Cobalt Geosciences, LLC
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RE: Geotechnical Addendum and Statement of Risk
Proposed Residence
9319 SE 43rd Street
Mercer Island, Washington

In accordance with your authorization, Cobalt Geosciences, LLC has prepared this letter to discuss geologic hazards, seasonal grading restrictions, and statements of risk. We have reviewed a recent City response indicating which geologic hazards may be present at the site and surrounding areas as well as what aspects of geotechnical reporting are required. Discussion is as follows:

The checklist indicates the presence or concern of erosion hazards, potential landslides, and seismic/liquefaction; as well as requesting information for wet season construction, foundation systems, retaining walls, excavations, and shoring.

Geologic Hazards

The site and adjacent areas include steep slope hazards based on magnitude. The potential landslide hazard designation is likely based on the presence of a historic slide east of the property.

There is no evidence of recent landslide activity, erosion, or other slope stability issues at the property or adjacent areas. There is a mapped and documented landslide east of the property. This slide is at least 200 feet east of the property and is not relevant to the site. We have consulted with homeowners on the slide to the east and the likely causes of the soil movements is groundwater emanating from the base of the bluff/slope southeast of the slide mass along with mass grading and excavations near the toe. The subject property is located upslope of the slide affected area with no evidence of emergent groundwater. Additionally, the topographic relief is much lower within the slope south of the subject property.

The steep slope south of the property is about 45 to 50 feet tall. The recommended setback of 25 feet is suitable based on the underlying geologic conditions (dense till). A typical IBC recommended setback would be H/3 or about 15 feet for a slope of this height.

Somewhat related to steep slope or landslide hazards, erosion hazards are usually based on slope magnitudes. At this site, the erosion potential of the steep slope areas would be very severe; however, no work will occur in these areas and the slopes will remain fully vegetated. Therefore, the risk of soil erosion due to construction is minimal and can be maintained at a low risk if temporary and permanent erosion control systems are in place during and after construction. Typical BMPs appear suitable for this project.

The risk of liquefaction at this site is very low due to the high soil density. Relevant design parameters for ASCE 7-10 and 7-16 are present below:

The overall subsurface profile corresponds to a Site Class *D* as defined by Table 1613.5.2 of the International Building Code (IBC). A Site Class *D* applies to an overall profile consisting of stiff/medium dense soils within the upper 100 feet.

We referenced the U.S. Geological Survey (USGS) Earthquake Hazards Program Website to obtain values for S_S, S_1, F_a, and F_v. The USGS website includes the most updated published data on seismic conditions. The following tables provide seismic parameters from the USGS web site with referenced parameters from ASCE 7-10 and 7-16.

Seismic Design Parameters (ASCE 7-10)

Site Class	Spectral Acceleration at 0.2 sec. (g)	Spectral Acceleration at 1.0 sec. (g)	Site Coefficients		Design Spectral Response Parameters		Design PGA
			F_a	F_v	S_{DS}	S_{D1}	
D	1.407	0.54	1.0	1.5	0.938	0.54	0.581

Seismic Design Parameters (ASCE 7-16)

Site Class	Spectral Acceleration at 0.2 sec. (g)	Spectral Acceleration at 1.0 sec. (g)	Site Coefficients		Design Spectral Response Parameters		Design PGA
			F_a	F_v	S_{DS}	S_{D1}	
D	1.415	0.492	1.0	Null	0.944	Null	0.606

Additional seismic considerations include liquefaction potential and amplification of ground motions by soft/loose soil deposits. The liquefaction potential is highest for loose sand with a high groundwater table. The site has a low likelihood of liquefaction.

Other Recommendations

Our geotechnical report provides information for temporary excavations and foundation design. Temporary shoring does not appear warranted based on the geometry of the proposed construction with regard to site and adjacent developments and finish floor elevations.

It is our opinion that the construction can be performed during the wet season in a manner that will not result in erosion or adverse effects on any mapped critical areas. It is imperative that temporary erosion control devices are installed prior to excavation work. These systems should not be removed until the site is fully landscaped.

If an erosion control plan is required, the project civil engineer or owner/contractor should prepare one. We recommend installation of a silt fence topographically lower than the proposed areas to be excavated. Any stockpiles of fill should be covered with visqueen when work is not occurring. We can provide additional recommendations upon request.

Statement of Risk

The geologic hazards at the site consist of steep slope and erosion hazards and not landslide hazards. Based on our review of nearby explorations and our field observations, the risk of these hazards is generally low to moderate. The proposed construction will not alter the current level of slope stability of nearby steep slope hazard areas. The site and adjacent areas are well vegetated, minimizing erosion potential of near surface soils.

While there are nearby steep slopes, the proposed work includes replacement of an existing home with a new home in the same general location and elevations. While site grading is proposed, the proposed construction will not be located within the hazard areas and the work can be performed in a manner to not adversely affect geologic hazards (erosion control and drainage). The near surface soils are generally dense and seismic hazard risks are minimal.

Statement of Risk: The site does not appear to be within a landslide hazard or seismic hazard area based on site topography and soil conditions. Proper installation and maintenance of erosion control devices will allow construction and reduce potential risks to current levels.

The following section is an excerpt from the City code.

3. Alteration of landslide hazard areas, seismic hazard areas and associated buffers may occur if the conditions listed in subsection (B)(2) of this section are satisfied and the geotechnical professional provides a statement of risk matching one of the following:

a. An evaluation of site-specific subsurface conditions demonstrates that the proposed development is not located in a landslide hazard area or seismic hazard area;

b. The landslide hazard area or seismic hazard area will be modified or the development has been designed so that the risk to the site and adjacent property is eliminated or mitigated such that the site is determined to be safe;

c. Construction practices are proposed for the alteration that would render the development as safe as if it were not located in a geologically hazardous area and do not adversely impact adjacent properties; or

d. The development is so minor as not to pose a threat to the public health, safety and welfare.

Sincerely,

Cobalt Geosciences, LLC

Phil Haberman, PE, LG, LEG
Principal

3/22/2021