September 24, 2021

Mr. Michael Westwood
3130 West 3600 South
West Haven, UT 84401
Phone: 801-643-2340
Email: westwood450@msn.com

Re: Reconnaissance-Level Geologic Hazard Evaluation
Lot 1, Westwood Subdivision
Approximately 7600 East 1900 North
Latitude: 41.29147, Longitude: -111.76638
Eden, Utah 84317
Parcel No. 210050030
Project No. 219050

Mr. Westwood:

This letter summarizes our geologic reconnaissance for the subject property located in Eden, Utah. Our scope of work consisted of observing the subject site, a review of available geologic maps and studies, and aerial photography to identify the geologic hazards present.

The subject site is three (3) acres subdivided from a 200-acre parcel, to be developed with a single-family residential structure (Figure No. 1, *Site Location*).

Geologic Setting and Site Reconnaissance

The subject site is located on the eastern margin of Ogden Valley, a sediment filled intermontane valley within the Wasatch Range, and major north-south trending mountain range making the eastern boundary of the Basin and Range physiographic province (Stokes 1986), in North-Central Utah. The Ogden Valley is in the lower Weber River drainage basin and is situated within a structural trough shared by Ogden Valley and Morgan Valley to the south.

The Ogden and Morgan Valleys are part of the Wasatch Hinterlands Section of the Middle Rocky Mountain Physiographic Province. Stokes describes the Wasatch Hinterlands as a belt of mixed, moderately rugged topography located on the east side of the Wasatch Range that has varied topography, with hilly areas dominating valley areas. This belt of hilly terrain with a few valleys located directly east of the Wasatch Range, crossed and drained by several west-flowing river systems, and is generally an area of active erosion and little deposition (Stokes 1986). The Weber River has been the primary factor in the formation of the Morgan Valley as it has eroded and down-cut the valley over time. The Ogden and Weber Rivers are fed by a number of smaller streams that drain from the Wasatch Mountains and hilly terrain of the Hinterlands as it flows through the valley in a general west and northwest direction, respectively.

The Ogden and Morgan Valleys were prehistorically occupied by an arm of Lake Bonneville, a Pleistocene age, freshwater lake that covered most of northwestern Utah and parts of northeastern Nevada. Sediment deposited by the lake are still present within portions of the valley and at places within the foothills surrounding the valley below the elevation of the high stand of the lake which was between approximately 5,170 and 5,200 feet above sea level. The Great Salt Lake of northwestern Utah is a remnant of ancient Lake Bonneville.

The site is located within a setting of complex geological conditions where Pre-Cambrian and Paleozoic rocks were moved over the same during a series of eastward thrust extensions the last of which is named the Willard Thrust sheet. The Willard Thrust is believed to have moved onto the vicinity during the Cretaceous Sevier orogeny at approximately 140 million years ago (ma). This exposure was the result of movement along high-angle faults along the Wasatch fault during the late Tertiary and Quaternary age (Bryant, 1988). Finally, Quaternary stream erosion by Middle Fork Drainage has filled the valley resulting in Holocene age slope movement (Qmso) on parts of the site. The current geological mapping drawn from Coogan and King (2016) of the site is shown on Figure No. 2, *Surficial Geologic Map of the Site*.

The site elevation ranges between approximately 4,985 to 4,995 feet above sea level and is nearly flat. The slope gradually increases toward north and east. The surficial geology of the site is mapped by Sorenson & Crittenden (1979)[1] and Coogan and King (2016)[2] to be Alluvial deposits, Holocene and Pleistocene (map unit Qay), over transgressive and Bonneville-shoreline deltaic and lacustrine deposits, upper Pleistocene (map unit Qdlb). These units are described in more detail below (Figure No. 2, *Surficial Geologic Map of the Site*). The areas surrounding the subject site are covered by the same deposits as described below:

Qay **Alluvium (Holocene and Pleistocene)** – Sand, silt, clay, and gravel in stream and alluvial-fan deposits that are not close to late Pleistocene Lake Bonneville and are geographically in the Huff Creek and upper Bear River drainages; variably sorted; variably consolidated; composition depends on source area; deposits lack fan shape of Qaf and are distinguished from terraces (Qat) based on upper surface sloping toward adjacent streams from sides of drainage, or are shown where fans and terraces are too small to show separately at map scale; Qay is at slightly above present drainages and not incised by active drainages, so is the youngest unit; generally 6 to 20 feet (2-6 m) thick

Qdlb **Transgressive and Bonneville-shoreline deltaic and lacustrine deposits (upper Pleistocene)** – Mostly sand, silty sand, and gravelly sand deposited near shore in Lake Bonneville; extensive at mouth of Weber Canyon; related to transgression to and occupation of the Bonneville shoreline with lacustrine deposits covering deltaic deposits; in Morgan Valley and near mouth of Coldwater Canyon (North Ogden quadrangle) contain more cobbles and overall more gravel; 0 to at least 40 feet (12 m) thick in Ogden and Morgan Valleys; about 400 feet (120 m) thick in bluff at the mouth of Weber Canyon. These deposits are prone to slope failures.

Qal **Alluvial deposits (mostly Holocene)** – Moderately sorted, unconsolidated sand, silt, clay, and gravel; locally includes muddy, organic overbank and oxbow lake deposits...

Qap **Lake Bonneville-age alluvium (upper Pleistocene)** – Like undivided alluvium but height above present drainages appears to be related to shorelines of Lake Bonneville and is within certain limits, and unconsolidated to weakly consolidated; alluvium labeled Qap and Qab is related to Provo (and slightly lower) and Bonneville shorelines of Lake Bonneville (at ~4800 to 4840 feet [1463-1475 m] and 5180 feet [1580 m] in Morgan

[1] United States Geological Survey GQ-1503: Geologic map of Huntsville quadrangle, Weber and Cache Counties, Utah, by Martin L. Sorensen and Max D. Crittenden, Jr., 1979.

[2] Utah Geological Survey OFR 653: Interim geologic map of the Ogden 30' x 60' quadrangle, Weber, Box Elder, Cache, Davis, Morgan, Rich, and Summit Counties, Utah, by James C. Coogan, Jon K. King, 2016.

Valley), respectively; suffixes partly based on heights above adjacent drainages near Morgan Valley (see tables 1 and 2); Qap is typically about 15 to 40 feet (5-12 m) above present adjacent drainages, but is locally 45 feet (12 m) above; Qapb is used where more exact age cannot be determined, typically away from Lake Bonneville, or where alluvium of different ages cannot be shown separately at map scale; Qap is up to about 50 feet (15 m) thick, with Qapb and Qab, at least locally up to 40 and 90 feet (12 and 27 m) thick, respectively. Queried where classification or relative age uncertain (see Qa).
A prominent surface ("bench") is present on Qap and Qatp at about 4900 feet (1494 m) elevation and about 25 to 40 feet (8-12 m) above the Weber River in Morgan Valley and along the South Fork Ogden River.

Qafp? **Lake Bonneville-age alluvial-fan deposits (upper Pleistocene)** – Like undivided alluvial fans, but height above present drainages appears to be related to shorelines of Lake Bonneville and is within certain limits (see table 1); these fans are inactive, unconsolidated to weakly consolidated, and locally dissected; fans labeled Qafp and Qafb are related to the Provo (and slightly lower) and Bonneville shorelines of latePleistocene Lake Bonneville, respectively, while unit Qafpb is used where fans may be related to the Provo or Bonneville shoreline (for example Qafpb is ~40 feet [12 m] above Lost Creek Valley), or where fans of different ages cannot be shown separately at map scale; Qafp fans typically contain well-rounded, recycled Lake Bonneville gravel and sand and are moderately well sorted; generally 10 to less than 60 feet (3-18 m) thick. Lake Bonneville-age fans are queried where relative age is uncertain (see Qaf for details); fans labeled Qafpb? are above the Bonneville shoreline and might be Qafo or like Qafm; see the note under Qao about two possible ages of older alluvium (Qao, Qato, and Qafo).

Qac **Alluvial and colluvial deposits (Holocene and Pleistocene**) – Unsorted to variably sorted gravel, sand, silt, and clay in variable proportions; typically mapped along smaller drainages that lack flat bottoms; includes stream and fan alluvium...

Qafy **Alluvial-fan deposits (Holocene and Pleistocene)** – Mostly sand, silt, and gravel that is poorly bedded and poorly...variably consolidated; includes debris flows, particularly in drainages and at drainage mouths (fan heads), with unit Qafy being the lowest (youngest) fans...Qafy fans are active, impinge on present-day floodplains, divert active streams, and overlie low terraces...

Qatp **Stream-terrace alluvium (Holocene and Pleistocene)** – Sand, silt, clay, and gravel in terraces above flood plains near late Pleistocene Lake Bonneville and are geographically in the Ogden and Weber River, and lower Bear River drainages; moderately sorted; variably consolidated; upper surfaces slope gently downstream; locally includes thin and small mass-movement and alluvial-fan deposits; where possible, subdivided into relative ages, indicated by number and letter suffixes, with 2 being the lowest/youngest terraces, typically about 10 to 20 feet (3-6 m) above adjacent flood plains; Qat with no suffix used where age unknown or age subdivisions of terraces cannot be shown separately at map scale; 6 to at least 20 feet (2-6+ m) thick, with Qatp 50 to 80 feet (15-24 m) thick in Mantua Valley.
Terraces labeled Qatp are likely related to the Provo and slightly lower shorelines of Lake Bonneville (at and less than ~4820 feet [1470 m] in area), and with Qap form "benches" at about 4900 feet (1494 m) along the Weber River and South Fork Ogden River. Qato terraces pre-date Lake Bonneville. Relative age queried (Qatp?) where age is uncertain.

Ql **Lake Bonneville deposits, undivided (upper Pleistocene)** – Silt, clay, sand, and cobbly gravel in variable proportions; mapped where grain size is mixed, deposits of different materials cannot be shown separately at map scale, or surface weathering obscures grain size and deposits are not exposed in scarps or construction cuts; thickness uncertain.

Qlsb **Lake Bonneville sand (upper Pleistocene)** – Mostly sand with some silt and gravel deposited nearshore below and near the Provo shoreline (Qlsp) and between the Provo and Bonneville shorelines (Qlsb); Qls mapped downslope from slope break below Provo shoreline beach deposits where thin Lake Bonneville regressional sand may overlie transgressional sand; grades downslope into unit Qlf with decreasing sand content and laterally with more gravel into units Qdlp, Qdlb, and upslope with more gravel into unit Qlgb; Qls and Qlsb queried where grain size or unit identification uncertain; may be as much as 75 feet (25 m) thick, and thickest near Ogden; typically less than 20 feet (6 m) thick in Morgan Valley; may include small deltas and deltas that lack typical delta shape.

Qlamh **Lacustrine, marsh, and alluvial deposits, undivided (Historical)** – Sand, silt, and clay mapped where streams enter Pineview Reservoir, and reservoir levels fluctuate such that lacustrine, marsh, and alluvial deposits are intermixed; thickness uncertain.

Qms **Landslide deposits (Holocene and upper and middle? Pleistocene)** – Poorly sorted clay- to boulder sized material; includes slides, slumps, and locally flows and floods...

Qmso **Landslide deposits (older- Pleistocene)** – Poorly sorted clay- to boulder sized material; includes slides, slumps, and locally flows and floods; generally characterized by hummocky topography, main and internal scarps, and chaotic bedding in displaced blocks...

Qmc **Landslide and colluvial deposits, undivided (Holocene and Pleistocene)** – Poorly sorted to unsorted clay- to boulder-sized material; mapped where landslide deposits are difficult to distinguish from colluvium (slopewash and soil creep) and where mapping separate, small, intermingled areas of landslide and colluvial deposits is not possible at map scale; locally includes talus and debris flow and flood deposits; typically mapped where landslides are thin ("shallow"); also mapped where the blocky or rumpled morphology that is characteristic of landslides has been diminished ("smoothed") by slopewash and soil creep; composition depends on local sources; 6 to 40 feet (2-12 m) thick. These deposits are as unstable as other landslide units (Qms, Qmsy, Qmso).

Zmcg **Lower (green arkose) member (Neoproterozoic)** – Grayish-green, fine-grained arkosic (feldspathic) meta-sandstone and sandy argillite (meta-graywacke), with local quartzite lenses up to 200 feet (60 m) thick; weathers darker gray to brown to greenish-gray and greenish-brown; 500 to 1000 feet (150-305 m) thick and lower thickness would eliminate the need for faulting in southwest part of Huntsville quadrangle.This unit is prone to slope failures.

The site is located predominately upon Qay/Qdlb, alluvium and deltaic and lacustrine deposits (Holocene and Pleistocene) – the site material is mostly silt of Lake Bonneville deposits over coarser deltaic deposits of Middle Fork Drainage such as silt, sand, and gravel, north of the alluvial deposit of Holocene age deposited by Middle Fork Drainage. Further to the northeast and east, at a distance of approximately 1,000 feet and 3,000 feet, respectively, Qmc and Qmso, Landslide deposits (Holocene - Pleistocene) are mapped in the above referenced map. These deposits have no impact to the site due to their distance from the site.

A reconnaissance of the site was conducted by a professional geologist on September 9, 2021. The subject site is currently vacant and undeveloped. The subject lot was covered by sage brush and grass at the time of our site visit. A line of trees was visible to the south of the lot where a dry drainage ditch is located. The flow of water from the Middle Fork Drainage during the run-off period is being diverted into drainage ditches for agricultural purposes. Gates located upstream control the flow of water to these agricultural lands. The Middle Fork Drainage is located approximately 1,000 feet to the south of the lot. No impact from the Middle Fork Drainage to the lot is expected. There is no development adjacent or proximal to the lot.

Earthquake

Seismic ground shaking from the Wasatch Fault or other faults in the area is not addressed in this letter and the residential buildings are typically designed according to the International Residential Code (IRC 2015).

Surface Fault Rupture

No faults have been mapped crossing the subject property and no evidence of surface fault rupture or related ground deformation was observed on the lot. A concealed normal fault is mapped on the referenced map by Coogan and King (2016) at approximately 700 feet northeast of the lot. Ogden Valley Northeastern Margin Fault is mapped at approximately 3,000 feet to the east-northeast of the site. Several faults are mapped at approximately 1 mile to the east-northeast of the site. Based on these findings, it is our conclusion that the potential for surface fault rupture or related tectonic or coseismic ground deformation at the site during future earthquake events is relatively low. It is our opinion that additional studies or mitigation to address these hazards on the property are not warranted. Seismic design recommendations for the site to address potential ground shaking during an earthquake event should be included during a geotechnical study for the property.

Liquefaction

Soil liquefaction can occur when saturated subsurface soils below groundwater lose their intergranular strength due to an increase in soil pore water pressures during a dynamic event such as an earthquake. Loose, saturated sands are most susceptible to liquefaction, but some loose, saturated gravels and relatively sensitive silt to low-plasticity silty clay soils can also liquefy during a seismic event. Liquefaction potential hazards have not been studied or mapped for the Ogden Valley area, as has occurred in other parts of northern Utah (Anderson and others 1994). The liquefaction susceptibility of underlying soils is not known and would require deep explorations to quantify. However, liquefaction impact in the mountainous areas are typically low unless the conditions described above exist. It is our opinion that impact from liquefaction at the lot is low.

Landslides

The referenced geologic maps reviewed for this assessment shows that a landslide is located approximately 1,000 feet northeast of the subject lot, where head scarp of this landslide has been mapped in the Sorenson & Crittenden (1979) map and has been mapped as the Bonneville shoreline level in the Coogan & King 2016 map. This landslide has no impact on the lot due to distance and topography. The average slope at the lot is approximately 1.5%. A LiDAR image of the site area was reviewed (Figure No. 4, *LiDAR Image of The Site Area*) and no landslide features were observed at the site. The potential landslide hazard at the lot remains relatively low.

Debris Flow

Debris flow hazards are typically associated with development on alluvial fans at the mouths of canyons and ravines that drain mountainous or hilly terrain up-slope of the fan. Debris flows and related mass wasting events are generally triggered by rapid snow melt and/or intense, localized precipitation events in the drainage area of the mountainous area that accumulate water and debris in the drainage channel. The water and debris then flow down the channel, accumulate additional debris from the channel, and flood or deposit the debris on the alluvial fan at the mouth of the drainage. Flooding events generally involve primarily water flow with lesser amounts of sediment and debris, while debris flows consist mostly of a slurry of sediment and debris that can include large boulders, trees, and mud. Alluvial fan flooding and debris flows can pose a significant threat to development and life on the alluvial fan. Alluvial fan flooding and debris flows can inundate basements, push homes off of foundations, and damage or destroy structures and landscaping.

The nearest debris flow process deposits are mapped as Qafy by Coogan and King (2016), where the mouth of Gertson Canyon is located approximately 8,000 feet to the north of the lot where the flow emits on the alluvial fan (Figure No. 3, *Topographical Map of the Site Area).* The fan is incised by the Gertson Creek, where the majority of the flow from slopes above are directed. The lot is located at the distal portion of this alluvial fan and not in the direction of the creek that drains into the Pine View Reservoir at approximately 1 mile east of the lot. Also, the lot is mapped on the Middle Fork Drainage younger (Qay: Holocene to Pleistocene) deposits over the older (Qdlb: Pleistocene) delta deposits. The Middle Fork Drainage is observed at a distance of approximately 1,000 feet to the south originating from the slopes east of the lot and appears to flow into the area of the lot. The flow from this drainage is controlled at the gates up slope to divert water to various agricultural farms in the area. The LiDAR image, Figure No. 4, shows that the drainage has expanded to the north in the past. However, it appears that this took place long before the current climate regime and before the flow this drainage was controlled upstream to divert it into various agricultural lands. It is our opinion that the risk from alluvial fan flooding or debris flow from these sources is currently very low at the site

<u>Rockfall</u>
The subject property is not located in a potential rockfall runout zone. No rockfall source areas were observed in the higher terrain and no rockfall clasts were observed on the surface of the subject property. It is our conclusion that the potential rockfall hazard on the subject property is very low.

<u>Subsidence</u>
Subsidence and earth fissures related to groundwater mining occur when groundwater is pumped from an aquifer at a rate greater than aquifer recharge, resulting in dewatering of the aquifer. Bringing recharge and discharge into balance will slow or stop land-subsidence and earth-fissure formation—a process successfully implemented in some areas experiencing land-subsidence and earth-fissure problems (Ingebritsen and Jones, 1999; Bell and others, 2002)[3]. Fissures are linear cracks in the ground that form in response to horizontal tensional stresses that develop when land subsidence causes different parts of an aquifer to compact by different amounts. Our review of the LiDAR image and aerial photographs, and observations of the surface of the site during the site reconnaissance did not reveal any earth fissures or linear cracks. Tectonic subsidence is surface tilting subsidence that occurs along the boundaries of normal faults in response to surface-faulting earthquakes (Keaton, 1986)[4]. Because the site is not located in near proximity to active earthquake faults, tectonic subsidence hazards are not considered a risk to the site. It is our conclusion that currently the subject property is at low risk

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[3] Ingebritsen, S.E., and Jones, D.R., 1999, Santa Clara Valley, California—a case of arrested subsidence, in Galloway, D., Jones, D.R., and Ingebritsen, S.E., editors, Land subsidence in the United States: U.S. Geological Survey Circular 1182, variously paginated.

[4] Keaton, J.R., 1986, Potential consequences of tectonic deformation along the Wasatch fault: Utah State University, Final Technical Report to the U.S. Geological Survey for the National Earthquake Hazards Reduction Program, Grant 14-08-0001-G0074, 23 p.

from subsidence.

Flood Hazards
Federal Emergency Management Agency (FEMA, 2015, FIRM Panels: 49057C) at the site indicates the lot location is outside of floodway areas in Zone AE", where base flood elevations are determined.

Other Geologic Hazards
Other relatively common geologic/natural hazards that can impact development and pose a risk to human life include volcanic eruption, snow avalanche, seismic seiches, and tsunamis. Based on the local and regional geographical and geological setting of the subject property, as well as the nature and required setting for occurrence of these types of other potential hazards, it is our conclusion that the subject property is at low risk from other geologic/natural hazards.

Conclusions
Based on the research, observations, findings and geologic interpretations conducted for this assessment, we conclude that the relative risk to the subject site and future proposed development on the property from all other potential geologic hazards is relatively low and additional geologic hazards studies and/or mitigation measures are not warranted at the site. It is our opinion that the site is suitable for development of a single-family residential house.

We did not conduct subsurface explorations at the site. As such, we cannot comment on the global stability of the site, stability of its adjacent slopes, 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, or precipitation or snow-melt beyond the normally experienced in past few decades may change conditions sufficiently to cause activation of a slide in this area. Slope stability will need to be addressed for building sites or roads where slopes are present.

The information presented in this letter applies only to the subject site 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
9/23/2021
STATE OF UTAH

Frank F. Namdar, P.G.
Geologist

Timothy A. Mitchell
Senior Engineer

FN/tm

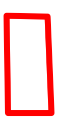
Attachments:
Figure No. 1 *Site Location Map*
Figure No. 2 *Geologic Map of the Site*
Figure No. 3 *Topographic Map of the Subject Site Area*
Figure No. 4 *LiDAR Image of the Site Area*

Statement of Qualifications

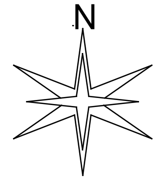
SITE LOCATION

LOT 1, WESTWOOD SUBDIVISION
APPROXIMATELY 7600 EAST 1900 NORTH
EDEN, UTAH

*Aerial photo by Google



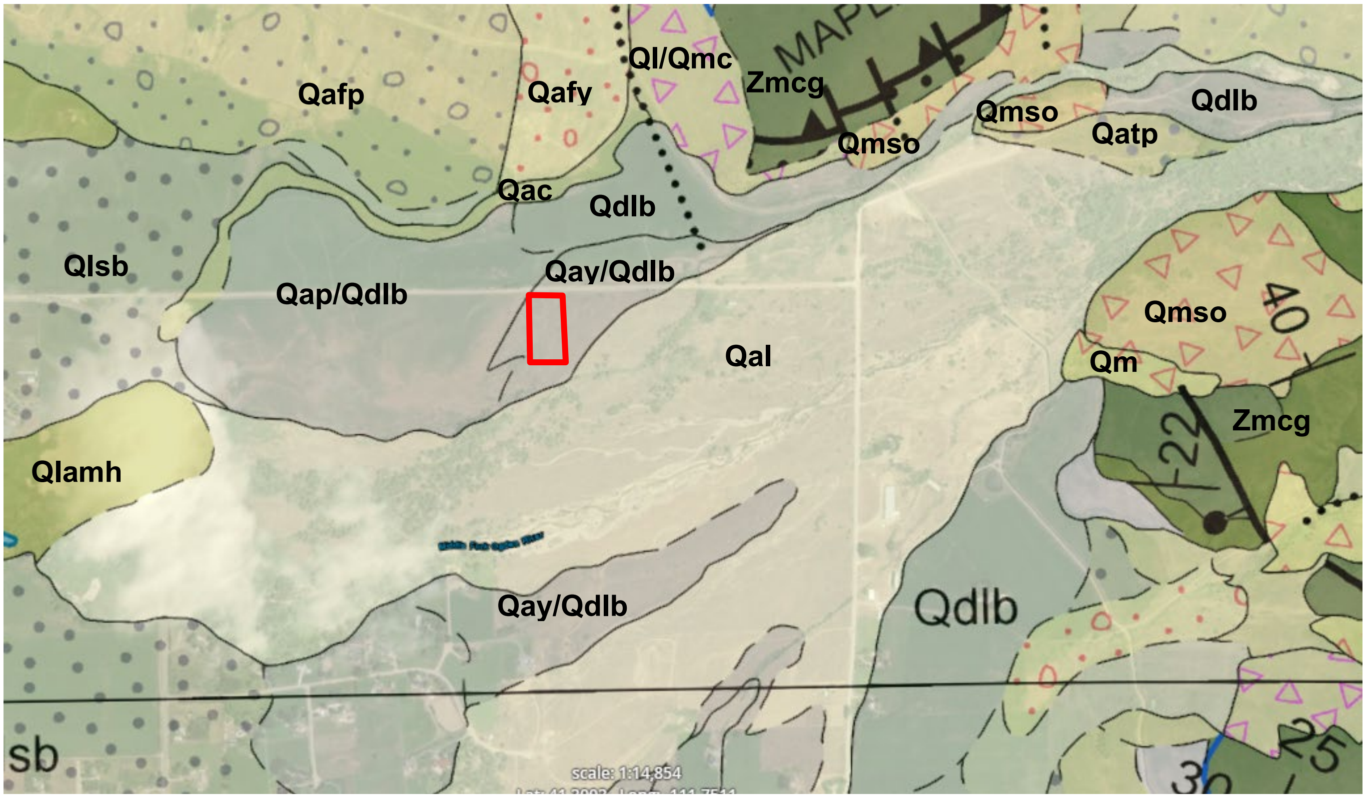
LOT LOCATION



PROJECT NO.: 219050		FIGURE NO.: 1

SURFICIAL GEOLOGIC MAP OF THE SITE

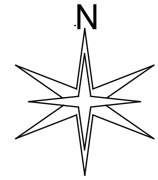
LOT 1, WESTWOOD SUBDIVISION
APPROXIMATELY 7600 EAST 1900 NORTH
EDEN, UTAH



Interim geologic map of the Ogden 30' x 60' quadrangle, Weber, Box Elder, Cache, Davis, Morgan, Rich, and Summit Counties, Utah, and Uinta County, Wyoming

Utah Geological Survey OFR 653
by
James C. Coogan and Jon K. King
2016

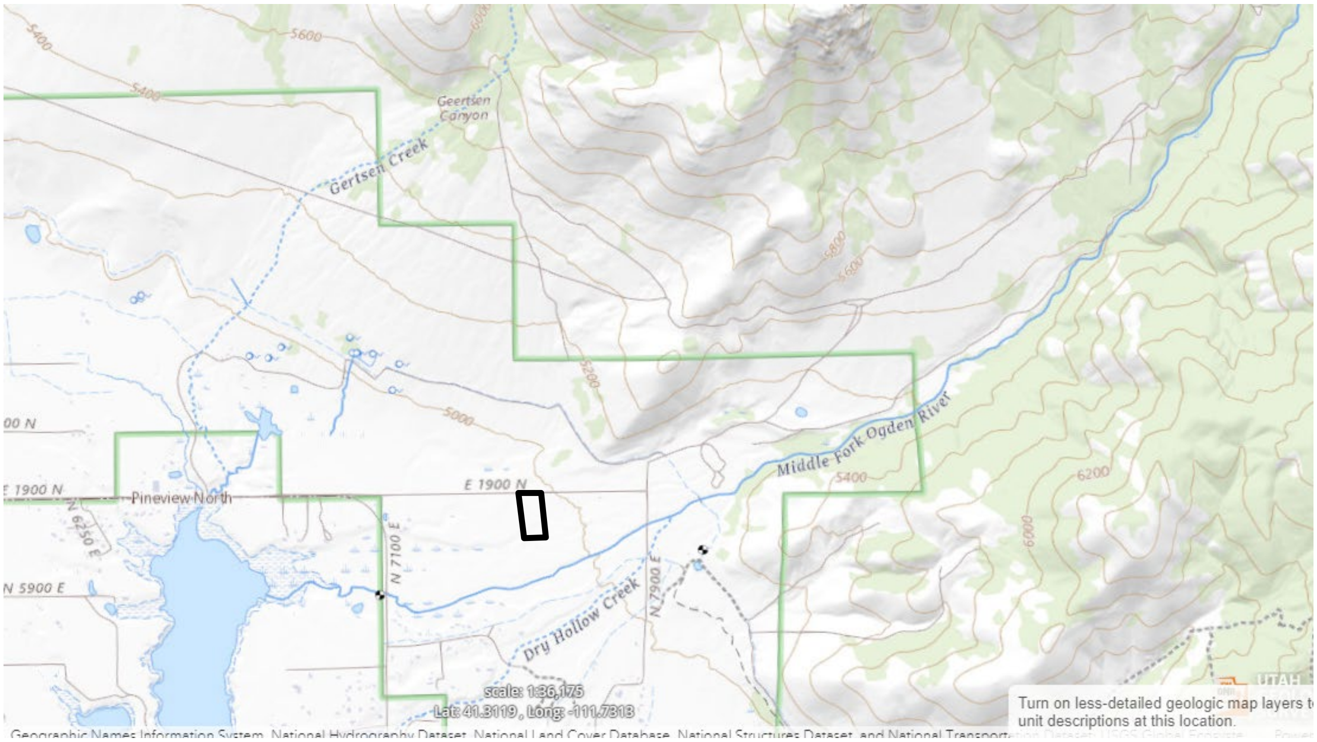
Lot Location



*Refer to the text for description of the units

PROJECT NO.: 219050	EARTHTEC ENGINEERING	**FIGURE NO.:** 2

TOPOGRAPHICAL MAP OF THE SITE AREA
LOT 1, WESTWOOD SUBDIVISION
APPROXIMATELY 7600 EAST 1900 NORTH
EDEN, UTAH



2021 Google Terrain Map – Huntsville Quad

N

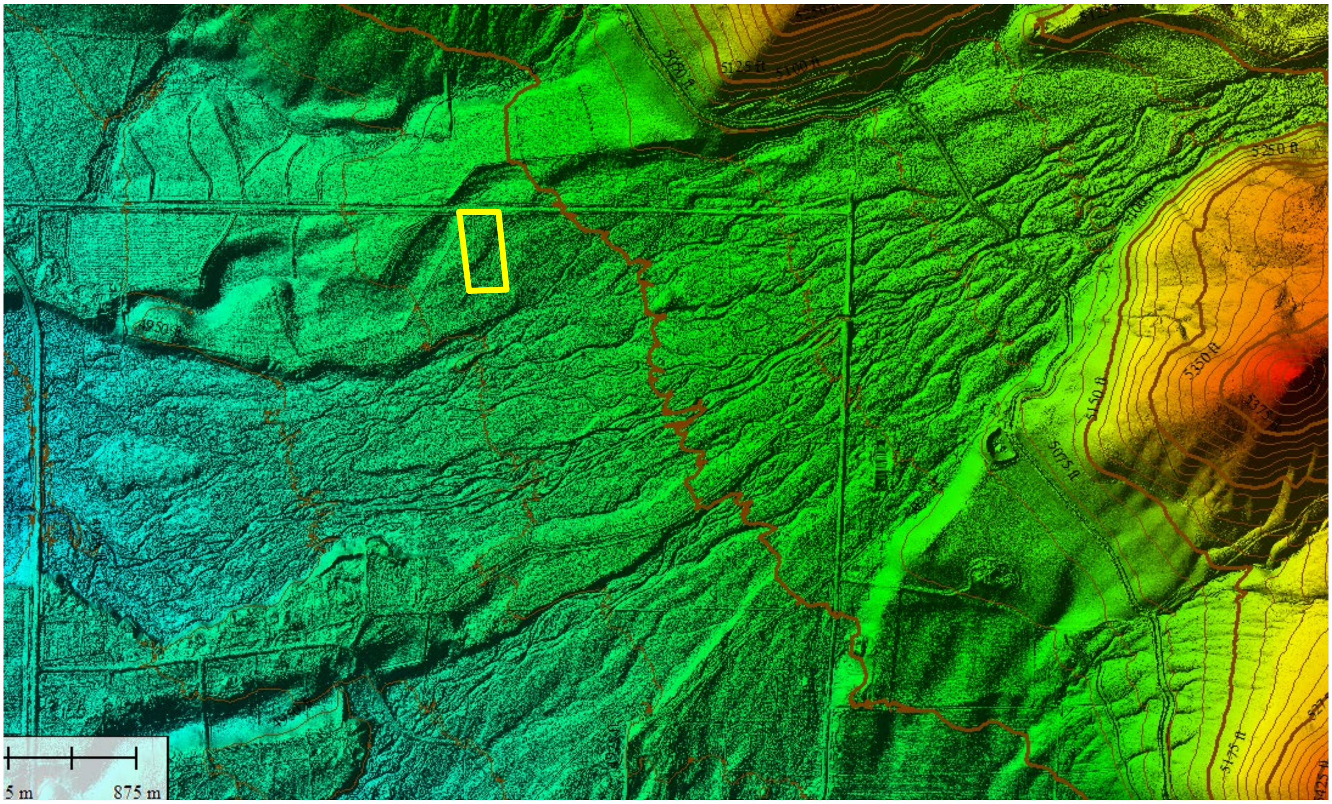
Not to Scale

LOT LOCATION

PROJECT NO.: 219050	Earthtec Engineering	**FIGURE NO.: 3**

LiDAR IMAGE OF THE SITE AREA

LOT 1, WESTWOOD SUBDIVISION
APPROXIMATELY 7600 EAST 1900 NORTH
EDEN, UTAH



0.5 Meter Bare Earth LiDAR DEM by Utah AGRC

N

Not to Scale

LOT LOCATION

PROJECT NO.: 219050	Earthtec Engineering	FIGURE NO.: 4

Frank F. Namdar, P.G., E.I.T.

Utah DOPL – Professional Geologist	191486-2250
Wyoming Board of Registration for Professional Geologists-P.G.	PG 2654
National Assessment Institute – Fundamentals of Engineering	1997

Work Experience-

Project Manager

Earthtec Engineering - Ogden, UT
August 2015 - Present
Geologist, Engineer-
*Prepared Geotechnical Investigation Reports
*Performed Geotechnical Investigations
*Performed Phase I & II Environmental Site Assessments
*Performed Geological Studies & Hazard Evaluations & reporting

Project Manager

Bingham Engineering, Inc. – Salt Lake City, UT
March 2003 - August 2015
Engineer, Geologist-
*Performed Phase I, II Environmental Site Assessments
*Performed Environmental Site Characterizations
*Performed Environmental Remedial Investigation
*Performed Remedial Actions
*Performed Geologic Hazard Studies
*Performed Geotechnical Studies
*Performed Environmental Sampling of indoor/outdoor Air, Soil, Surface and Ground Water
*Prepared Health & Safety Plans
*Performed Landfill Gas Testing
*Prepared NPDES Permit Compliance, reports, SWPPP, SPPP
*Performed Hazardous Materials Survey
*Performed Radiological Sampling, monitoring, Waste Characterizations, Human Health Risk Assessments, RI/FS, Remediations

Project Engineer

Summit Engineering Services – Salt Lake City, UT
March 2001 - February 2003
Engineer, Scientist
*Prepared environmental site assessment, subsurface investigation, quarterly monitoring reports, corrective action plan and feasibility studies on various remediation techniques related to underground storage tanks
*Operated and maintained groundwater and soil remediation systems related to USTs *Observed circular and H pile installation and performed
* Performed geotechnical analysis, design and recommendation, geological hazard evaluations and field explorations.

Project Engineer

Pentacore Resources – Salt Lake City, UT
August 2000 - March 2001
Engineer, Scientist
* Performed environmental engineering analysis, reports, research, field exploration and sampling, inspection, and AUTOCAD drawing for Phase I, Phase II, and RBCA projects
* Managed various environmental and Geotechnical projects
* Performed NPDES permit compliance, reports, site status monitoring reports and hazardous materials survey.
*Prepared Prepared NPDES Permit Compliance, reports, SWPPP, SPPP

Staff Engineer

Terracon – Salt Lake City, UT
May 1998 - August 2000
Engineer, Geologist
* Performed Geotechnical analysis, design and recommendations, geological hazard evaluations, field explorations, and laboratory testing for: commercial buildings along the Wasatch Front; Utilities and communication Towers in Utah, Idaho, and Wyoming; City, County and State Roads; Municipal Structures

Field Engineer

Maxim Technologies – Salt Lake City, UT
August 1993 - May 1998
Engineer, Geologist
*Performed Geotechnical analysis, soil design, field explorations, laboratory testing, and field construction inspections
*Prepared proposals and cost estimates and solicited potential clients for Geotechnical and construction inspections projects
* Performed environmental site assessments, groundwater modeling, field exploration, sampling, and UST removal and installations for various projects

Geologist

Airtech International, Inc. – Newport Beach, CA
October 1992 - December 1992
Environmental Geologist
* Prepared work plan for landfill soil gas sampling, and constructed test holes and monitoring wells for landfill soil gas and ground water sampling

Staff Engineer

Rogers & Associates Engineering Corporation – Salt Lake City, UT
January 1990 - December 1992
Environmental Engineer
*Performed ground water modeling, human health risk assessments
*Performed remediation investigations and feasibility studies

* Performed landfill performance assessments, and remediation and decommissioning for DOE, EPA and NRC projects
*Performed radiological monitoring and sampling to characterize NORM at a natural gas storage and distribution facility
*Performed site suitability and cost analysis, and possible subsurface geophysical options available for site evaluations for low level radioactive waste

<u>Geologist</u> Sergent, Huskins, and Beckwidth– Salt Lake City, UT
March 1988 - December 1990
Geologist, Engineering Assistant
* Performed geological background documentation, map and aerial photograph research, geologic hazard evaluation, photogeologic study for Kern River Pipeline project. Performed geological mapping, field data and sample collection. Conducted various field and laboratory soils tests, inspected materials for construction projects and prepared daily and weekly reports.

Education- University of Utah- Salt Lake City, UT
*Bachelor Degree – Geology 1990
University of Utah- Salt Lake City, UT
*Bachelor Degree – Geological Engineering 1992