AGEC
Applied GeoTech

March 4, 2021

Lowe Companies
6028 South Ridgeline Drive, Suite 203
Ogden, UT 84405

Attention: Matt Lowe
EMAIL: matt@lowecompanies.com

Subject: Reconnaissance-level Geologic-hazards Study
Proposed Gateway Estates Subdivision
Approximately 10700 East Highway 39
Huntsville, Utah
Project No. 1210067

Mr. Lowe:

Applied Geotechnical Engineering Consultants was requested to perform a reconnaissance-level geologic-hazards study for the proposed Gateway Estates subdivision.

PURPOSE AND SCOPE OF INVESTIGATION

This letter presents the results of a reconnaissance-level geologic-hazards study for the proposed Gateway Estates subdivision at approximately 10700 East Highway 39 in Huntsville, Utah.

The study was conducted to identify potential geologic hazards that may affect the proposed development. The hazards evaluated are surface fault rupture, landslide, tectonic subsidence, rockfall, debris flow and liquefaction. The study included a review of geologic literature, aerial photographs and lidar data, site reconnaissance, and geologic analysis. This report has been prepared to summarize the data obtained during the study and to present our conclusions.

PROPOSED CONSTRUCTION

We understand that single-family residences are planned to be constructed on the property. We anticipate the buildings will be one- to two-story structures with basements.

SITE DESCRIPTION

At the time of our site visit on February 10, 2021, there were no permanent structures or pavement on the site. The property consists of undeveloped land.

The general topography of the site is presented on Figure 2. There is a dry drainage that extends generally north-south through the west central portion of the property, which fans out into an alluvial fan. There are other minor drainages on the east and west sides of the property. Ridges with bedrock outcrops extend through much of the north half of the property and into parts of the south-central part of the property.

Vegetation consists of grass, brush and some patches of trees. Tree coverage is greatest in the central drainage.

There is similar properties to the north, east and west. State Route 39 borders the south side of the property. There are houses and camps south of the road.

OFFICE METHODS OF INVESTIGATION

Geologic conditions at the site were evaluated by a review of geologic literature, aerial photographs and lidar data. Aerial photographs and lidar data used during the investigation were downloaded from the Utah Geological Survey website. Photographs with numbers of AAJ-1B-23 and 24, and a date of August 10, 1946 were reviewed. The lidar data is from 2016 with 0.5-meter resolution.

A. Geologic Literature Review

The site is located on the north side of the South Fork of the Ogden River on the east side of the Ogden Valley. Ogden Valley is a northwest trending valley within the Wasatch Mountains of north-central Utah. The valley is filled with an accumulation of lacustrine, alluvial and colluvial sediments from deposition during the past 15 million years.

Bedrock is exposed through most of the steep parts of the site. The bedrock is mapped by Coogan and King (2016) to consist of Neoproterozoic metamorphic rocks classified as quartzites, meta-sandstone and argillites with dip down to the east-northeast at approximately 40 degrees (See Figure 1). The surface deposits in drainages consist of alluvium with colluvial deposits along the margin of drainages. There are landslide deposits mapped for the southwest corner of the property. The landslide map of Elliott and Harty (2010) shows no additional landslides for the property. The landslides appear to have relative shallow-depth slide planes and may be associated with springs in the area.

Ogden Valley is a down-dropped structure with the Ogden Valley Northeast margin fault along the northeast side of the valley and the Ogden Valley Southwest margin fault and the Ogden Valley North Fork fault along the southwest side of the valley. These faults are oriented in a general northwest to southeast direction with the two western faults estimated to have moved in the last 750,000 years and the east fault having evidence of movement in the last 2.6 million years. The faults are considered normal faults with dip direction down to the northeast on the two west fault systems and down to the southwest for the Ogden Valley Northeast margin fault. The faults are considered relatively old structures and do not represent a significant surface-fault-rupture hazard for development within the Ogden Valley area. Tectonic subsidence associated with fault movement would similarly not be a significant hazard at this site.

The Utah Fault and Fold database shows the Ogden Valley northeast margin fault located approximately 1 mile west of the property. No active faults are mapped through or near the site. The closest active fault to the site based on the Utah Geological Survey database is the Wasatch fault located approximately 12 miles to the west (Utah Geological Survey, 2021). The Morgan Fault is considered a potentially active fault and is approximately 12 miles south of the site.

B. Aerial Photograph and Lidar Review

Based on review of the aerial photographs and lidar data, the landslide deposits are mapped on Figure 2.

Based on the topography of the site and surrounding area debris flow is not considered a potential geologic hazards at the site.

C. Seismicity

The property is located in the Intermountain Seismic Zone, which consists of an area of relatively high historical seismic activity. The most intense seismic ground shaking at the site is expected to originate from the Wasatch fault zone. The Wasatch fault zone is considered capable of producing earthquakes on the order of 7 to 7.5 magnitude and can result in significant seismic ground shaking at the site. The US Geological Survey data indicate that a peak ground acceleration of 0.41g can be expected to have a 2 percent probability of being exceeded in a 50-year time period at this site (ICC, 2017).

D. Liquefaction Potential

Based on our understanding of the geology of the area, liquefaction is not considered a hazard at this site (Anderson and others, 1994).

FIELD METHODS OF INVESTIGATION

A site visit was made on February 10, 2021 by a geologist from AGEC. The site was snow covered and thus evidence of geologic hazards could be obscured by the snow cover. There is surface evidence of the landslides mapped on Figure 2 and potential evidence that rockfall could be a hazard for develop below bedrock outcrops above or on Lots 1, 2, 3, 4, 21, 25, 28 ,29, 30 and 31. Rockfall should be evaluated for these lots once the snow has melted.

CONCLUSIONS AND RECOMMENDATIONS

Landslide is a potential hazard for development of the area mapped as landslide deposits on Figure 2. Additional subsurface investigation and stability analysis is recommended for lots planned to be developed in this area. Slope stability could also be a concern where slopes are steepened and should be evaluated for individual residences planned to be constructed. Rockfall is a potential hazard for the lots indicated above and should be further evaluated. It is our professional opinion that debris flow, surface fault rupture, tectonic subsidence and liquefaction are not significant hazards at the site.

LIMITATIONS

This study was performed in accordance with generally accepted engineering geology practices for the area. The findings of the study are based on published geologic maps, review of aerial photographs and lidar data of the site and our interpretation of geologic conditions at the site.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

Douglas R. Hawkes, P.E., P.G.

Reviewed by James E. Nordquist, P.E.
DRH/bw

Enclosure

REFERENCES

Anderson, L.R., Keaton, J.R., and Bay, J., 1994; Liquefaction Potential Map for Weber County, Utah; Utah Geological Survey Contract Report 94-1.

Coogan, J.C. and King, J.K.,2016; Interim geologic map of the Ogden 30' X 60' quadrangle, Utah and Wyoming, Utah Geological Survey Open-file Report 653DM.

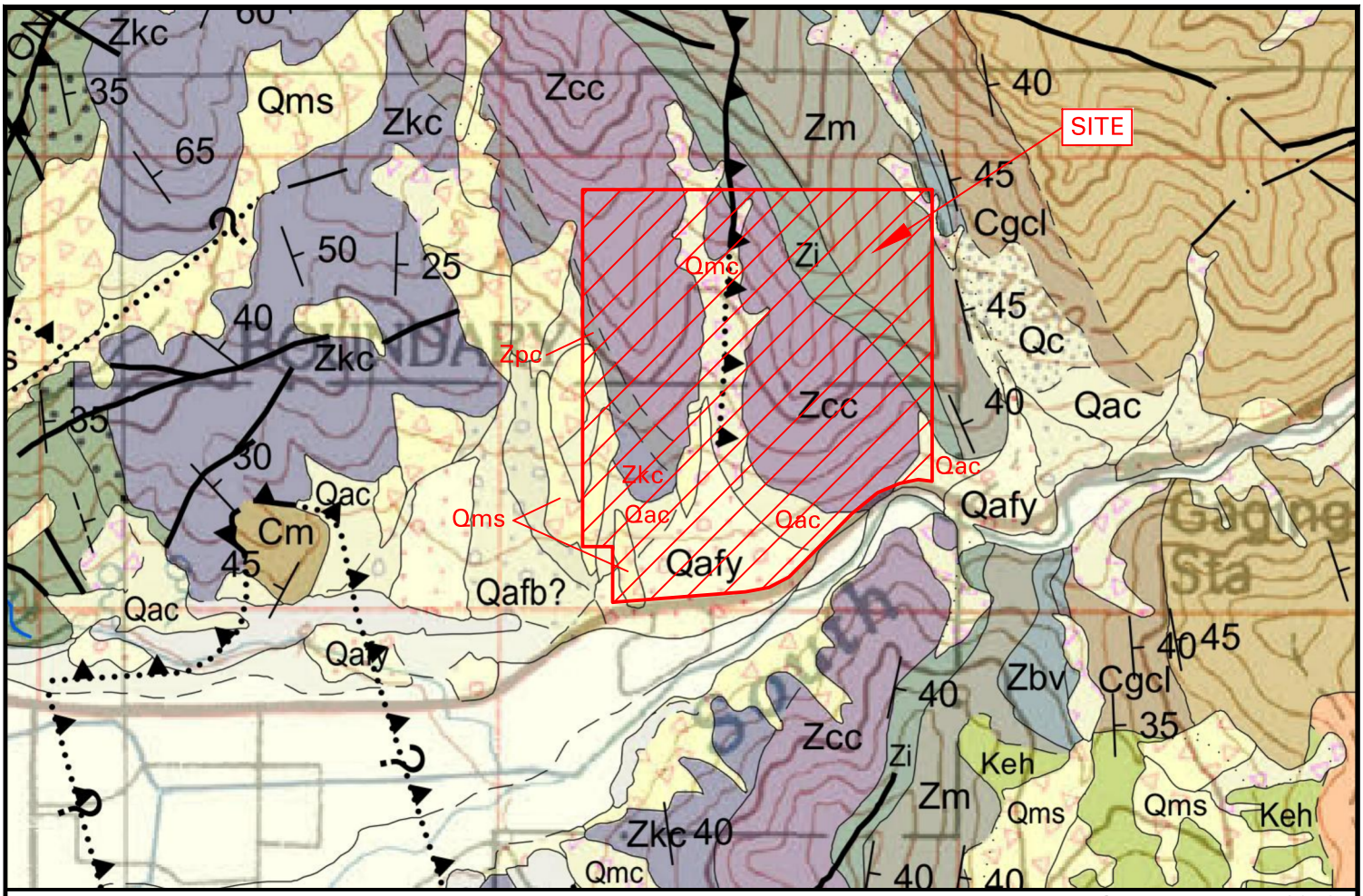
Elliott, A.H. and Harty, K.M., 2010; Landslide maps of Utah, Ogden 30' X 60' quadrangle, Utah Geological Survey Map 246DM, Plate 6.

International Code Council, 2017, 2018; International Building Code, Falls Church, Virginia.

King, J.K., McDonald, G.N. and Coogan, J.C., 2014; Geologic map of the Huntsville quadrangle, Weber and Cache Counties, Utah, Utah Geological Survey map in progress.

Sorensen, M.L. and Crittenden, M.D.,Jr., 1979; Geologic map of the Huntsville quadrangle, Weber and Cache Counties, Utah, US Geological Survey Map GQ-1503.

Utah Geological Survey, 2021; Utah Quaternary Fault and Fold Database, http://geology.utah.gov/resources/data-databases/qfaults/ accessed March 2, 2021.



From Coogan and King (2016)

EXPLANATION OF SYMBOLS AND GEOLOGIC UNITS IN AREA OF PROPOSED DEVELOPMENT

Qafy	-	Alluvial-fan deposit (Quarternary).
Qac	-	Alluvial and colluvial deposits (Quarternary).
Qmc	-	Landslide and Colluvial deposits (Quarternary).
Qms	-	Landslide deposits (Quarternary).
Zm	-	Mutual formation - quartzite (Neoproterozoic)
Zi	-	Inkom formation - argillite and metasandstone (Neoproterozoic)
Zcc	-	Caddy Canyon Quartzite - quartzite (Neoproterozoic)
Zpc	-	Papoose Creek Formation - argillite, metasandstone and quartzite (Neoproterozoic)
Zkc	-	Kelley Canyon Formation - argillite and phyllite (Neoproterozoic)

——— — — Geologic contact between units, dashed where approximate.

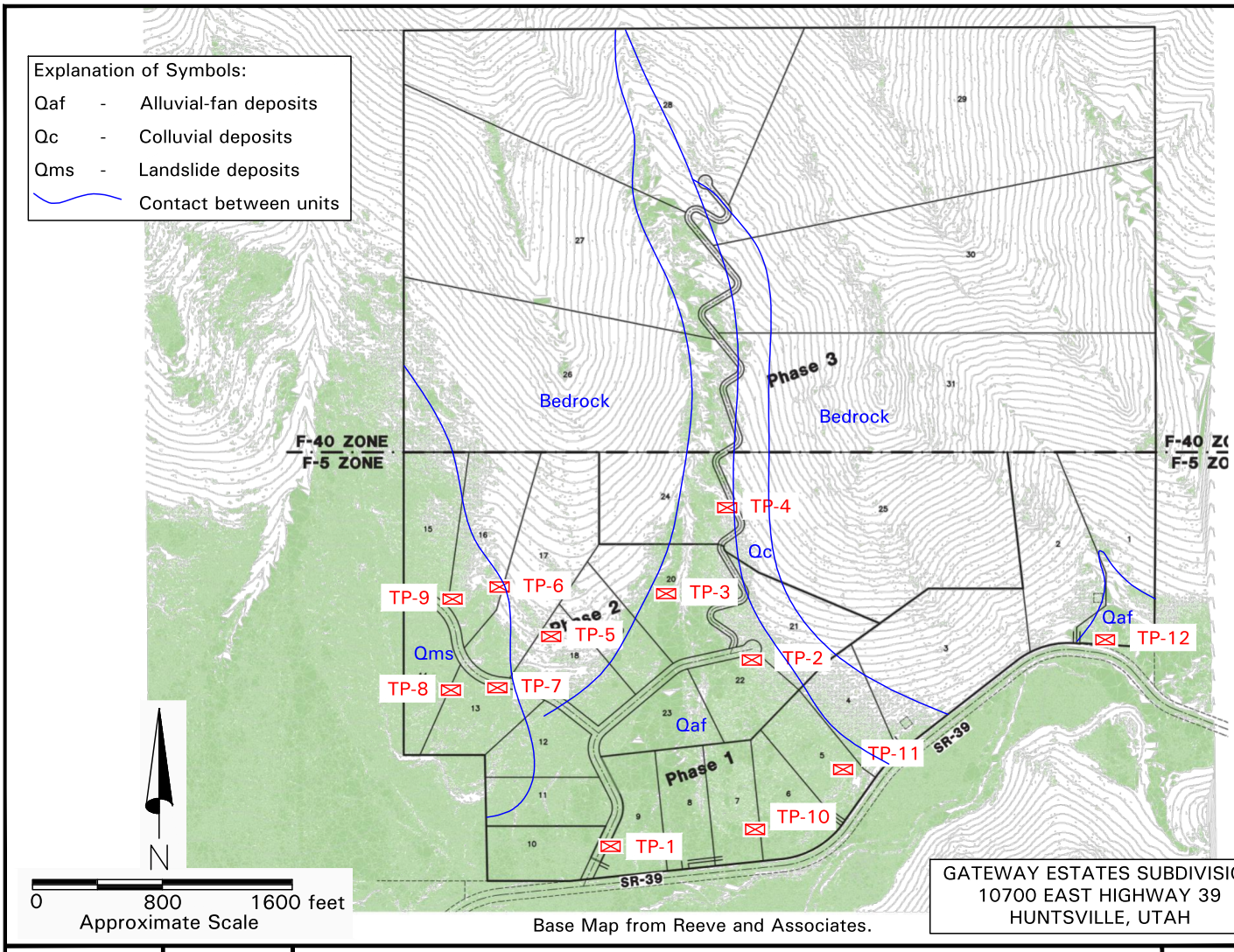
Thrust fault, dotted where concealed.

N

0 2000 4000 feet
Approximate Scale

GATEWAY ESTATES SUBDIVISION
10700 EAST HIGHWAY 39
HUNTSVILLE, UTAH

1210067	AGEC	Geologic Map	Figure 1



Base Map from Reeve and Associates.

GATEWAY ESTATES SUBDIVISION
10700 EAST HIGHWAY 39
HUNTSVILLE, UTAH

1210067	AGEC	Geology Map and Test Pit Locations	Figure 2