLC**

June 2, 2025

Harley C. Douglass, Inc.
5520 N. Florida St.
Spokane, WA 99217-5018

Attention: Mr. Harley C. Douglass

**Subject:** **Geologically Hazardous Areas Report**
Eagle Bluff Subdivision
S. Meadow Lane Rd.
Spokane, Washington
IEG Project No. 25-024

Mr. Harley C. Douglass,

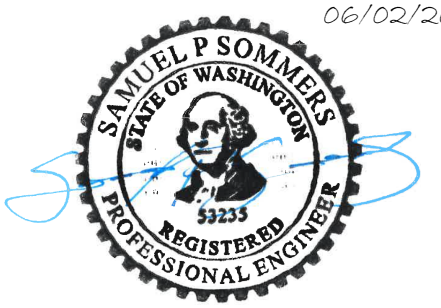
At your request, Inland Empire Geotech (IEG) has completed the geologically hazardous areas evaluation for the new single-family and multi-family residential subdivisions located at S. Meadow Lane Rd. in Spokane, Washington. The purpose of this evaluation was to characterize the soil and geologic conditions on the property and prepare the attached report presenting our professional opinions on the presence of geologically hazardous areas on the project site and if present, how to mitigate these areas.

Our services were completed in general accordance with our Proposal for Geotechnical Engineering Services (Proposal No. 25-024) dated March 21, 2025. Written authorization to proceed on our proposed scope of services was also provided by Harley C. Douglass, Inc. on April 3, 2025.

We appreciate the opportunity to support your project. If you have any questions or need additional information, please call us at 206.930.9205.

Sincerely,
**Inland Empire Geotech**

06/02/2025




**Samuel P. Sommers, P.E. (WA, ID, MT, OR)**
**Principal Geotechnical Engineer**

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## Project Documents

The following documents were provided to and reviewed by IEG to help develop our understanding of the planned construction:

- [1] Preliminary Plat Cover Sheet, prepared by J.R. Bonnett Engineering, dated March 2025.
- [2] Preliminary Plat Overall Site Plan, prepared by J.R. Bonnett Engineering, dated March 2025.

## Project Understanding

We understand the planned development will consist of 374 single-family lots and 9 multi-family lots are planned on the site. The project site consists of 11 acres totaling approximately 106.59-acres of undeveloped land. Associated roads, stormwater disposal facilities, and utility infrastructure will also be constructed as part of the development.

## Site Conditions

Based on the provided topographic information, the majority of the site slopes from west to east with a total relief of approximately 120 feet across the site. On the north end of the project site, there are steep slopes that generally range from 1H:1V to 1.5H:1V. We anticipate site cut and fill will be on the order of 30 feet or more to achieve the desired grades. The site is moderately vegetated with abundant bushes and a variety of evergreen trees ranging up to 12 inches in diameter. The property is currently in the process of being developed. Roads and utilities are being constructed throughout the site. The general location of the project site is shown on Figure A-1 – Vicinity Map in Appendix A.

### Subsurface Conditions

**Anticipated Subsurface Conditions**
The geologic conditions in the vicinity of the subject property are mapped on the "Geologic Map of the Spokane Southwest 7.5-minute Quadrangle, Spokane County, Washington" prepared by Michael H. Hamilton, Robert E. Derkey, and Dale F. Stradling, 2004.

The mapping indicates the site may be underlain by the following geologic units:

- Glacial flood deposits, predominantly sand (Qfs) – This unit of the Pleistocene epoch is described as medium-fine to coarse-grained sand and granules with sparse pebbles, cobbles, and boulders.
- Glacial flood deposits, predominantly gravel (Qfg) – This unit of the Pleistocene epoch is described as thick-bedded to massive mixture of boulders cobbles, pebbles, granules, and sand.
- Glacial lake and glacial flood deposits, undifferentiated (Qglf) – This unit of the Pleistocene epoch is described as fine-grained, massive, and thin-bedded lake deposits of sand and silt interbedded with irregularly distributed glacial-flood sand and gravel.

The USDA Natural Resources Conservation Service (NRCS) has mapped the soil on the property as the following units grading from southwest to northeast:

| Soil Unit | Soil Name | Slopes (per NRCS) | K Factor, Whole Soil |
|---|---|---|---|
| 3057 | Hagen Ashy Sandy Loam | 3 to 8 percent | 0.28 |
| 2052 | Brincken, moist-Speigle complex, mass wasted | 8 to 25 percent | 0.37 |
| 3054 | Speigle-Rubble land-rock outcrop complex | 30 to 90 percent | N/A |
| 3120 | Marble loamy sand | 0 to 8 percent | N/A |

The areas of NRCS mapping are presented on Exhibit A-2 – NRCS Mapping.

### Site Observation

A geotechnical engineer from IEG visited the site on April 16 and 17, 2025 and May 30, 2025, to observe site conditions relative to the geohazard scope of services. The engineer 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 40 percent, generally sloping to the east and north. Total elevation change across the site is on the order of 150 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 was previously logged removing most of the trees. Moderate deciduous trees and shrubs, and native grasses and weeds cover most of the site. No signs of landsliding were observed, tress around the project site were generally straight and we did not observe barren or eroded soil. Basalt rock was exposed in some placed, likely boulders transported as part of very old mass wasting deposits (colluvium).

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

We expect the proposed construction to be feasible on the project site provided a full geotechnical evaluation is performed to provide recommendations for

### Geologic Hazardous Areas

As part of our services, we evaluated the presence of geologically hazardous areas (GHAs) at the site. Geologically hazardous areas are defined by the Spokane Municipal Code Section 17E.040.030:

Erosion Hazard Areas (EHAs): EHAs are defined as “at least those identified by the U.S. department of agriculture natural resource conservation service (NRCS) as having a severe rill and interrill erosion hazard.”

We used the modified version of Universal Soil Loss Equation (USLE) outlined in Section 11.20.090 L Appendix L in the CAO which states “The index is a product of K times the average slope of the map unit (K*avg. slope). Slight has an index of less than or equal to 3.0 (less than 5 tons/acre/yr.), moderate has an index of 3.0 to 4.0 (5 to 8 tons/acre/yr.), and severe has and index greater than 4.0 (greater than 8 tons/acre/yr.)” to determine whether soils pose a severe potential for erosion. Based on K Factors in the table above, slopes greater than 10.8 percent in NRCS map unit 2052 and 14.3 percent in NRCS map unit 3057 pose severe potential for erosion. It is our opinion that based on the proposed development of the site, the only areas that pose severe erosion potential would be along the south half of the eastern boundary of the site where high slopes exist as well as the soil types with higher erosion potential.

Landslide Hazard Areas (LHAs): Landslide hazard areas are potentially subject to landslides based on a combination of geologic, topographic, and hydrologic factors. These include areas susceptible to landslides because of any combination of bedrock, soil, slope, structure, hydrology, or other factors. Classifications of landslide hazard areas include:

1. slopes greater than eighty percent subject to rockfall during seismic shaking;
2. any area with a slope of thirty percent or greater;
3. areas with all three of the following characteristics:
   a. Slopes greater than fifteen percent.
   b. Steep hillsides intersecting permeable sediment overlying an impermeable sediment or bedrock; and
   c. Evidence of perennial or intermittent springs or ground water seepage.
4. slopes that are parallel or sub-parallel to planes of weakness (such as bedding-planes, joint systems and fault planes) in subsurface materials;
5. areas of previous failures identified by the NRCS as having a severe limitation for building site development;
6. areas of previous failures designated on department of natural resources (DNR) maps as landslides;
7. areas potentially unstable as a result of bank carving and erosion or areas located in a canyon or on an active alluvial fan subject to inundation by debris flows or catastrophic flooding;
8. areas of the Latah formation (sedimentary layers of clay interlain between basalt flows) that are subject to landslides;
9. areas of uncompacted fill;
10. sloped areas exhibiting recent erosion or mass-wasting landslide activity such as gullies, piping and surfaces devoid of all vegetation;
11. sloped areas greater than fifteen percent with previous levels of development that may have changed sloped stability. Slope characteristics may have changed due to removal of vegetation, the removal and disturbance of soil or a change in surface geology, and modification to underlying geology. Slopes may also experience increased water content and corresponding increase in weight and change in soil friction characteristics due to increased irrigation.
12. sloped areas exhibiting high rates of creep as evidenced by trees with curved trunks, fence posts angled downslope or retaining walls that are angled downslope or broken.

Based on the topography, some of the areas of the site exceed 30 percent slope and therefore meet the definition of a SHA.

## General Performance Standards

From Spokane Municipal Code Section 17E.040.100: The following standards must be met for all development within geologically hazardous areas and associated buffers as classified in this chapter.

A. The development shall not increase surface water discharge or sedimentation to adjacent properties beyond.
B. The development shall not create adverse impacts on surrounding properties. These impacts include but are not limited to increases or decreases in water characteristics, deposition or removal of earth material, or changes that would harm the growth of existing vegetation.
C. Alterations to the site shall not adversely impact other critical areas occurring on- or off-site.
D. The proposed development shall not decrease the factor of safety for landslide occurrences below the limits of 1.5 for static conditions and 1.2 for dynamic conditions. Analysis of dynamic conditions shall be based on a minimum horizontal acceleration as established by the current version of the International Building Code.
E. Structures and improvements shall minimize alterations to the natural contour of the slope and the foundation shall be tiered where possible to conform to existing topography. Terracing of the land shall be kept to a minimum to preserve natural topography where possible. Structures and improvements shall be

located to preserve the most critical portion of the site and its natural landforms and vegetation. All development should be designed to minimize impervious lot coverage.

F. Roads, walkways, and parking areas shall be designed parallel to topographic contours with consideration given to maintaining consolidated areas of natural topography and vegetation.

G. Unless otherwise provided or as part of an approved alteration, removal of vegetation from an erosion or landslide hazard area or related buffer shall be prohibited. Removal of vegetation, including trees, shrubs, grasses, and forbs shall be the minimum required for construction. Any replanting that occurs shall consist of trees, shrubs and ground cover that is compatible with the existing surrounding vegetation, meets objectives of erosion prevention and site stabilization and does not require permanent irrigation for long term survival.

H. Structures and improvements shall be clustered where possible. Driveways and utility corridors shall be minimized through the use of common access drives and corridors where feasible. Access shall be in the least sensitive area of the site.

I. Point discharges from surface water facilities and roof drains onto or upstream from an erosion or landslide hazard area shall be prohibited except as follows:
    1. Conveyed via continuous storm pipe downslope to a point where there are no erosion hazards areas downstream from the discharge.
    2. Discharged at flow durations matching predeveloped conditions, with adequate energy dissipation, into existing channels that previously conveyed stormwater runoff in the predeveloped state; or
    3. Dispersed discharge upslope of the steep slope onto a low-gradient undisturbed buffer demonstrated to be adequate to infiltrate all surface and stormwater runoff, and where it can be demonstrated that such discharge will not increase the saturation of the slope.

J. On-site sewage disposal systems, including drain fields, shall be prohibited within erosion and landslide hazards areas and related buffers when sewer is available within two hundred feet or as otherwise provided by chapter 13.03 SMC.

## Geohazard Mitigation

As detailed in the preceding sections, the subject site is designated as an erosion hazard area and contains slopes that meet the criteria for classification as landslide hazard areas. Accordingly, implementation of the applicable General Performance Standards is warranted to mitigate the identified geohazards.

Although portions of the site fall within mapped Geologically Hazardous Areas (GHAs), it is our professional opinion that the proposed development is technically feasible. Site constraints can be effectively addressed through appropriate geotechnical and civil design, construction practices, and independent third-party verification during key phases of development.

Civil and structural engineering design shall account for site-specific conditions, including highly erodible soils and areas subject to seasonal surface water ponding. Special attention will be required in the design and placement of utilities, roadways, and structural foundations in or near these zones.

The application of standard construction Best Management Practices (BMPs), in combination with preservation of existing surface drainage patterns, is expected to be sufficient to control sediment transport and minimize erosion during and after construction. Dust suppression measures will be necessary during earthwork and extended dry periods to maintain air quality and visibility.

It is recommended that qualified professionals be retained to complete detailed erosion and sediment control planning, civil and stormwater design, and geotechnical investigation and analysis in support of final design and permitting.

## EVALUATION LIMITATIONS

This report has been prepared to assist the planning and design for the Eagle Bluff Subdivision project located at S. Meadow Lane Rd. in Spokane, Washington. Reliance by any other party is prohibited without the written authorization of IEG. Our services consist of professional opinions and conclusions made in accordance with generally accepted geotechnical engineering principles and practices in the local area at the time this report was prepared. It is important to understand that geotechnical recommendations are not warranties or guarantees of perfection. Certain architectural or cosmetic imperfections may occur and are often unavoidable due to the inherent variability of subsurface conditions and construction processes. By authorizing us to serve as the geotechnical engineer of record for your project, you acknowledge and accept that perfection is neither realistic nor expected. This acknowledgement is in lieu of all warranties, express or implied.

# Appendix A

# Vicinity Map
# NRCS Mapping


INLAND EMPIRE GEOTECH
BUILD WITH CONFIDENCE

| | |
|---|---|
| **FIGURE A-1 - VICINITY MAP** | |
| **PROJECT NAME:** *EAGLE BLUFF SUBDIVISION* | |
| **SITE LOCATION:** *S. MEADOW LANE RD., SPOKANE, WA* | |
| **DRAFTER:** *S. SOMMERS* | **PROJECT #:** *25-024* |
| **SCALE:** *NOT TO SCALE* | **DATE:** *04/24/2025* |


INLAND EMPIRE GEOTECH
BUILD WITH CONFIDENCE

**FIGURE A-2 - NRCS MAPPING**

| | |
|---|---|
| **PROJECT NAME:** *EAGLE BLUFF SUBDIVISION* | |
| **SITE LOCATION:** *S. MEADOW LANE RD., SPOKANE, WA* | |
| **DRAFTER:** *S. SOMMERS* | **PROJECT #:** *25-024* |
| **SCALE:** *NOT TO SCALE* | **DATE:** *06/02/2025* |