Earthtec Engineering

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April 13, 2022

Mr. Bart Tatton
2677 North Water Canyon Road
Huntsville, UT 84317
Phone: (801) 726-6205
Email: barttatton@yahoo.com

**Re: Reconnaissance-Level Geologic Hazard Evaluation**
**Lots 444, 452, 453, 454, Evergreen Park**
**13308 East Pine Canyon Road and 2677 North Water Canyon Road**
**Huntsville, Utah 84317**
**Parcel Nos. 23:030:0028, 23:036:0055**
**Project No. 228244**

Mr. Tatton:

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

The subject site is an approximately 2.86-acres parcel (lot 444), and a 9.56-acre parcel (combined lots 452, 453, 454). We understand that the lots will be developed with single-family residential structures. The location of the lots is shown in Figure No. 1. The house locations or site plans were not available at the time of this study.

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. Morgan Valley is in the lower Weber River drainage basin and is situated within a structural trough shared by Ogden Valley to the north.

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.

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 ages (Bryant, 1988). The current geological mapping of the site was drawn from Coogan and King (2016) and is shown on Figure 2.

Both parcels were covered with 2 feet of snow at the time of site visit. The subject site (which includes both of the listed parcels) elevation ranges between approximately 5,788 to 5,823 feet above sea level. The south parcel (parcel no. 23:030:0028) is currently undeveloped. The north parcel (parcel no. 23:036:0055) currently has a few small structures such as two small children's play houses and sheds and construction and recreational equipment parked on the north portion of the parcel. The north parcel has a gentle southeast-facing slope with an average slope of approximately 7%. The south parcel has a gentle southeast-facing slope with an average slope of approximately 9%. The surficial geology of the site is mapped by Thomas Mullens (1969)[1] and Coogan and King (2016)[2] to be Wasatch Formation (Tw) of the Eocene and upper Paleocene age deposits, described in more detail below (see Figure No. 2). The areas surrounding the subject site are covered by the same deposits as described below:

**Tw** **Wasatch Formation (Eocene and upper Paleocene)** – Typically red to brownish-red sandstone, siltstone, mudstone, and conglomerate with minor gray limestone and marlstone locally; conglomerate clasts mainly rounded Neoproterozoic and Paleozoic sedimentary rocks, typically Neoproterozoic and Cambrian quartzite; basal conglomerate more gray and less likely to be red, and contains more locally derived angular clasts of limestone, dolomite and sandstone, typically from Paleozoic strata; lighter shades of red, yellow, tan, and light gray present locally and more common in uppermost part of Wasatch strata, complicating mapping of contacts with overlying similarly colored Norwood and Fowkes Formations; greatest thickness about 5000 to 6000 feet (1500-1800 m) southeast of Morgan and thinner to north and west with about 2500 feet (760m) exposed in Peterson quadrangle; thinner east of leading edge of Willard thrust sheet, typically 600 feet (180 m) thick or less in Lost Creek drainage, and up to about 800 feet (240 m) thick in Meachum Ridge quadrangle; thicknesses vary locally due to considerable relief on basal erosional surface, for example along leading edge of Willard thrust, and also note onlap of Wasatch strata north and south of Round Valley, east of Morgan. The Wasatch Formation is at least locally prone to slope failures.

The age of the Wasatch Formation is based on the Eocene-Paleocene boundary used in Jacobson and Nichols (1982), which is likely the C24 paleomagnetic reversal (see Hicks and others, 2003). Other Eocene-Paleocene boundaries would put P6 palynomorphs in the Eocene, and the P stands for Paleocene. Wasatch strata contain P4-5 palynomorphs in the Mecham Ridge quadrangle (Coogan, 2010a-b, sample 97-7). To the southeast in the Salt Lake City 30x60' quadrangle, Wasatch strata contain P5-6 palynomorphs, but also the palynomorph *Platycarya platycaryoides* (Nichols and Bryant plate 2 in Bryant, 1990, sample D6052), which is Eocene (see Nichols, 2003). See also Jacobson and Nichols (1982) for P5 and P5-6 palynomorphs from

[1] United States Geological Survey GQ-790: Geologic Quadrangle Map of Causey Dam, Weber County, Utah, by Thomas E. Mullens, 1969.

[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.

samples taken south of our map area (P3055-2A, 3B and P3387-2; their figure 7 updated with mapping by Bryant, 1990), and P5-P6 palynomorphs from another sample from the Wasatch Formation (P2833-1, 2; their figure 11 updated with mapping in this report). North of our map area and east of the Willard thrust sheet, about 200 to 1600 feet (60-500 m) of Wasatch Formation was reportedly penetrated in oil and gas exploration wells in Birch Creek fold belt (see API 43-033-30042, 43-033-30043, 43-033-30028, and 43-033-30002, Utah DOGM well and log files), but these thicknesses may include the Evanston Formation.

**Keh** Hams Fork Member of Evanston Formation (Upper Cretaceous, Maastrichtian-Campanian) – Typically Light gray, brownish-gray, and tan sandstone, conglomeratic sandstone, and quartzite- and chert-pebble conglomerate, and variegated gray, greenish-gray, and reddish-gray mudstone; in Phil Shop Hollow (Devils Slide quadrangle) and Echo Canyon, dark-gray, carbonaceous shale and coal in lower part (see Mullens and Laraway, 1964); coal beds are present up to 200 feet (60 m) above contact with basal conglomerate, or, if conglomerate is missing, the base of Hams Fork Member in the Lost Creek Dam quadrangle, and about 400 feet (120 m) above the contact with the basal conglomerate up Coal Hollow in the Francis Canyon quadrangle (see Doelling, 1972); lacks carbonaceous shale and coal elsewhere; member coarsens downward and westward becoming basal conglomerate (unit Kehc); in Durst Mountain quadrangle, lower Hams Fork coarsens downward to gray and brownish-gray, cobble conglomerate containing distinctive Neoproterozoic quartzite clasts (not mapped separately) (Coogan and King, 2006); unit Keh thickens northward from 300 feet (90 m) at Echo Canyon to about 600 feet (180 m) in Devils Slide quadrangle to 1200 feet (365 m) near Lost Creek Dam, then thinning to north to less than 450 feet (140 m) thick in Horse Ridge and Dairy Ridge quadrangles (Coogan, 2006a-b); mostly obscured by Wasatch Formation farther to north, but appears to be about 160 feet (50 m) thick in Walton Canyon, Meachum Ridge quadrangle; about 300 to 1000 feet (140-300 m) thick along South Fork Ogden River, thinning to west, with about 1000-foot (300 m) thickness to south in Durst Mountain quadrangle (Coogan and King, 2006); unconformably truncated and locally absent beneath Wasatch Formation. Hams Fork queried (Keh?) where outcrop may be Wasatch Formation (Tw) and queried in stacked unit (Keh?/Pp) where it may be surficial deposits.
The Hams Fork Member is absent west of the Willard thrust and north of the South Fork Ogden River on the Willard thrust sheet below the angular unconformity at the base of the Wasatch Formation and above the basal angular unconformity with the underlying Mesozoic and Paleozoic rocks (Coogan, 2006a-b). The northern Causey Dam, northwestern Horse Ridge, and western Dairy Ridge quadrangles were an area of high paleotopography on the Willard thrust sheet.

**Qms** **Landslide deposits (Holocene and upper and middle? Pleistocene)** – Poorly sorted clay- to boulder sized material; includes slides, slumps, and locally flows and floods. It is mapped where the age is uncertain (though likely Holocene and/or late Pleistocene), where portions of slide complexes have different ages but cannot be shown separately at map scale, or where boundaries between slides of different ages are not distinct.

**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).

**Qab** **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 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).

**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.

**Qal** **Stream alluvium and flood-plain deposits (Holocene and uppermost Pleistocene)** – Sand, silt, clay, and gravel in channels, flood plains, and terraces typically less than 16 feet (5 m) above river and stream level; moderately sorted; unconsolidated; along the same drainage Qal2 is lower than Qat2 and has likely been subject to flooding, at least prior to dam building; present in broad plains along the Bear, Ogden, and Weber Rivers and larger tributaries like Deep, Cottonwood, East Canyon, Lost, and Saleratus Creeks, along Box Elder, Heiners, and Yellow Creeks, and in narrower plains of larger tributary streams; locally includes muddy, organic overbank and oxbow lake deposits; composition depends on source area, so in back valleys typically contains many quartzite cobbles recycled from the Wasatch Formation; mostly Holocene, but deposited after regression of Lake Bonneville from the late Pleistocene Provo shoreline; width in Morgan Valley is combined flood plain of Weber River and East Canyon and Deep Creeks; 6 to 20 feet (2-6 m) thick and possibly as much as 50 feet (15 m) along Weber River and thinner in the Kaysville quadrangle; greater thicknesses (>50 feet [15 m]) are reported in Morgan Valley (Utah Division of Water Rights, well drilling database), but likely include Lake Bonneville and older Pleistocene deposits

**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, an 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.

The site is located predominately upon Tw: Wasatch Formation (Eocene and upper Paleocene), also identified as Tkwe, the main body of the Wasatch and Evanston Formations in USGS GQ-790 – Typically red to brownish-red sandstone, siltstone, mudstone, and conglomerate with minor gray limestone and marlstone locally; conglomerate clasts mainly rounded Neoproterozic and Paleozoic sedimentary rocks, typically Neoproterozoic and Cambrian quartzite; basal conglomerate more gray and less likely to be red, and contains more locally derived angular clasts of limestone, dolomite and sandstone, typically from Paleozoic strata. A geotechnical study and considerations for proper drainage and design of the foundation and use of proper soil characteristics to study the soils of the lot for development is recommended to determine the soil behavior under building loads, if such deposits are found at the site during a geotechnical exploration.

A reconnaissance of the site was conducted by a professional geologist on March 10, 2022.

South Parcel:
The south parcel is currently vacant and undeveloped. The surface of the site was covered mostly by snow. Most surficial features, if any, was covered by snow. The parcel is on a gentle southeast slope. There were no notable natural or man-made features at the site. A house was observed to the west of the parcel lots adjacent to the site.

North Parcel:
The north parcel was partially developed and had a few small structures such as two small children's play houses, metal storage bins, sheds and construction and recreational equipment parked on the north portion of the parcel. This parcel has a gentle southeast-facing slope. There is an ephemeral creek and a small pond near these structures. The surface of the site was covered mostly by snow, grass and trees. There is a steep slope on the north edge of the parcel south of Oak Canyon Road. There is a surface disturbance near a man-made structure that, at a small area below this slope, has impacted this slope potentially due to the removal of toes of the slope at this location. Any development at or near this slope will need to be evaluated for its stability. This is a small area and is not of great concern at this time but will need closer attention in future development. There were no other notable natural or man-made features at the site.

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 parcels or its surrounding parcels. High resolution aerial photographs of the area of the parcels were reviewed. Features related to faulting were not found in these aerial photographs. The Ogden Valley Northeastern Margin Thrust Faults are mapped at approximately 7 miles to the west of the site, and the Bear River Range Faults are mapped approximately 6 miles to the north of the site. Based on these findings, it is our conclusion that the potential for surface fault rupture or related tectonic or co-seismic 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 parcels 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 that portion of the north parcel.

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 for Ogden Valley area is low. The liquefaction susceptibility of underlying soils is not known and would require deep explorations to quantify. However, liquefaction impact in the mountainous areas is typically low unless the conditions described above exist. It is our opinion that impact from liquefaction at the subject parcels is relatively low.

Landslides

The referenced geologic maps reviewed for this assessment show the south parcel is at distance of approximately 780 feet north of the closest mapped landslide, and the north parcel is greater than 1,100 feet north of the same landslide. LiDAR imaging for the area of subject parcels was not available at the time of this study. A 10 Meter USGS Digital Elevation Model image (DEM) was reviewed (see Figure No. 3). This image is not a high-resolution image to allow determination of surficial features related to faults and landslides.

High resolution aerial photographs of the area of the parcels were reviewed. Features related to mass movement were not found in these aerial photographs. During our site observation of the north parcel, a short and steep slope north of the parcel and south of Oak Canyon Road was observed. We observed a surface disturbance near a man-made structure that at a small area below this slope has impacted this slope, potentially due to removal of toe of the slope at this location. Any development at or near this slope will need to be evaluated for its stability. This is a small area and is not a great concern at this point. A careful design for draining the soil for the development at the site will have to be addressed during the geotechnical study at the site to avoid the favorable conditions for landslide impacts at the site.

<u>Debris Flow</u>
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 alluvial fans (map unit Qac) are located over 800 feet to the west. The lot is not located near the mouth of canyons and is not subject to flow from drainages above the site. The ephemeral creek that feeds the small pond at the north parcel is not able to produce considerable flow to impact the parcel. The debris flow impact at the site is currently low.

<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>Flood Hazards</u>
Federal Emergency Management Agency (FEMA, 2015, 49057C0275F and 49057C0300E Flood Maps) for subject parcels were Zone D designation which is used for areas where there are possible but undetermined flood. Local sheet flow, slope wash, and seasonally perched soil water typical of sloping areas should be anticipated for the site, and site improvements.

<u>Other Geologic Hazards</u>
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. Slope angles between 30 to 45 degrees are optimal for avalanches as shown by Utah Avalanche Center. The risk of avalanches decreases on slope angles below 30 degrees. At 50 or more degrees, they tend to produce slough or loose snow avalanches that account for only a small percentage of avalanche deaths and property damage annually. Observing the topography of the potential source area at the site and the slopes of the mountain above the site, it appears that the impact from snow avalanche is relatively low.

**Conclusions**

Based on the research, observations, findings and geologic interpretations conducted for this assessment, we conclude that the relative risk to the subject parcels and future proposed development on the parcels from all other potential geologic hazards is relatively low and additional geologic hazards studies and/or mitigation measures are not warranted at the subject parcels. It is our opinion that the subject parcels are suitable for development of a single-family residential houses. As mentioned before in this letter: "*During our site observation of the north parcel, a short and steep slope north of the parcel and south of Oak Canyon Road was observed. We observed a surface disturbance near a man-made structure that at a small area below this slope has impacted this slope, potentially due to removal of toe of the slope at this location. Any development at or near this slope will need to be evaluated for its stability. This is a small area and is not a great concern at this point. A careful design for draining the soil for the development at the site will have to be addressed during the geotechnical study at the site to avoid the favorable conditions for landslide impacts at the site.*".

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. The 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
4/12/2022
STATE OF UTAH

Frank F. Namdar, P.G.
Geologist

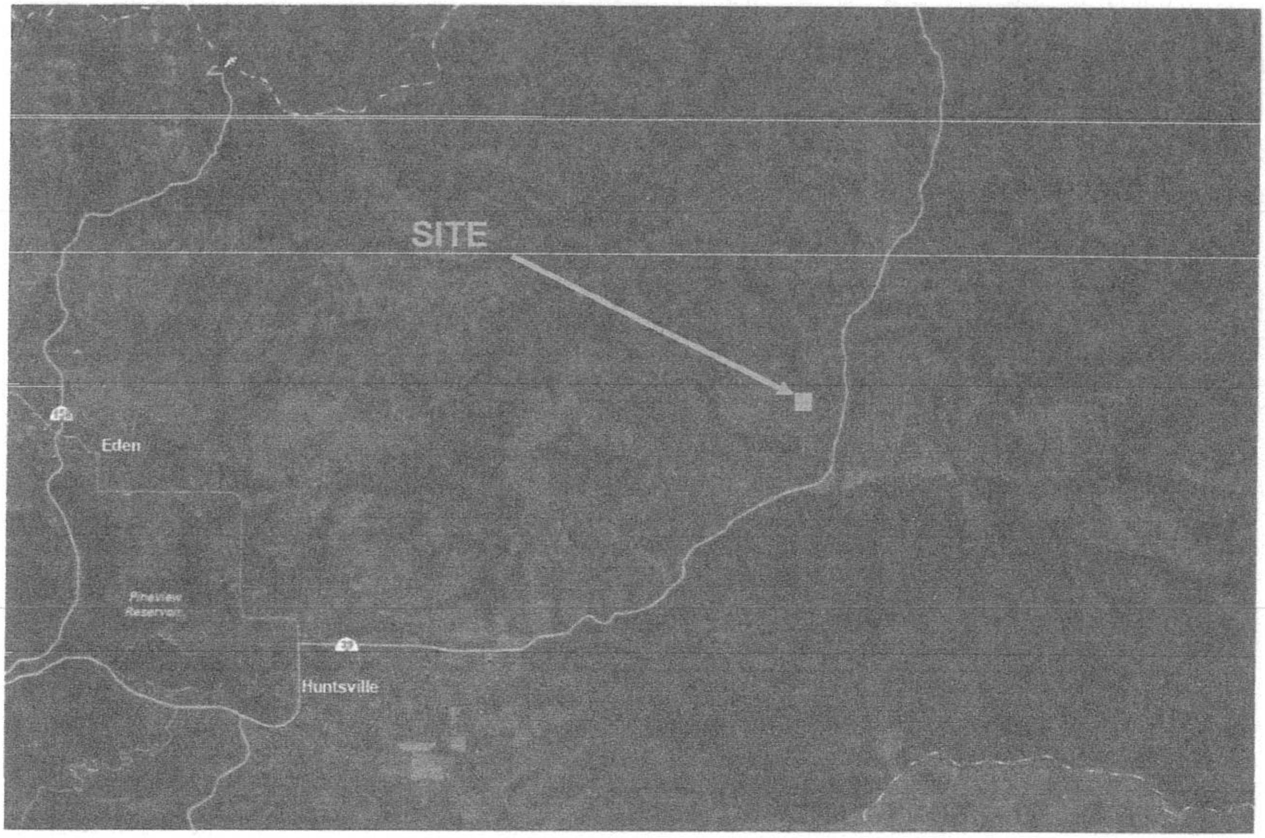
Michael S. Schedel
Staff Geologist

FN/ms

Attachments: Figure No. 1 *Site Location*
Figure No. 2 *Surficial Geologic Map of the Site*
Figure No. 3 *Digital Elevation Model of the Subject Site Area*
*Statement of Qualifications*

# SITE LOCATION

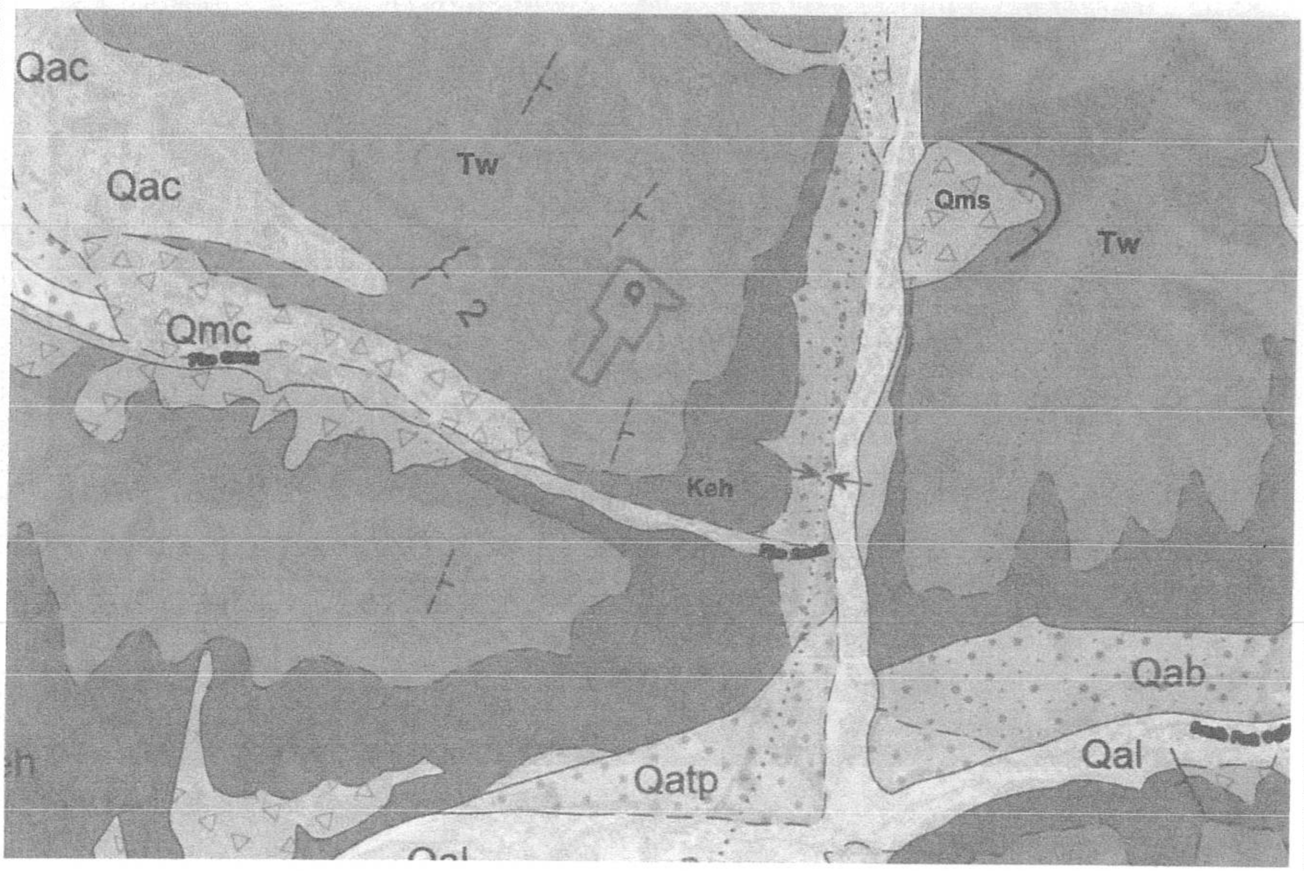
## LOTS 444, 452, 453, 454, EVERGREEN PARK
## 13308 EAST PINE CANYON ROAD AND 2677 NORTH WATER CANYON ROAD
## HUNTSVILLE, UTAH




*Aerial photo by Utah Parcels

| | | |
|---|---|---|
| **PROJECT NO.:** 228244 | EARTHTEC ENGINEERING | **FIGURE NO.:** 1 |

# SURFICIAL GEOLOGIC MAP OF SITE
## LOTS 444, 452, 453, 454, EVERGREEN PARK
## 13308 EAST PINE CANYON ROAD AND 2677 NORTH WATER CANYON ROAD
## HUNTSVILLE, 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**

*Refer to the text for description of the units

**Site Location**

N

Not to Scale

| PROJECT NO.: 228244 | EARTHTEC ENGINEERING | FIGURE NO.: 2 |
|---|---|---|

**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-**

<u>Project Manager</u>

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

<u>Project Manager</u>

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

<u>Project Engineer</u>

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

Geologist

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