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October 30, 2018

HCA Investments
Attention: Mr. Jeremy Jaggi
4287 Harrison Boulevard, #135
Ogden, UT 84403
Phone: 801-559-0197
Email: jeremy.jaggi@hcainvestments.com

Re: Reconnaissance-Level Geologic Hazard Evaluation
3-Acre Lot Subdivision
2277 East 5850 South
Ogden, Utah 84403
Parcel No. 070860065 (west portion)
Project No. 187081

Mr. Jaggi:

This letter summarizes our geologic reconnaissance for the subject property located in Ogden, Utah. Our scope of work consisted of observing the subject lot and a review of available geologic studies, aerial photography, and LIDAR (Light Detection And Ranging) data to identify the geologic hazards present.

Geologic Setting and Site Reconnaissance

The subject property is located near the eastern shore of the Great Salt Lake in a valley between the Great Salt Lake Basin and the Wasatch Mountain Range. The valley and Great Salt Lake Basin were formed by extensional tectonics during the Tertiary and Quaternary geologic periods. The valley and Great Salt Lake Basin, and much of western Utah, were previously covered by Lake Bonneville, a large, Pleistocene age, fresh water lake that reached a high-stand surface elevation of approximately 5,170 feet above sea level. The Great Salt Lake is a remnant of Lake Bonneville. The valleys and lake basin to the west of the Wasatch Range have been partially filled with several thousand feet of lake (lacustrine) sediment during Lake Bonneville time, and post-Bonneville (Holocene) deltaic, lacustrine, alluvial, and colluvial deposits. The Wasatch Mountains to the east of the subject property are comprised of the early Proterozoic Farmington Canyon Complex consisting primarily of schist and gneiss. The surficial geology at the location of the subject site has been mapped as "Provo-shoreline and regressive alluvial and deltaic deposits (upper Pleistocene) – Cobbly gravel, sand, silt, and clay deposited above (subaerial) and in Lake Bonneville (subaqueous)" by Adolph Yonkee and Mike Lowe (2016).

The property is located on the north side of Eastwood Boulevard at an elevation that ranges between approximately 4,823 and 4824 feet above sea level. It is a flat property located on a wide and flat bench that stretches approximately ½ mile from the Wasatch Mountains to the northeast to Utah Highway 89 to the southwest. The property is located approximately 700 feet southwest of the Wasatch Mountain slope and approximately 2,400 feet northeast of the slope northeast of Highway 89. The area of the property is mapped by Coogan and King 2016[1] as the

[1] Utah Geological Survey OFR 653: Interim geologic map of the Ogden 30' x 60' quadrangle, Weber, Box Elder,

following:

Qadp **Provo-shoreline and regressive alluvial and deltaic deposits (upper Pleistocene)** – Cobbly gravel, sand, silt, and clay deposited above (subaerial) and in Lake Bonneville (subaqueous); typically mapped where shorelines are obscure, so that line cannot be drawn between alluvial fan and delta; mapped below/near the Provo shoreline and related to the Provo and slightly lower regressional shorelines; deposits prominent east of Brigham City, at mouth of North Ogden Canyon, and on bench north of the Weber River; deposited as delta foreset beds with original dips of 30 to 35 degrees that allow separation from mixed lacustrine deposits (Qdlp); deltaic deposits at least 40 feet (12 m) thick and contain subrounded to well-rounded pebble and cobble gravel in a matrix of sand and silt with interbeds of sand and silt; capped by gently dipping alluvial-fan and stream topset beds that are less than 16 feet (5 m) thick, are poorly to moderately sorted, silty to sandy, subangular to well-rounded pebble and cobble gravel, and contain subangular to angular clasts in a matrix of sand and silt with interbeds of sand and silt (see units lpd and alp of Personius, 1990).
East of Brigham City at the mouth of Box Elder Canyon these deposits have been extensively excavated for sand and gravel. King estimates these deposits are about 200 feet (60 m) thick (from topographic contours) south of the mouth of Box Elder Creek, while Smith and Jol (1992) implied they are 400 feet (120 m) thick to the west of the Ogden map area.
The Provo shoreline fan-delta sediments were eroded from Bonneville-shoreline lacustrine and alluvial deposits, contain 20 to 70 percent rounded recycled Lake Bonneville clasts (Personius, 1990), and were redeposited during and soon after the Bonneville flood, which occurred during the drop of Lake Bonneville to the Provo shoreline. The Qadp unit probably includes Provo-stillstand deltaic deposits, sub-Provostillstand (regressional) alluvial-fan and lacustrine-deltaic deposits that contain abundant reworked materials from the Provo-shoreline delta, and locally overlying alluvial-fan deposits. Personius (1990) noted that deposits at the mouth of Box Elder Canyon are a fan-delta.

Qafy **Alluvial-fan deposits (Holocene and Pleistocene)** – Mostly sand, silt, and gravel that is poorly bedded and poorly sorted and that is not close to late Pleistocene Lake Bonneville and is geographically in the Huff Creek and upper Bear River drainages; variably consolidated; includes debris flows, particularly in drainages and at drainage mouths (fan heads); generally less than 60 feet (18 m) thick. Qaf with no suffix used where age uncertain or for composite fans where portions of fans with multiple ages cannot be shown separately at map scale; toes of some fans have been removed by human disturbances, so their age cannot be determined. Where possible, subdivided into relative ages, indicated by letter and number suffixes (like Qa and Qat suffixes) and relative ages only apply to the local drainage, with unit Qafy being the lowest (youngest) fans and unit 3 may or may not post-date Lake Bonneville. Relative ages of these fans are partly based on heights above present drainages at drainage-eroded edge of fan. The relative age is queried where the age is uncertain, generally due to the height not fitting into the typical order of surfaces. The various deposits listed,

Cache, Davis, Morgan, Rich, and Summit Counties, Utah, and Uinta County, Wyoming by James C. Coogan and Jon K. King 2016.

Qafy and Qaf3 through Qaf5, are 20 to 140 feet (6-40 m) above and west of Saleratus Creek, and also above Yellow Creek and the Bear River.

Qlg, Qlgb **Lake Bonneville gravel and sand (upper Pleistocene)** – Mostly interbedded pebble and cobble gravel and sand deposited along beaches and slightly offshore; varies from clast supported to only rare gravel clasts in a matrix of sand and silt; grades downslope and, locally, laterally into finer grained deposits (Qls, Qlsp, Qlsb); mapped as Qlg downslope from topographic slope break of Provo and regressive beaches (Qlgp) because gravel and sand may be related to Lake Bonneville transgression on this gentler slope; also mapped as Qlg where Provo shoreline not distinct or relationships to shorelines uncertain; Qlg and Qlgb queried where grain size or unit identification uncertain; up to about 100 feet (30 m) thick in gravel pits but less than 20 feet (6 m) thick on most valley slopes. Constructional landforms (beach ridges, bars, and spits) and transgressive (t) shorelines limited in Ogden map area. Qlgp is mapped in beaches near and below the erosional bench at the Provo shoreline (P); gravel typically subrounded to rounded, but locally along bedrock mountain fronts marked by a carbonate-cemented, poorly sorted, angular pebble to boulder gravel in a sandy matrix.
Qlgb is mapped in beaches mostly just downslope from Bonneville shoreline (B), typically an eroded bench, and above Provo shoreline; deposited during transgression to and occupation of the Bonneville shoreline; clasts typically subrounded to rounded but contains subangular to angular clasts on steep bedrock mountain fronts; mountain front Bonneville shoreline benches covered by locally mappable (> 6 feet [2 m] thick) colluvium and talus (Qmt, Qc, Qct).

Qmsy **Landslide deposits (Holocene and upper and middle? Pleistocene)** – Poorly sorted clay- to bouldersized material; includes slides, slumps, and locally flows and floods; generally characterized by hummocky topography, main and internal scarps, and chaotic bedding in displaced blocks; composition depends on local sources; morphology becomes more subdued with time and amount of water in material during emplacement; Qms may be in contact with Qms when landslides are different/distinct; thickness highly variable, up to about 20 to 30 feet (6-9 m) for small slides, and 80 to 100 feet (25-30 m) thick for larger landslides. Qmsy and Qmso queried where relative age uncertain; Qms queried where classification uncertain. Numerous landslides are too small to show at map scale and more detailed maps shown in the index to geologic mapping should be examined.

A reconnaissance of the site was conducted by a professional geologist on October 23, 2018. The subject site is currently vacant and undeveloped. The surface of the site was covered by grass and weeds, and occasional trees. There were no structures at the property, but a large metal bin, wood pallets, bricks and a pile of broken concrete in the southwest side of the property and a semi-trailer on the west side of the property. There were no notable natural or man-made features at the property, other than fences on the perimeter.

No evidence of faulting was observed at the site. The nearest fault is Wasatch Fault located approximately 1,900 feet to the northeast of the site. We did not observe surface features that would be produced by a landslide, and no landslides have been mapped on the subject site. No other known geologic hazards are present at the site.

Based on Yonkee & Lowe (2004)[2] the nearest landslide is to the northeast of the site (labeled Qms_2 in the attached geologic map).

Based on a review of available geological hazard maps, visual observations of the subject site for features related to fault, mass movement, and debris flow, a review of aerial photography, LIDAR data, and geologic maps of this area, it is our opinion that the potential for mass movement or surface faulting at the property is low.

Seismic ground shaking from the Wasatch Fault is not addressed in this letter and the residential buildings are typically designed according to the International Residential Code (IRC 2015). We did not conduct subsurface explorations at the site. As such, we cannot comment on the global stability of the site or on the engineering properties of the soils. Potential future discovery of faults and modifications to this site such as road cuts and other cuts in the slope, the addition of water such as the installation of septic field or watering the lawn or diversion of natural surface water into on near the subject site may change conditions sufficiently to cause activation of a slide in sloped areas.

The information presented in this letter applies only to the subject lot observed. Other areas were not observed during our observation. The observation presented in this letter was conducted within the limits prescribed by our client. No warranty or representation is intended in our proposals, contracts, reports, or letters.

We appreciate the opportunity of providing our services on this project. If we can answer questions or be of further service, please call.

Respectfully;
EARTHTEC ENGINEERING

LICENSED PROFESSIONAL GEOLOGIST
FARHANG F. NAMDAR
191486-2250
STATE OF UTAH
10-30-18

Frank F. Namdar, P.G.
Professional Geologist

Timothy A. Mitchell, P.E.
Senior Engineer

FN/tm

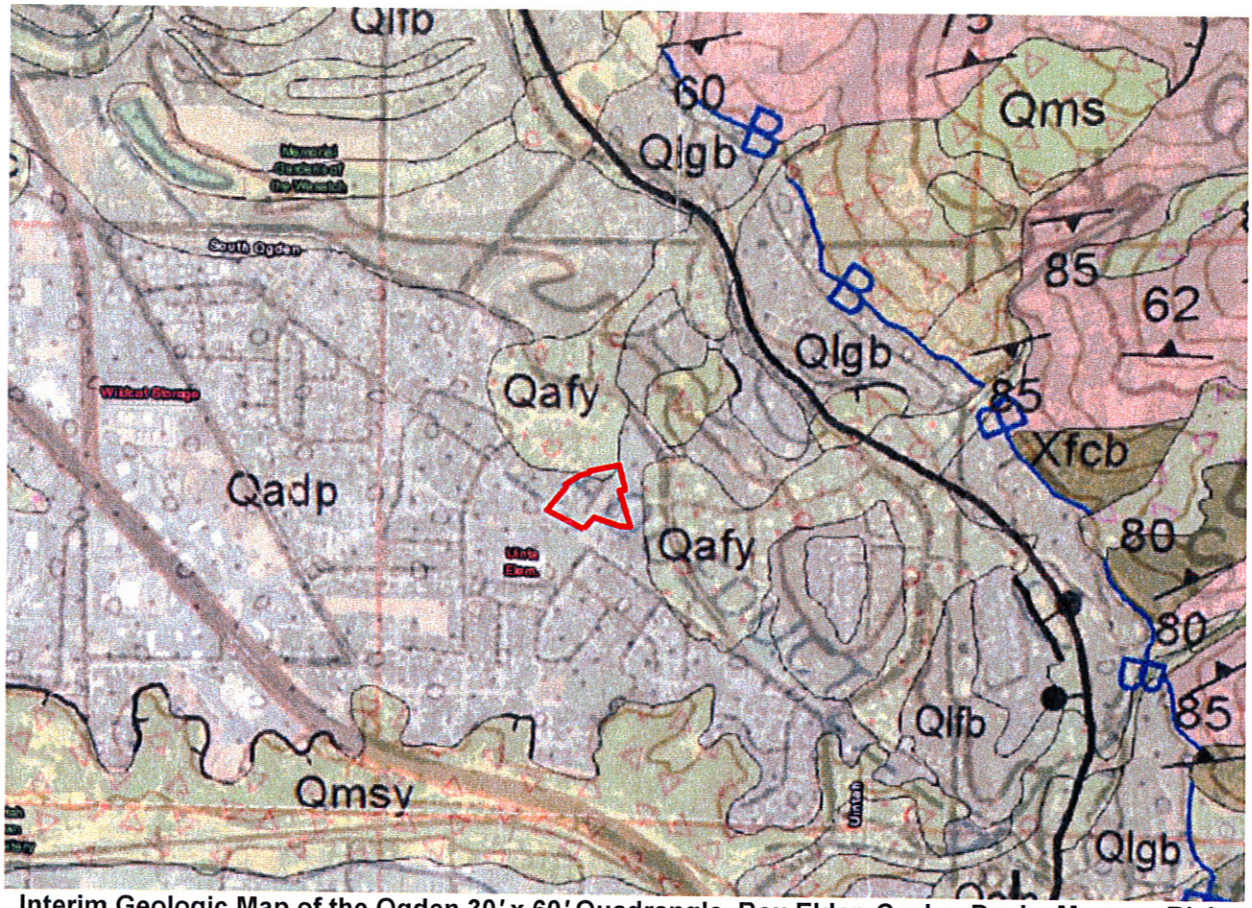
Attachments: Site Boundaries
Geologic Maps
LDAR Image

[2] Geologic Map of the Ogden 7.5 min Quadrangle, Weber and Davis Counties, Utah, Adolph Yonkee & Mike Lowe 2004.

Site Boundaries

N

Not to Scale



Interim Geologic Map of the Ogden 30' x 60' Quadrangle, Box Elder, Cache, Davis, Morgan, Rich, and Summit Counties, Utah
James C. Coogan and Jon K. King Uinta County, Wyoming
OPEN-FILE REPORT 653DM
UTAH GEOLOGICAL SURVEY
a division of Utah Department of Natural Resources
2016

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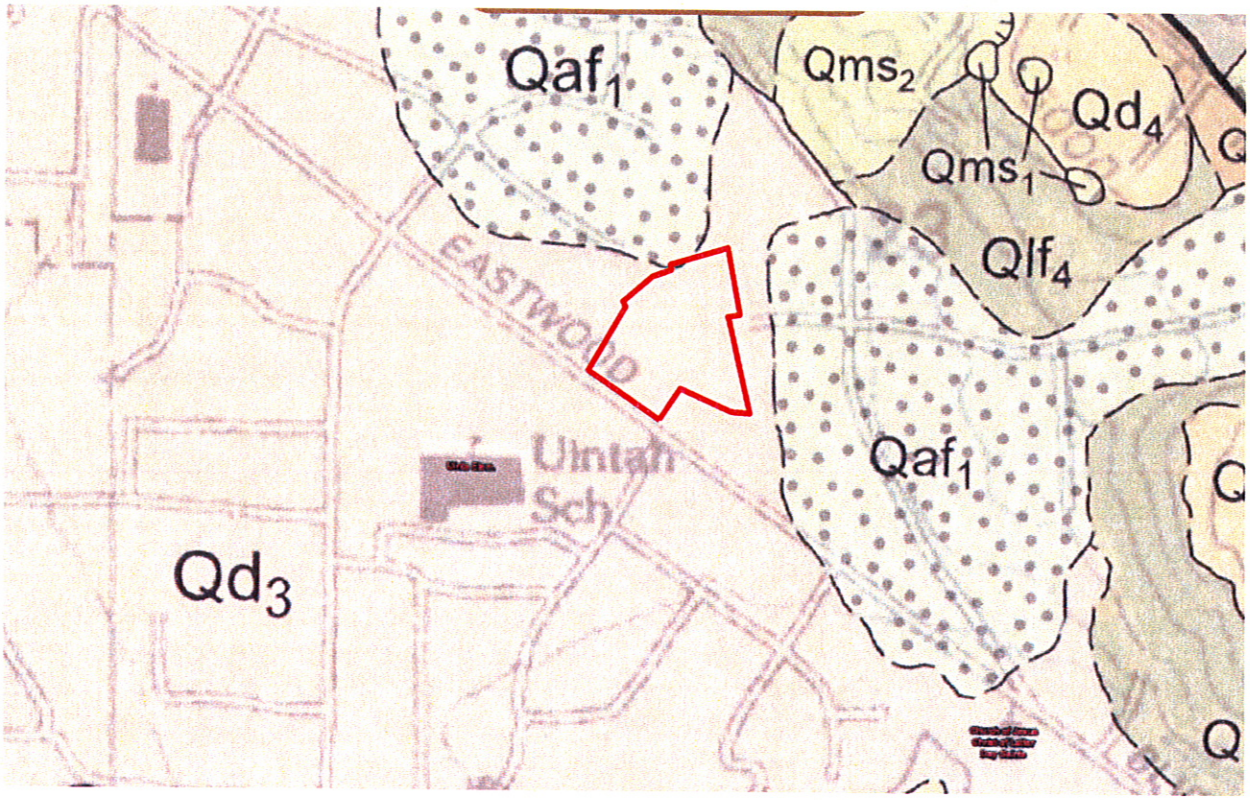

Geologic Map of the Ogden 7.5 min Quadrangle, Weber and Davis Counties, Utah.

By Adolph Yonkee and Mike Lowe

2004

Qadp Capped by alluvial topset beds that are poorly to moderately sorted, silty to sandy, angular to well-rounded pebble and cobble gravel; deltaic deposits include rounded to subrounded gravel in a matrix of sand and silt with interbeds of sand and silt

Qd_3 Deltaic deposits, Bonneville regressive– Main part of unit includes foreset beds of rhythmically interlayered, gently inclined, fine to medium sand and silt, and topset beds of clast-supported, moderately to well-sorted, pebble and cobble gravel and gravelly sand; gravels contain rounded to subrounded clasts; deposited when Lake Bonneville was at and regressing from Provo shoreline; forms large, gently westward-inclined surface that was locally reworked along regressive shorelines; total thickness locally as much as 30 meters (100 ft). Unit also includes moderately to well-sorted, pebble and cobble gravel in smaller terraces more than 30 meters (100 ft) above modern stream level that are graded to delta deposits and shorelines above the Gilbert level; exposed thickness of terrace gravels up to 6 meters (20 ft).

.5 Meter Bare Earth LiDAR DEM / DTM Image