GCS Geoscience

Report Professional Geologist Site Reconnaissance and Review
Proposed Liberty 14.02 Acre Subdivision Parcel
Parcel #22-004-0142 (10.83-Ac.), 5638 N. 3100 East Street
Parcel #22-280-0001 (3.19-Ac.), 2955 E. 5750 North Street
Liberty, Weber County, Utah

For:

Scott and Rachel Hale
983 E. Bella Vista Drive
Fruit Heights, Utah
84037

By:

GCS Geoscience
554 South 7700 East Street
Huntsville, Utah 84317

December 22, 2020
GCS File No: 2020.73

GCS Geoscience

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December 22, 2020
File No: 2020.73

Scott and Rachel Hale
983 E. Bella Vista Drive
Fruit Heights, Utah
84037

Attn: Scott and Rachel Hale

Subject: Report
Professional Geologist Site Reconnaissance and Review Services
Proposed Liberty 14.02 Acre Subdivision Parcel
Parcel #22-004-0142 (10.83-Ac.), 5638 N. 3100 East Street
Parcel #22-280-0001 (3.19-Ac.), 2955 E. 5750 North Street
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INTRODUCTION

In response to your request, GCS Geoscience (GCS) has prepared this Professional Geologist site reconnaissance review report for the above referenced site. The 14.02-Acre Proposed Subdivision Parcel consists of two contiguous property parcels, 10.83-acres, and 3.19-acres, that are proposed to be combined and subdivided into two or more single-family residential development lots. The proposed subdivision property is located in the Liberty Area in Weber County, Utah, as shown on attached Figure 1. Figure 2 provides aerial coverage of the site and detail of the current (2018) layout of the site vicinity.

The property is presently open and undeveloped and appears to presently be used for agricultural purposes. The subject properties and surrounding properties are zoned by Weber County as Agricultural Valley AV-3 (Agricultural Valley Zone - 3) land-use zone. According to the Weber County Code of Ordinances the purpose of *the Agricultural Valley AV-3 Zone is to designate farm areas, which are likely to undergo a more intensive urban development, to set up guidelines to continue agricultural pursuits, including the keeping of farm animals, and to direct orderly low-density residential development in a continuing rural environment.*

The prescribed minimum building lot area in the AV-3 Zone is three acres (excluding cluster provision areas), with single family residences included as a permitted use.

It is our understanding that you are proposing to combine and subdivide the properties into two or more single-family residential homesite lots. We expect that the proposed construction will consist of a single-family residence structures, likely to be constructed with a basement level and supported on conventional spread and strip footings. Above grade levels will consist of wood frame construction one to three levels in height. Projected site grading is anticipated to consist primarily of cutting into the existing ground to construct the residences and roadways, with very little fill projected for the site.

Because the proposed subdivision site appears to be located in part on a hillslope area in the vicinity of mapped landslide hazards, marginal soils, Quaternary faults and FEMA floodplain areas, Weber County is requesting that a geological site reconnaissance be performed to assess whether all or parts of the site are exposed to the hazards that are included in the Weber County Code, Section 108-22 Natural Hazard Areas. These hazards include, but are not limited to: Surface-Fault Ruptures, Landslide, Tectonic Subsidence, Rock Fall, Debris Flows, Liquefaction Areas, Flood, or other Hazardous Areas.

Scope of Work

The purpose of this **Professional Geologist Site Reconnaissance Review** is to evaluate if the proposed development is outside or within areas identified as Natural Hazards Overlay District, and if within a hazard area, to recommend appropriate additional studies that comply with the purpose and intent of the Weber County Natural Hazards Area guidelines and standards in order to be "cleared" for building permit issuance by the county, as outlined by the Weber County Development Process packet as provided by the Weber County Building Inspection Department.

The objectives and scope of this study were presented Scott and Rachel Hale (Clients) in our (GCS) Proposal-Agreement dated December 5, 2020, and was returned signed December 7, 2020 by Scott Hale.

LITERATURE AND RESOURCE REVIEW

To evaluate the potential exposure of sites to geological hazards that impact sites or site improvements, Weber County has compiled a series of Geographic Information Systems (GIS) data mapping layers of geological hazard related information. These data may be queried on-line using the Weber County Geo-Gizmo web server application at:

http://www.co.weber.ut.us/gis/maps/gizmo/.

Using the Geo-Gizmo application, under the Engineering Layers category, is listed geological hazard related layers that may be toggled on and off to determine potential hazards exposure to sites in the county. These mapping layers include the following categories; *Quake Epicenters, FEMA Flood Zone Line, FEMA Base Flood Elevation, Wasatch Faults, Landslide Scarps, Geologic Faults, Faults, Quaternary Faults, FEMA Flood Zone, FEMA LOMR, Engineering Problems; Liquefaction Potential, Landslide, FEMA Letters of Map Change, and FEMA Flood Zones.* These layers have been compiled from the respective agencies including the Federal Emergency Management Agency (FEMA), the Utah Geological Survey (UGS), and the U.S. Geological Survey

(USGS). These mapping layers consist of regional compilation hazards data but are not compiled at scales that are necessarily applicable for site specific usage and planning. When hazard layer data on the Geo-Gizmo are found to overlay with Permit Applicant site improvement locations, Weber County Engineers and Planners will request that the Permit Applicant have a Professional Geologist Site Reconnaissance Review, such as presented herein, conducted for the site.

In addition to the Geo-Gizmo site screening, the Weber County Engineers and Planners rely on published UGS geological mapping (Coogan and King, 2016), that includes much of Weber County for determining if a site is located upon a potentially hazardous geological mapping unit, thus requiring a geological reconnaissance. This interactive "Weber County Geologic Map" may be viewed on-line at:

https://weber.maps.arcgis.com/apps/webappviewer/index.html?id=bd557ebafc0e4ed58471342bb03fdac5

Our preliminary review of the Geo-Gizmo found no areas of concern for the proposed subdivision location.

Our review of the Weber County Geologic Map indicated that the site is located upon a geological mapping units designated as ***Qac**- Mixed deposits…(Holocene and Pleistocene),* **Qa2/Qafp?** - Alluvial deposits*…(Holocene and Pleistocene), and* **Qab - Qapb** - Alluvial deposits…(upper Pleistocene); these are mapping units that have been found related to geologic hazard processes in Weber county, thus requiring this reconnaissance and review.

Our site-specific review consisted of a GIS data integration effort that included:

1. Reviews of previous mapping and literature pertaining to site and regional geology including and Sorensen and Crittenden (1979), Mulvey (1992), USGS and UGS (2016), Elliott and Harty (2010), King and McDonald (2014), and Coogan and King (2016).

2. An analysis of vertical and stereoscopic aerial photography for the site including a 1963 1:15,840 scale stereoscopic sequence, 2012 5.0 inch digital HRO orthoimagery coverage, and 2014 1.0 meter digital NAIP orthoimagery coverage of the site.

3. A GIS analysis using the QGIS® GIS platform to geoprocess and analyze 2011 1.0 meter LiDAR digital elevation data made available for the site by the Utah Automated Geographic Reference Center (AGRC). The GIS analysis included using the QGIS® platform Geospatial Data Abstraction Library (GDAL, 2013) Contour; the GRASS® (Geographic Resources Analysis Support System, 2013) r.slope and r.shaded.relief modules.

For the best site-specific documentation for this review we relied on geologic mapping by Coogan and King (2016), which provided the most up-to-date rendering of geological mapping for the site location. Supporting documentation by King and McDonald (2014), Sorensen and Crittenden (1979), and FEMA (2015) was also used to support this review. The geological mapping for this review is provided on Figure 3, Geologic Mapping. Topographic, slope, and elevation data for this review was supported through the aforementioned LiDAR analysis which is presented on Figure 4, LiDAR Analysis.

REVIEW FINDINGS

The site is located in Ogden Valley on the eastern flank of Chilly Peak. The valley is a northwest trending fault bounded graben structure, with the Wasatch Range comprising the western flank of the valley and the Bear River Range the eastern flank (Avery, 1995). Chilly Peak is located approximately 2.8 miles west of the site, and stands 8620 feet in elevation. Topographically the site is located on older (ancestral) valley floodplains of the North Fork of the Ogden River, which is presently located over 800 feet to the west of the site. The elevation of the site surface ranges between approximately 5256 feet on the southeast side of the site, and 5288 feet on the west side of the site as shown on Figure 4. For the most part, the surface of the site is formed upon lacustrine and alluvial sediments that were deposited during the transgression and regression of Lake Bonneville between 19,000 to 15,000 years ago (Currey and Oviatt, 1985). An unnamed drainage crosses on the very north of the site. The water from this drainage originates from emergent springs on slopes to the north of the site

Geological Mapping: Figure 3 shows the location of the site relative to GIS overlays including geological mapping drawn from Coogan and King (2016). A summary of the geological mapping of the site vicinity, as paraphrased from Coogan and King (2016), is provided as follows:

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

Qay – Qa2 - Younger alluvium (mostly Holocene) – Like undivided alluvium, with **Qay** and **Qa2** at to slightly above present drainages, unconsolidated, and not incised by active drainages; likely mostly Holocene in age and postdates late Pleistocene Provo shoreline of Lake Bonneville...

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...

Qmc - Landslide and colluvial deposits, undivided (Holocene and Pleistocene) – Poorly sorted to unsorted clay- to boulder-sized material...(slopewash and soil creep)...These deposits are as unstable as other landslide units...

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

Qalp? - Lake Bonneville regression-age stream alluvium (upper Pleistocene?) – Pebble and cobble gravel, gravelly sand and silty sand, with minor clay in channel incised into Lake Bonneville deltaic and lacustrine deposits...

Qab - Qapb - Lake Bonneville-age alluvium (upper Pleistocene) – Related to shorelines of Lake Bonneville, Sand, silt, clay, and gravel in channels, flood plains, and terraces, unconsolidated to weakly consolidated alluvium...

Qa2/Qafp? - Younger alluvium (mostly Holocene) **Qa2** over **Qafp?** Lake Bonneville-age alluvial-fan deposits (upper Pleistocene) — Related to shorelines of Lake Bonneville, mostly sand, silt, and gravel that is poorly bedded and poorly sorted...

Tn – Norwood Formation (lower Oligocene and upper Eocene) – Typically light-gray to light-brown altered tuff (claystone), altered tuffaceous siltstone and sandstone, and conglomerate...

Zkc - Kelley Canyon Formation (Neoproterozoic) – Dark-gray to black, gray to olive-gray-weathering argillite to phyllite, with rare metacarbonate...The Kelley Canyon Formation is prone to slope failures...

In summary, the site vicinity is bounded on the east and west by eastward thrusted Precambrian and Paleozoic rocks (Sorensen and Crittenden, 1979), which form the mountains, with the valley forming as a fault bounded graben structure (Avery, 1995). Most recently, in the past 19,000 to 15,000 years ancient Lake Bonneville inundated parts of Ogden Valley (Currey and Oviatt, 1985), leaving transgressional lake bed and related recessional alluvial deposits (**Qab – Qapb**, and **Qafp?**) on the site with remnant (**Qa2**), alluvium covering the ancient recessional alluvial deposits, with active alluvial deposits (**Qac**) occurring along the unnamed drainage on the north side of the site.

Hazards Review: In addition to the review and location query we searched for nearby or proximal classifications or conditions that could possibly present hazardous conditions to the site. A summary of this search is provided as follows:

1. **Landsliding:** The nearest active landslide units are mapped as **Qms** deposits by Coogan and King (2016), and are located approximately 1700 feet to the east of the site, as shown on Figure 3. These deposits should not impact the proposed subdivision.

2. **Alluvial fan debris flow processes** including flash flooding and debris flow hazard: The nearest potential debris flow process deposits to the site are mapped as **Qafy** by Coogan and King (2016)**,** and occur approximately 960 feet to the northeast of the site, and these deposits should not impact the proposed subdivision.

3. **Surface fault rupture hazards, strong earthquake ground motion, tectonic Subsidence and liquefaction:**

   Surface fault rupture hazards: The nearest active (Holocene) earthquake fault to the site is the Weber section of the Wasatch fault zone (UT2351E) which is located 3.7 miles west of the site, thus fault rupture hazards are not considered present on the site (Black and others, 2004). The Ogden Valley North Fork fault (UT2376) is located much closer to the site, approximately 0.5 miles to the southwest of the proposed subdivision, however the most recent movement along this fault is estimated to be pre-Holocene (<750,000 ybp), and is not considered an active risk to the site (Black and others, 1999). Active earthquake faults are generally considered to be faults which have disrupted the ground surface within the past 11,000 years of earth history (the Holocene epoch). Implied with this definition is that such faults are likely to disrupt the ground surface in the relatively near future (Lund and others, 2016).

   Strong earthquake ground motion originating from the Wasatch fault or other near-by seismic sources is capable of impacting the property. The Wasatch fault zone is considered active and capable of generating earthquakes as large as magnitude 7.3 (Arabasz and others, 1992). Based on probabilistic estimates (Peterson, and others, 2014) queried for the site, the expected peak horizontal ground acceleration on rock from a large earthquake with a ten-percent probability of exceedance in 50 years is as high as 0.20*g,* and for a two-percent probability of exceedance in 50 years is as high as 0.49*g* for the site.

   The a ten-percent probability of exceedance in 50 years event has a return period of 475 years, and the 0.20*g* acceleration for this event corresponds " strong" perceived shaking with "light" potential damage based on instrument intensity correlations. The two-percent probability of exceedance in 50 years event has a return period of 2475 years, and the 0.49*g* acceleration for this event corresponds "severe" perceived shaking with "moderate to heavy" potential damage based on instrument intensity correlations (Wald and others, 1999).

   Future ground accelerations greater than these are possible but will have a lower probability of occurrence.

   Tectonic Subsidence is surface tilting subsidence that occurs along the boundaries of normal faults in response to surface-faulting earthquakes (Keaton, 1986). Because the site is not located in near proximity to active earthquake faults, tectonic subsidence hazards are not considered a risk to the site.

Liquefaction potential hazards: In conjunction with strong earthquake ground motion potential of large magnitude seismic events as discussed previously, certain soil units may also possess a potential for liquefaction during a large magnitude event. Liquefaction is a phenomenon whereby loose, saturated, granular soil units lose a significant portion of their shear strength due to excess pore water pressure buildup resulting from dynamic loading, such as that caused by an earthquake. Among other effects, liquefaction can result in densification of such deposits causing settlements of overlying layers after an earthquake as excess pore water pressures are dissipated. Horizontally continuous liquefied layers may also have a potential to spread laterally where sufficient slope or free-face conditions exist. The primary factors affecting liquefaction potential of a soil deposit are: (1) magnitude and duration of seismic ground motions; (2) soil type and consistency; and (3) occurrence and depth to groundwater.

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). Liquefaction commonly occurs in saturated non-cohesive soils such as alluvium, consequently the alluvial deposits on the site mapped as deposits **Qab – Qapb**, **Qa2/Qafp?** and **Qac** may be susceptible to liquefaction during a future large earthquake event.

4. **Rockfall and avalanche hazards**: The site is over a mile from steep slope areas where such hazards may originate.

5. **Flooding:** Mapping by Federal Emergency Management Agency (FEMA, 2015) is shown on Figure 3. The Zone A and AE shown on Figure 3, includes the 100-year flood hazard zone as delimited by FEMA (2015) studies conducted in the Ogden Valley area. On the basis of the FEMA determination *...mandatory flood insurance purchase requirements and floodplain management standards apply...*for improvements made in the Zone AE area shown on Figure 3. The entirety of the proposed subdivision is shown to be outside the flood zone areas shown on Figure 3.

   Spring time and rapid snowmelt flooding may occur along the unnamed drainage within the **Qac** mapped areas, on the north side of the site. Local sheet flow, slope wash, and seasonally perched soil should be anticipated for the site, and site improvements.

6. **Sloping surfaces:** The site vicinity slope gradients developed from our LiDAR analysis range from level to well over 50-percent as shown on Figure 4. Within the subdivision area slope gradients are relatively gentle. On Figure 4, the property slopes are shown to slope very gently to the east. The calculated average slope for subdivision area is 4.3 percent.

The threshold gradient for site slope development considerations and hillside review according to the Weber County Section 108-14-3 includes slopes greater that 25-percent (Weber County Code, 2020).

7. **Radon exposure:** Radon is a naturally occurring radioactive gas that has no smell, taste, or color, and comes from the natural decay of uranium that is found in nearly all rock and soil. Radon and has been found occur in the Ogden Valley area, and can be a hazard in buildings because the gas collects in enclosed spaces. Indoor testing following construction to detect and determine radon hazard exposure should be conducted to determine if radon reduction measures are necessary for new construction. The radon-hazard potential mapping has been prepared for most of Ogden Valley by the Utah Geological Survey (Solomon, 1996), and the property appears to be located in an area mapped as having a "Moderate" radon potential classification. For new dwelling structures radon-resistant construction techniques as provided by the EPA (2016) should be considered.

Site Reconnaissance

The proposed subdivision site was reconnoitered on December 12, 2020. The property was observed to be open and undeveloped and appears to be used for agriculture purposes. The property was accessed from 3100 East Street on the east side of the property. The surface of the site consists primarily of a nearly planar surface that slopes very gently to the east.

Cover vegetation on the site is assumed to consist of cultivated pasture grass, with the site observed to be almost entirely covered with cut hay during the time of our reconnaissance. Site soils were observed to be silty sands and sandy silts, with gravel and cobbles presumed to be at depth.

Irrigation piping and sprinkler connections were observed stationed across the site. The unnamed drainage on the north side of the site was observed to be approximately three feet lower than surrounding ground, and ice-covered but flowing at the time of our reconnaissance.

At the time of our reconnaissance, adjacent properties were similarly undeveloped or consisted of farmsteads with single family homes. During the reconnaissance no conditions of imminent geologic hazards were observed at the site.

CONCLUSIONS

Based upon the findings of this review we believe that the subject 14.02-acre proposed subdivision location is not adversely exposed to the geological hazards specified in the Section 108-22 Natural Hazard Areas of the Weber County Code (2020). With this finding we point out that the alluvial deposits on the site mapped as **Qab – Qapb, Qa2/Qafp? and Qac** may be susceptible to liquefaction during a future large earthquake event. Liquefaction Potential studies are not required for residential land uses in Weber County; however, disclosure of such conditions is required by Sec. 108-

22-4. - Disclosure required of the Weber County Code (2020). For the subdivision property we consider the potential liquefaction hazard as undetermined, and disclose that the hazard may be present on the site.

Rapid snowmelt and spring run-off flooding may occur during the future on the unnamed drainage on the north side of the site, to avoid potential flooding we recommend that the mapped **Qac** areas on the site be avoided for the placement of dwellings on the proposed subdivision.

Because groundwater and subsurface soils conditions for the site are presently unevaluated, we suggest that site specific geotechnical engineering soils and groundwater study be considered for the eventual subdivision design and construction, and minimally we recommend that a licensed Geotechnical Engineer observe the foundation excavations prior to the setting of the footings of the homesite structures to be constructed on the proposed subdivision, to confirm the suitability of the foundation soils for the proposed subdivision construction.

Although not addressed by the Weber County ordinances, we recommend that radon exposure be evaluated to determine if radon reduction measures are necessary for the homesite construction on the proposed subdivision. It is our understanding that new construction in Ogden Valley area often includes radon remedial measures as part of final design.

LIMITATIONS

Our services were limited to the scope of work discussed in the introduction section of this report, and the **Conditions** specified in our (GCS) Proposal-Agreement dated December 5, 2020. The results provided by this study are limited to geological hazards included as "potential hazards" in Section 108-22 Natural Hazard Areas of the Weber County Code (2020). The reporting provided here is not a geotechnical engineering study based upon subsurface observations, and should in no way preclude the results of geotechnical engineering soils and groundwater studies for foundations, earthwork, and geoseismic design prepared by a professional engineer licensed in the State of Utah.

Although risk can never be eliminated, more detailed and extensive studies yield more information, which may help understand and manage the level of risk. The recommendations contained in this report are based on our site observations, available data, probabilities, and our understanding of the facilities investigated. This report was prepared in accordance with the generally accepted standard of practice at the time the report was written. No warranty, express or implied, is made.

This report may be used only by the Client and only for the purposes stated within a reasonable time from its issuance. The regulatory requirements and the "state of practice" can and do change from time to time, and the conclusions presented herein may not remain current. Based on the intended use of the report, or future changes to design, GCS Geoscience may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the Client or anyone else, unless specifically agreed to in advance by GCS Geoscience in writing will release GCS Geoscience from any liability resulting from the use of this report by any unauthorized party.

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We appreciate the opportunity to work with you on this project and look forward to assisting you in the future. If you have any questions or need additional information on this or other reporting, please contact the undersigned at (801) 745-0262 or (801) 458-0207.

Respectfully submitted,

GCS Geoscience

Gregory C. Schlenker, PhD, PG
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Principal Geologist

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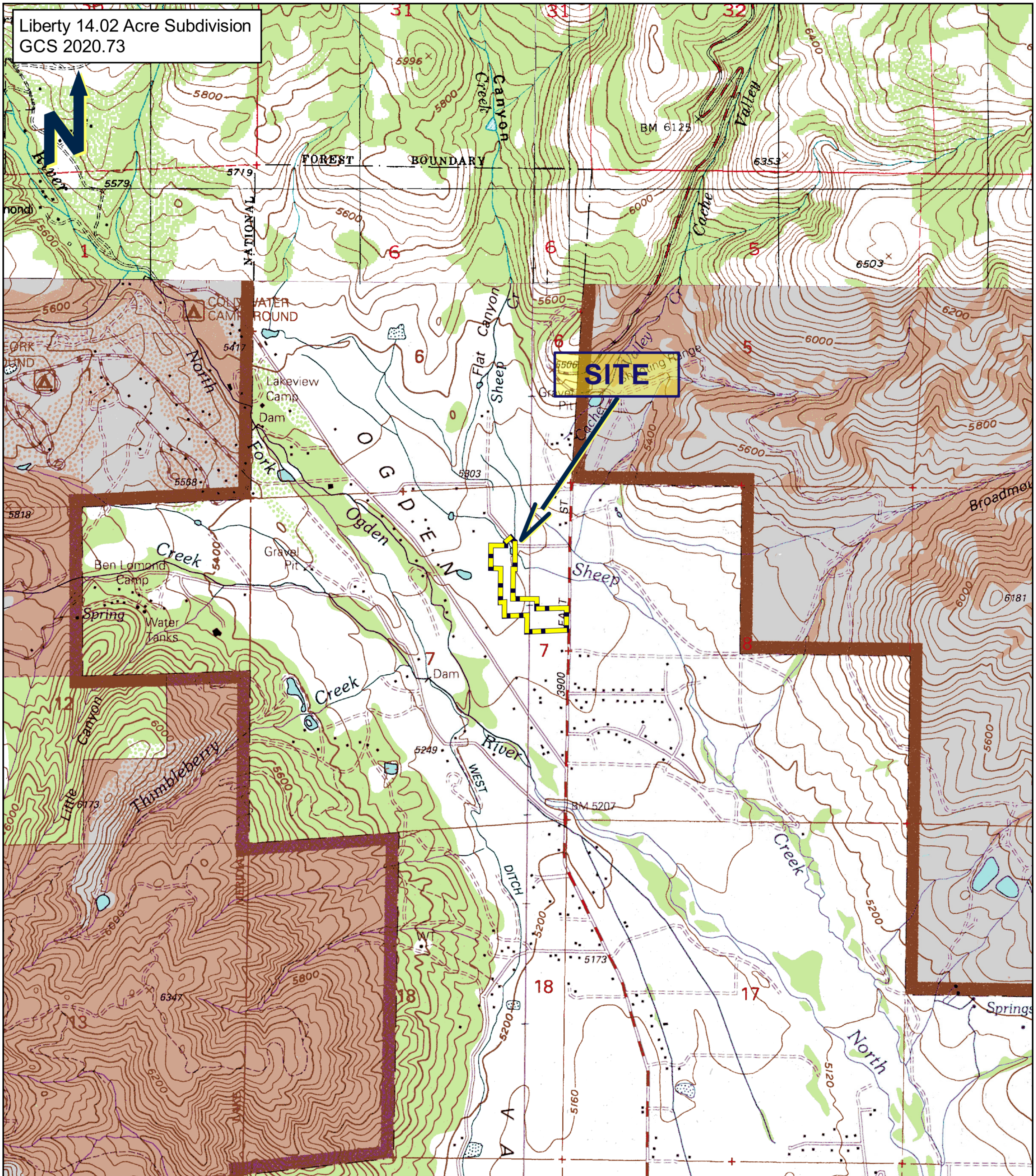
Encl. Figure 1, Site Vicinity Map
Figure 2, Aerial Coverage
Figure 3, Geologic Mapping
Figure 4, LiDAR Analysis

Liberty 14.02 Acre Subdivision
GCS 2020.73



Base:
USGS 7.5 Minute topographic maps titled "North Ogden, Utah 1998; Mantua, Utah, 1991; James Peak , Utah 1991; and Huntsville, Utah 1998"from Utah AGRC; http://gis.utah.gov/

0 2000 4000 ft

1:24,000

FIGURE 1
VICINITY MAP

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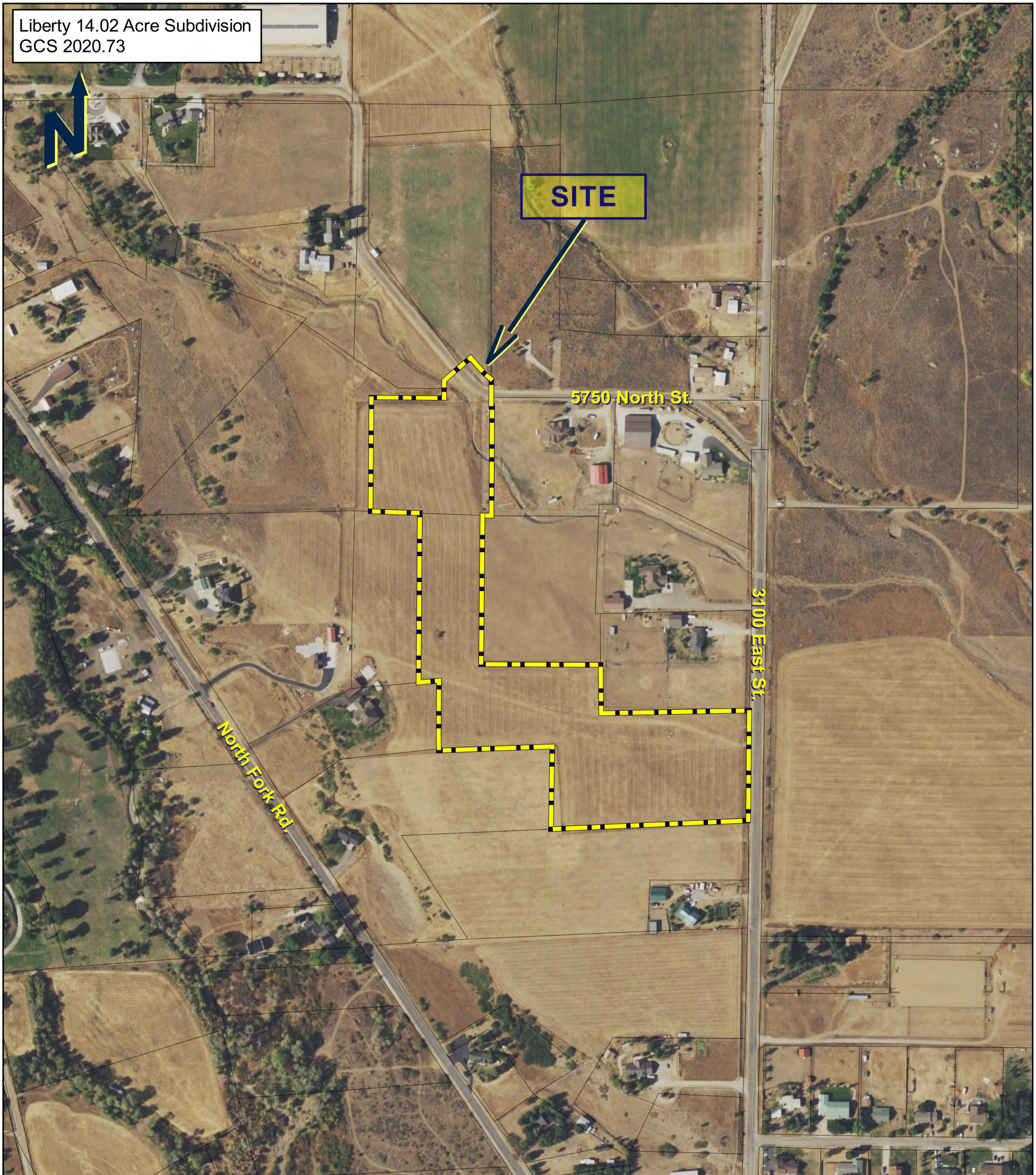

Base:
2018 0.6m NAIP Color Orthoimagery,
from Utah AGRC; http://gis.utah.gov/

0 400 800 ft

1:4,800

FIGURE 2
AERIAL COVERAGE

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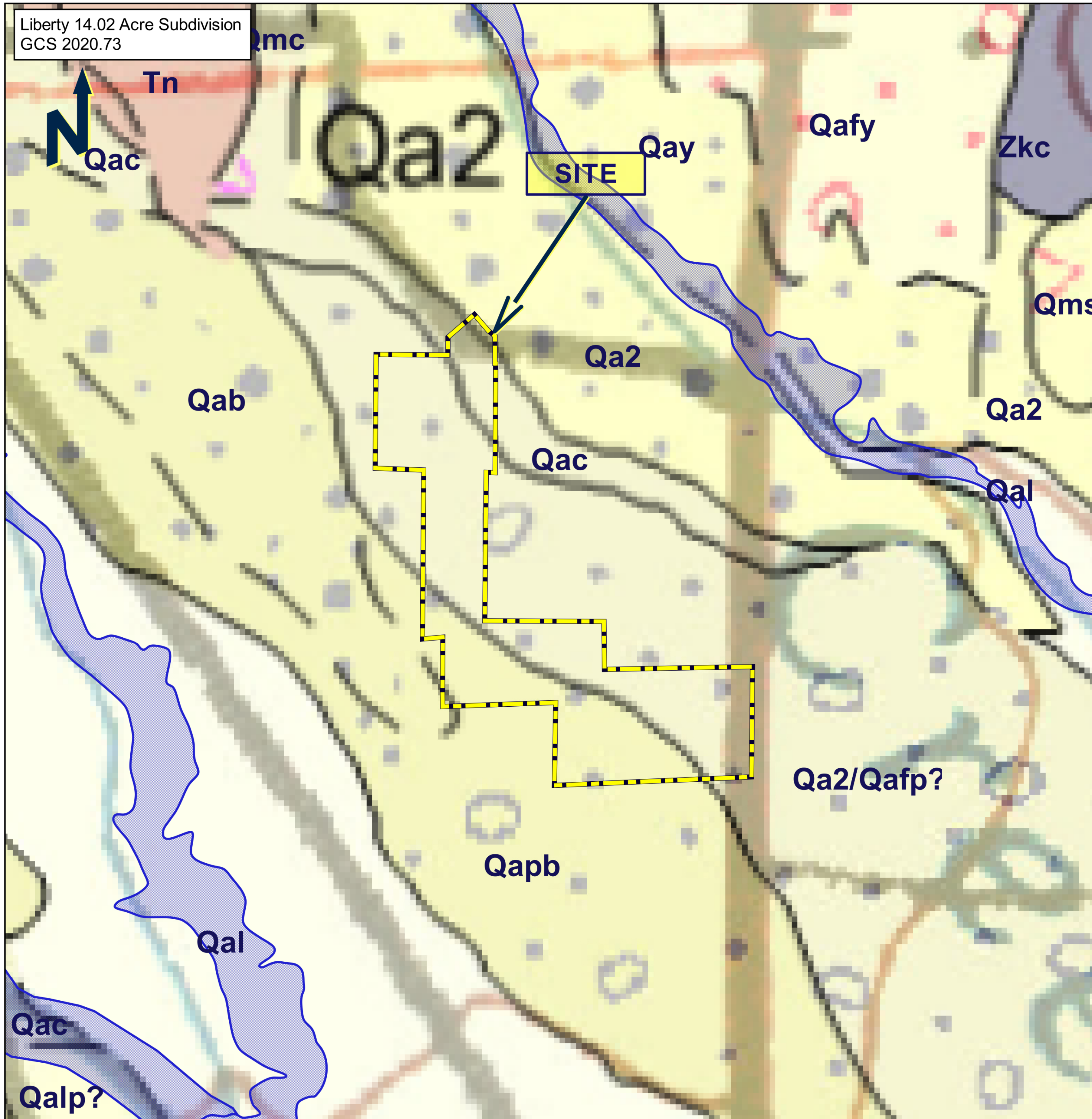

Base:
Coogan and King, 2016

0 400 800 ft

1:4,600

Geology (after Coogan and King, 2016)

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

Qay – Qa2 -Younger alluvium (mostly Holocene) – Like undivided alluvium, with **Qay** and **Qa2** at to slightly above present drainages, unconsolidated, and not incised by active drainages; likely mostly Holocene in age and postdates late Pleistocene Provo shoreline of Lake Bonneville...

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Qmc - Landslide and colluvial deposits, undivided (Holocene and Pleistocene) – Poorly sorted to unsorted clay- to boulder-sized material...(slopewash and soil creep)...These deposits are as unstable as other landslide units...

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

Qalp? - Lake Bonneville regression-age stream alluvium (upper Pleistocene?) – Pebble and cobble gravel, gravelly sand and silty sand, with minor clay in channel incised into Lake Bonneville deltaic and lacustrine deposits...

Qab - Qapb - Lake Bonneville-age alluvium (upper Pleistocene) – Related to shorelines of Lake Bonneville, Sand, silt, clay, and gravel in channels, flood plains, and terraces, unconsolidated to weakly consolidated alluvium...

Qa2/Qafp? - Younger alluvium (mostly Holocene) **Qa2** over **Qafp?** Lake Bonneville-age alluvial-fan deposits (upper Pleistocene) — Related to shorelines of Lake Bonneville, mostly sand, silt, and gravel that is poorly bedded and poorly sorted...

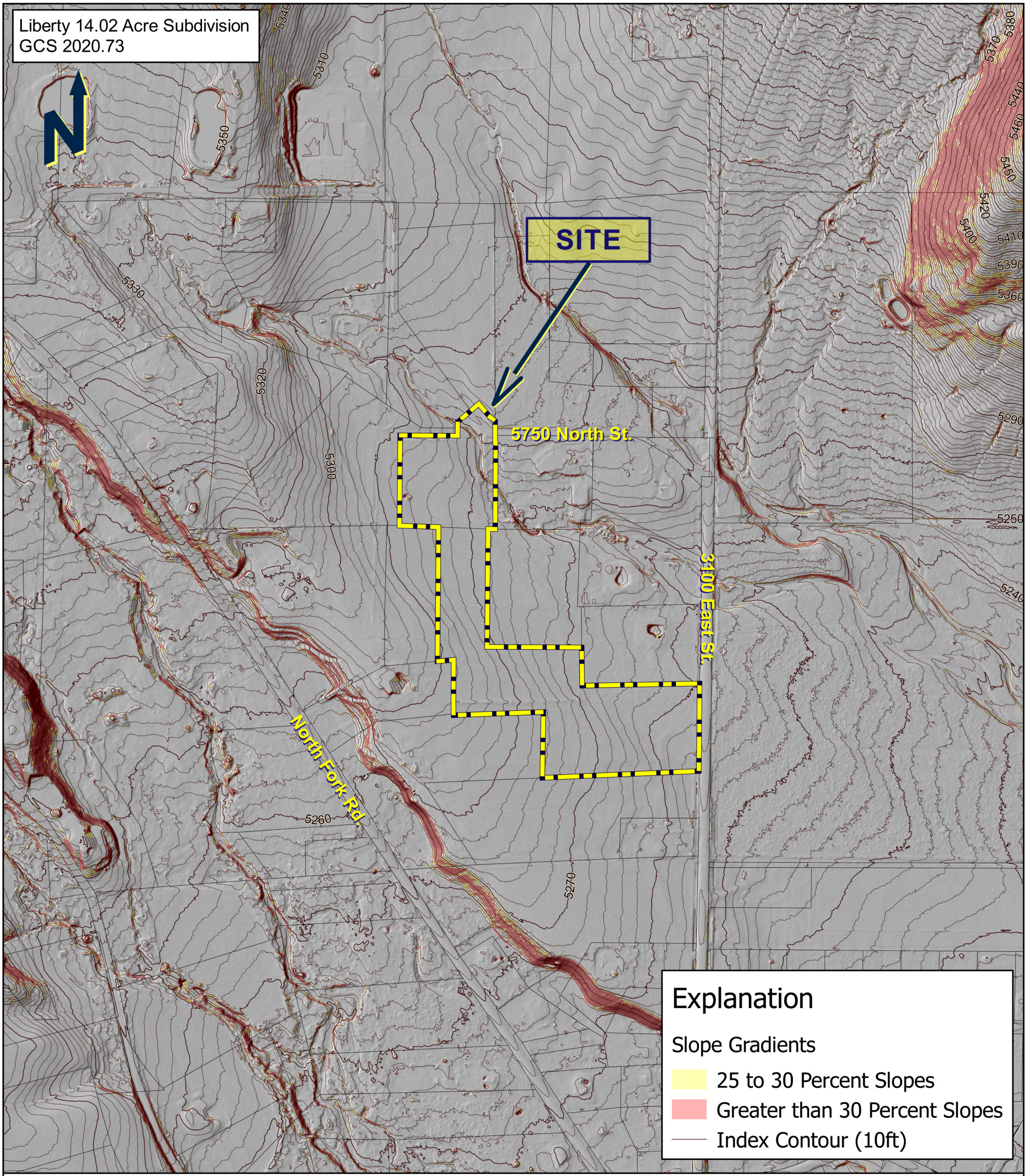
Tn – Norwood Formation (lower Oligocene and upper Eocene) – Typically light-gray to light-brown altered tuff (claystone), altered tuffaceous siltstone and sandstone, and conglomerate...

Zkc - Kelley Canyon Formation (Neoproterozoic) – Dark-gray to black, gray to olive-gray-weathering argillite to phyllite, with rare metacarbonate ...The Kelley Canyon Formation is prone to slope failures...

FEMA - Flood Insurance Rating Zones (2015)

Zone A and AE- Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies...Mandatory flood insurance purchase requirements and floodplain management standards apply.

FIGURE 3
GEOLOGIC MAPPING
GCS Geoscience



Base:
2011 1.0m LiDAR Imagery,
from Utah AGRC; http://gis.utah.gov/

0 500 1000 ft

1:6,000

FIGURE 4
LiDAR ANALYSIS

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