



Geologic Hazards Study

**Peaks Recovery Center
Colorado Springs, Colorado**

August 30, 2019

Terracon Project No. 23195078

Prepared for:

Peaks Recovery Center
Colorado Springs, Colorado

Prepared by:

Terracon Consultants, Inc.
Colorado Springs, Colorado



August 30, 2019



Peaks Recovery Center
2270 La Montana Way
Colorado Springs, Colorado 80918

Attn: Mr. Chris Burns – Executive Director
P: (719) 528-3500

Re: Geologic Hazards Study
Peaks Recovery Center
1785, 1775, and 1865 Old Ranch Road
Colorado Springs, Colorado
Terracon Project No. 23195078

Dear Mr. Burns:

Terracon Consultants, Inc. (Terracon) has prepared a Geologic Hazard Study for the above referenced project. This study was performed in general accordance with Terracon Proposal No. P23195078 dated July 12, 2019. This report presents the findings on geologic hazards for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

A handwritten signature in blue ink, appearing to read "Nathan D. Hukkanen".

Nathan D. Hukkanen, E.I.
Staff Engineer

Ryan W. Feist, P.E.
Principal

LAND USE REVIEW DIVISION
COMMUNITY DEVELOPMENT DEPARTMENT



CITY OF COLORADO SPRINGS

APPLICATION FORM FOR GEOLOGIC HAZARD REPORT

Applicant: Peaks Recovery Center Telephone (719) 528-3500 Fax _____
Address: 2270 La Montana Way Zip Code 80918 e-mail info@peaksrecovery.com

Premises Involved: Development Plan/Subdivision Plat Name: Peaks Recovery Center Old Ranch Road

Tax Schedule No(s). 6 2 2 9 0 - 0 7 - 0 0 1, 6 2 2 8 0 - 0 4 - 0 0 9

(This can be obtained from the El Paso County Tax Assessor located at 27 E. Vermijo Avenue on the 2nd Floor; phone: 520-6600 or at their web site <http://www.land.elpasoco.com>)

GEOLOGIC HAZARD REPORT REQUIRED: (FIVE (5) PRELIMINARY COPIES)

An application review fee will be required to accompany these applications (make checks payable to City of Colorado Springs). The fee schedule is as follows:

Review of Geologic Hazard Reports	<u>City Planning Fee:</u> \$300 plus any Colorado Geological Survey Review Cost Over \$300
	<u>City Engineering Fee:</u> \$284

The following documents have been included and considered as part of this report (checked off by individual(s) preparing the geologic report):

Development Plan: Not Reviewed

Landscape Plan (if applicable): Not Reviewed

Grading Plan: Not Reviewed

Drainage Report (necessary if debris and/or mud flow hazard is present): Not Reviewed

ENGINEERS STATEMENT

I hereby attest that I am qualified to prepare a Geologic Hazard Study in accordance with the provisions of Section 504 of the Geologic Hazards Ordinance of Colorado Springs. I am qualified as:

____ Professional Geologist as defined by CRS 34-1-201(3); or,
XX Professional Engineer as defined by Board Policy Statement 50.2 - "Engineering in Natural Hazard Areas" of the Colorado State Board of Registration for Professional Engineers and Professional Land Surveyors. Board authority as defined by CRS 12-25-107(1).

Submitted by: _____ Date: August 30, 2019

This Geologic Hazard Study is filed in accord with the Zoning Code of the Code of the City of Colorado Springs, 2001, as amended.

City Engineer Date

City Planning Director Date

REPORT TOPICS

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Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the **GeoReport** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

SITE LOCATION
SITE BOUNDARY
SITE GEOLOGIC MAP
SITE POTENTIALLY SWELLING SOILS AND ROCK MAP
LANDSLIDE SUSCEPTIBLE AREAS MAP
DEPTH TO WATER TABLE MAP
FEMA FLOOD PRONE AREAS MAP
PHOTOGRAPHY LOG

Note: Refer to each individual Attachment for a listing of contents.

REPORT SUMMARY

A Geologic Hazards Study has been performed for the proposed Peaks Recovery Center development, to be located at 1785, 1775, and 1865 Old Ranch Road in Colorado Springs, Colorado. We offer the following comments regarding geologic hazards:

- n Based on our review of the available geologic literature and our site observations, the geologic hazards of expansive soils and bedrock, collapsible soils, and potential artificial fill soils have been identified at this site. It is our opinion that the geologic hazards discussed herein, if encountered, can be appropriately mitigated during the design and construction phases of the project, after completion of a geotechnical engineering evaluation in the areas of the proposed development.
- n The geologic hazards of potentially unstable slopes, shallow water tables, and flood prone areas have been identified within the southern portion of this site. It is our understanding that the proposed new development for the Peaks Recovery Center will be located within the northern portion of the site, and therefore it is our opinion that the risk for the geologic hazards identified within the southern portion of the site to impact the proposed development is very low.

This summary should be used in conjunction with the entire report. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled **GENERAL COMMENTS** should be read for an understanding of the report limitations.

Geologic Hazards Study
Peaks Recovery Center
1785, 1775, and 1865 Old Ranch Road
Colorado Springs, Colorado
Terracon Project No. 23195078
August 30, 2019

INTRODUCTION

This report presents the results of our Geologic Hazards Study performed for the proposed Peaks Recovery Center development to be located at 1785, 1775, and 1865 Old Ranch Road in Colorado Springs, Colorado. The purpose of these services is to provide Geologic Hazards information relative to:

- | | | | |
|---|---|---|-------------------------|
| n | unstable or potentially unstable slopes and landslide areas | n | expansive soils |
| n | undocumented fill soils | n | shallow water tables |
| n | ground subsidence and mining activity | n | flood prone areas |
| n | debris flow and debris fans | n | collapsible soils |
| n | rockfall | n | steeply dipping bedrock |
| n | groundwater springs | n | hillside overlay |
| | | n | faults |

SITE CONDITIONS

The following description of surficial site conditions is derived from our site visit and our review of publicly available aerial and topographic maps.

Item	Description
Parcel Information	<p>The site is located at 1785, 1775, and 1865 Old Ranch Road in Colorado Springs, Colorado.</p> <p>Approximate GPS coordinates: 38.9797 N, 104.7936 W.</p> <p>See Site Location</p>
Existing Improvements	<p>The site consists of two developed lots containing two existing residential structures on each lot. The southern portions of the properties contain wooded areas with creek banks with slope angles greater than 30 percent associated with Kettle Creek. The properties are bordered to the west by Academy Christian Church, to the north by Old Ranch Road, and to the east and south by a residential lot.</p>

Responsive ■ Resourceful ■ Reliable

Item	Description
Current Ground Cover	Irrigated grass, sparse trees, paved drive ways, and residential structures cover a majority of the properties. The southern portions of the properties contain native grasses and trees.
Existing Topography	The developed portions of the site are relatively flat, while the southern portion of the site generally slopes downward to the south with slopes ranging from about 4:1 to 3:1 with localized slope angles as steep 1:1 (horizontal: vertical) associated with the Kettle Creek banks.

We also collected photographs at the time of our initial site visit. Representative photos are provided in our [Photography Log](#).

PROJECT DESCRIPTION

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	Email and phone conversations between July 3 and 12, 2019.
Project Description	The site will be developed with a new recovery center building and associated parking areas and drive lanes in the northwest portion of the site, and the existing residential structures will be retained as part of the recovery center campus. Reportedly there will not be new development of the portions of the site south of the existing residential structures.
Retaining Walls	None planned
Grading	A site grading plan was not available at the time of this report.

GEOTECHNICAL CHARACTERIZATION

Regional Geology

The proposed area is located within the Colorado Piedmont section of the Great Plains physiographic province. The Colorado Piedmont, formed during Late Tertiary and Early quaternary time (approximately two-million years ago), is a broad, erosional trench which separates the Southern Rocky Mountains from the High Plains. Structurally, the site lies along the western flank of the Denver Basin. During the Late Mesozoic and Early Cenozoic Periods (approximately seventy million years ago), intense tectonic activity occurred, causing the uplifting of the Front Range and associated downwarping of the Denver Basin to the east. Relatively flat uplands and broad valleys characterize the present-day topography of the Colorado Piedmont in this region.

Site Specific Geology

Surficial geologic conditions at the site, as mapped by the Colorado Geological Survey (CGS) (¹Carroll, C.J. et al.), consists of eolian deposits of the Holocene to late Pleistocene age, terrace alluvium of late-middle Pleistocene age, and sedimentary bedrock of the Dawson Formation (Upper Cretaceous and Paleocene).

Eolian deposits are typically described as fine- to coarse-grained silty sand deposited by wind. Eolian deposits can present a risk for hydro-collapse.

Alluvium deposits are typically described as clay, silt, sand, gravel or similar unconsolidated detrital material, deposited during comparatively recent geologic time by a stream or other body of running water, as a sorted or semi-sorted sediment.

Facies Unit Two of the Dawson Formation is mapped at the site and can be generally described as arkosic sandstone and andesitic sandstone interbedded with fine micaceous sandstones and sandy claystone.

Based on the site being previously developed, it is considered likely that surficial fill soils exist at the site. Further geotechnical exploration will be required to determine actual subsurface conditions in areas of proposed development.

POTENTIAL GEOLOGIC HAZARDS

The geological hazards ordinance for the City of Colorado Springs (City Code Section 7.4.5) lists potential geologic hazards that should be addressed by a study.

Unstable or Potentially Unstable Slopes and Landslide Areas

Surficial geologic conditions at the site, as mapped by the Colorado Geological Survey (CGS) website (Colorado Springs Landslide Susceptibility; CGS MS-42), indicates that evidence of landslide susceptibility has not been observed at the site.

¹Thorson, J.P., Carroll, C.J., and Morgan, M.L. 2002, **Geologic Map of the Pikeview 7.5 Minute Quadrangle**, El Paso County, Colorado. Open-File Report OF01-03

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The site is not located within the two geologic hazard areas in southwest Colorado Springs, designated Area 1 and Area 2 by the City of Colorado Springs as part of an Engineering Geology Study.

Relatively steep slopes with gradients between 1:1 to 3:1 (horizontal:vertical) and up to approximately 60 feet in height were observed along the southern portion of the site associated with the Kettle Creek drainage. It appears that these slopes are native soils. Based on the relatively steep gradients it is our opinion that the slopes could have the potential to become unstable, depending on the subsurface conditions of the slopes. During our site visit however, we did not observed indications of slope instability at the site such as pistol-butting of trees, surficial sloughing of soils, etc.

It is our understanding that planned building area are greater than 100 feet from the crest of the 3:1 slopes. Therefore, it is our opinion that the risk for potential unstable slopes to impact the development is considered very low. Should planned building areas be considered south of the existing residential structures, Terracon should be contacted for additional evaluation with respect to slope stability.

Artificial Fill Soils

Based on the site being previously developed, it is considered likely that artificial fill soils exist at the site. Further geotechnical exploration will be required to determine actual subsurface conditions in areas of proposed development, and to provide proper mitigation methods, such as removal and replacement, for artificial fill soils at the site, if encountered.

Ground Subsidence

The site is not located in an area previously mapped in the Colorado Geologic Survey "Statewide Historic Underground Coal Mines" map.

Debris Flow and Debris Fan

Debris flows were not observed in the immediate vicinity of the site based on our site observations. Based on the site being previously developed with the existing buildings, as well as the remaining areas surrounding the site being previously developed, it is our opinion that the potential for debris flow is considered very low.

Rockfall

Evidence of rockfall was not observed in the immediate vicinity of the site based on our observations. Areas of exposed rock outcrops were also not observed in the immediate vicinity of the site, therefore, it is our opinion there is no potential for rockfall to occur on the site.

Shallow Water Tables and Groundwater Springs

Shallow groundwater was not mapped at the site based upon review of the USGS Depth to Water Table in the Colorado Springs – Castle Rock Area (²Hillier and Hutchinson). The site is mapped within an area of groundwater greater than 20 feet below land surface.

Shallow groundwater may exist along the southern portion of the site near Kettle Creek, however we understand development of this site is not currently planned for this area.

Based on our understanding of the proposed project and the reviewed data, it is our opinion that the potential for shallow water to impact the proposed development is considered low. It is also our opinion that a perimeter drainage system around the proposed building is not necessary based on there not being any below grade areas planned for the development.

Flood Prone Areas

Based on a review of the Federal Emergency Management Agency (FEMA) Special Flood Hazard Areas Inundated by 100-year Flood Map, the areas within the Kettle Creek drainage at the subject property are shown to be within Zone 'AE' and Zone 'X', which are defined as "Special Flood Hazard Areas Inundated by 100-year Flood" and 'areas between the limits of the 500-year flood', respectively. The reported elevation profile of the 100-year flood extends from about 6,621 feet to 6,627 feet along the Kettle Creek drainage in the southern portion of the site. Information provided to us indicates that proposed development at the site is outside the 100-year flood and 500-year flood plains. Therefore, it is our opinion that there is a very low risk for flood prone areas to impact the proposed development.

Expansive Soils and Bedrock

Mapping completed by the Colorado Geological Survey (Carroll, C.J., and Crawford, T.A, 2000; Hart, 1973-1974), indicates the site is in an area associated with low to moderate swell potential.

A full-scale geotechnical study should be performed prior to the proposed development at the site, and provide mitigation options for expansive soils and bedrock, if encountered. Expansive soils and bedrock can likely be mitigated using remedial grading activities or deep foundations and a structural floor.

³Hillier, Donald E., and Hutchinson, E. Carter., 1980, **Depth to Water Table in the Colorado Springs – Castle Rock Area**, Colorado. Miscellaneous Investigation Series Map I-857-H.

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Collapsible Soils

Mapping completed by the Colorado Geological Survey (Carroll, C.J., and Crawford, T.A, 2000), indicates the site is located in an area that contains eolian sand deposits known to have collapse potential.

A full-scale geotechnical study should be performed prior to the proposed development at the site, which can provide mitigation options for compressible soils, if encountered. Compressible soils can likely be mitigated using remedial grading activities.

Steeply Dipping Bedrock

The site is not within a mapped (Himmelreich Jr, and Noe, 1999) zone of areas susceptible to differential heave in expansive, steeply dipping bedrock.

Hillside Overlay

The site is not within the hillside overlay according to the City of Colorado Springs, Hillside Overlay Map, dated August 2008.

Faults

The Rampart Range Fault is the nearest fault to the site and is located approximately 4.5 miles west of the site. Therefore, it is our opinion that there is a very low risk for faults to impact the proposed development.

GEOLOGIC HAZARDS AND DEVELOPMENT CONSTRAINTS

Based on a review of our Geotechnical Engineering Report for the site, our review of the available geologic literature, our site observations, and our analyses, the site is considered suitable for the proposed Peaks Recovery Center project. We have not discovered information related to the previously referenced geologic hazards that would impede the planned development at this site.

As previously mentioned, it is our understanding that the new development will include a new recovery center building in the northwest portion of the site, and no new development is planned south of the two existing residential homes. New foundations, slabs, and pavements and additional earthwork will require a subsurface exploration be performed prior to construction to provide site specific earthwork recommendations.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our desktop review and site visit. A subsurface exploration will need to be conducted in order to provide design-level geotechnical recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

ATTACHMENTS

Contents:

Site Location
Site Boundary
Site Geologic Map
Site Potentially Swelling Soils and Rock Map
Landslide Susceptible Areas Map
Depth to Water Table Map
FEMA Flood Prone Areas Map
Photo Log (9 pages)

Note: All attachments are one page unless noted above.

SITE LOCATION

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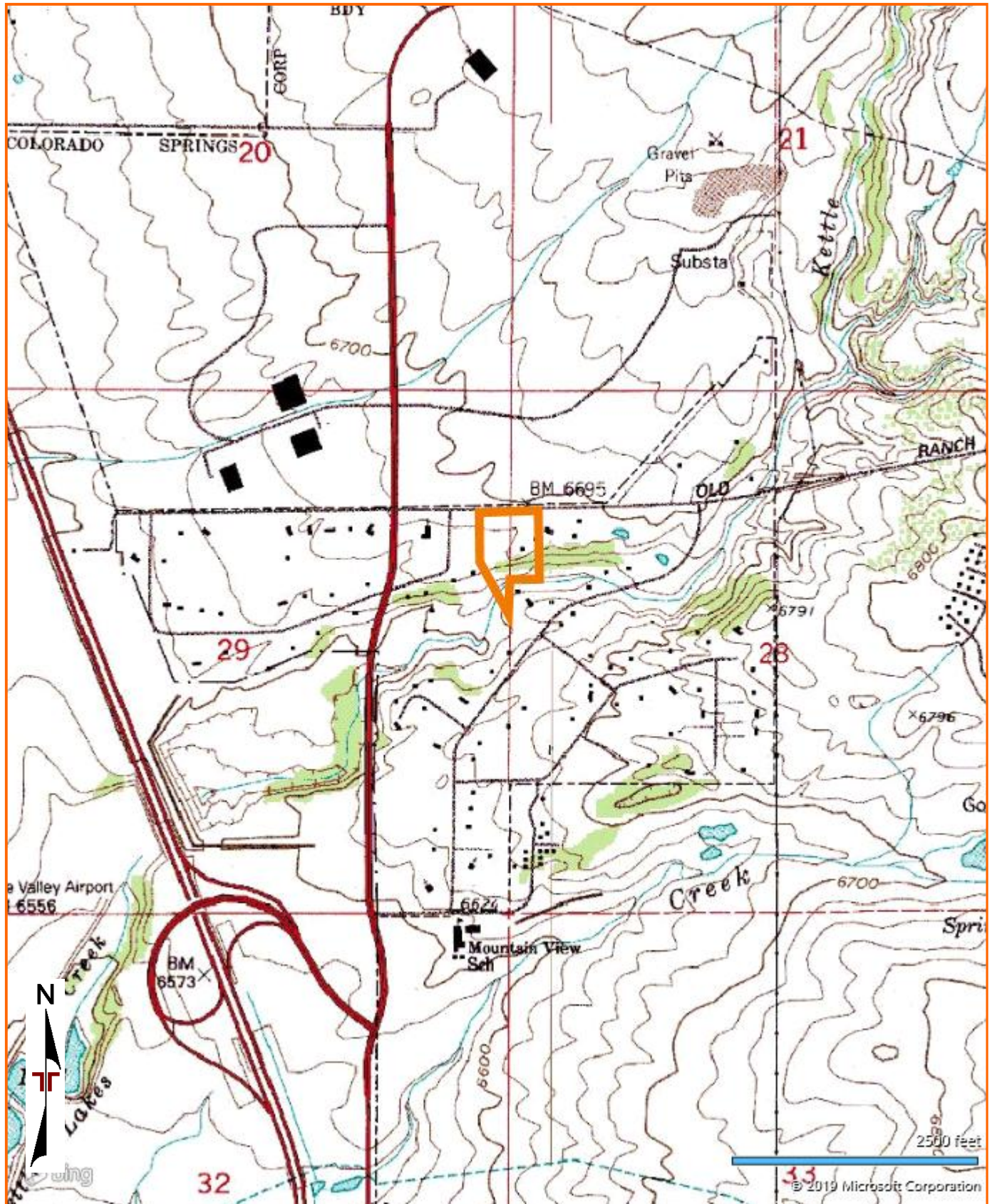


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS
NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED
BY MICROSOFT BING MAPS

SITE BOUNDARY

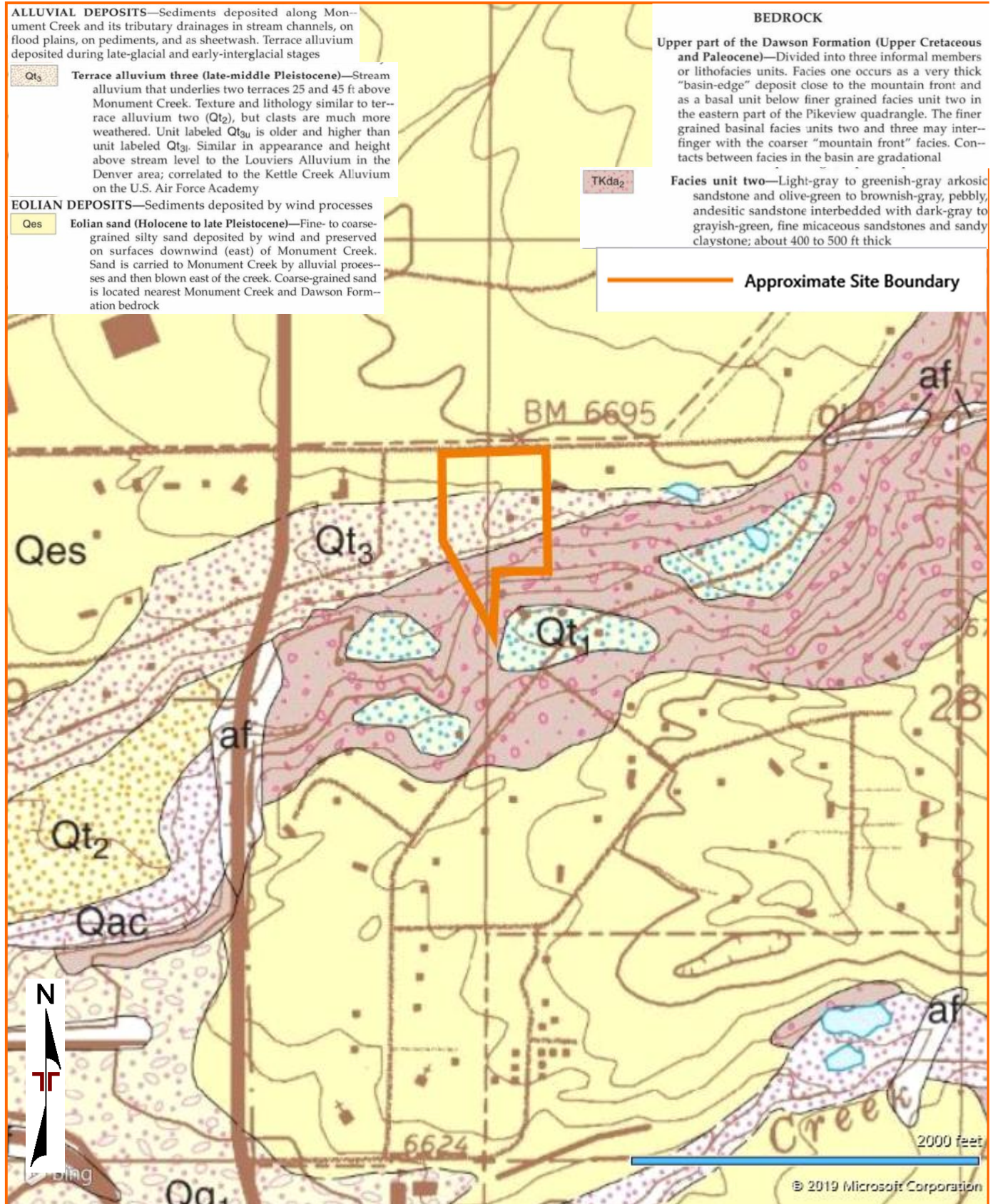
Old Ranch Road Peaks Recovery Center ■ Colorado Springs, Colorado
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Terracon



SITE GEOLOGIC MAP

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SITE POTENTIALLY SWELLING SOILS AND ROCK MAP

Peaks Recovery Center Geologic Hazard Study ■ Colorado Springs, CO
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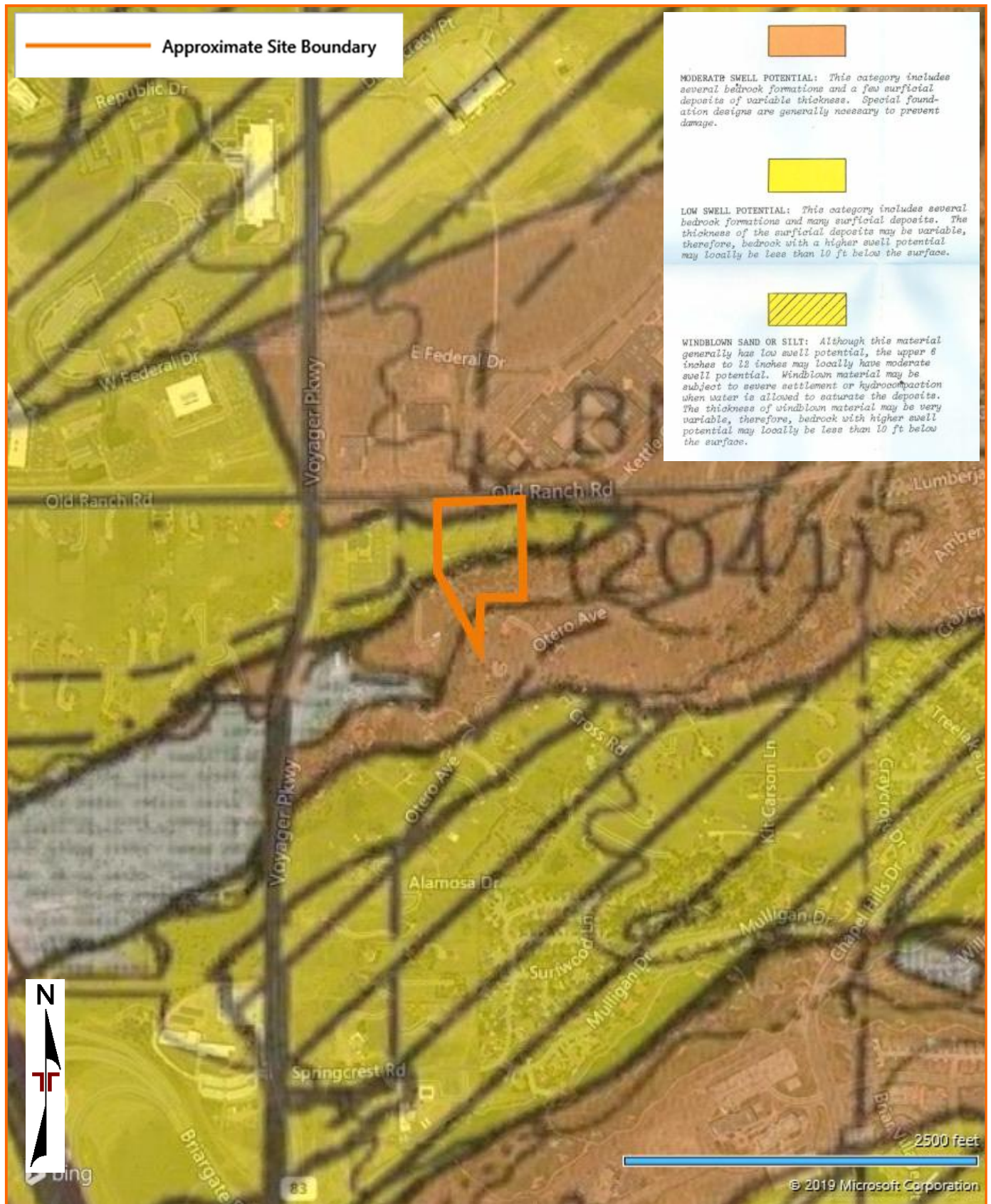


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS; MAP PROVIDED BY CGS AND HART, 1973-74

LANDSLIDE SUSCEPTIBLE AREAS MAP

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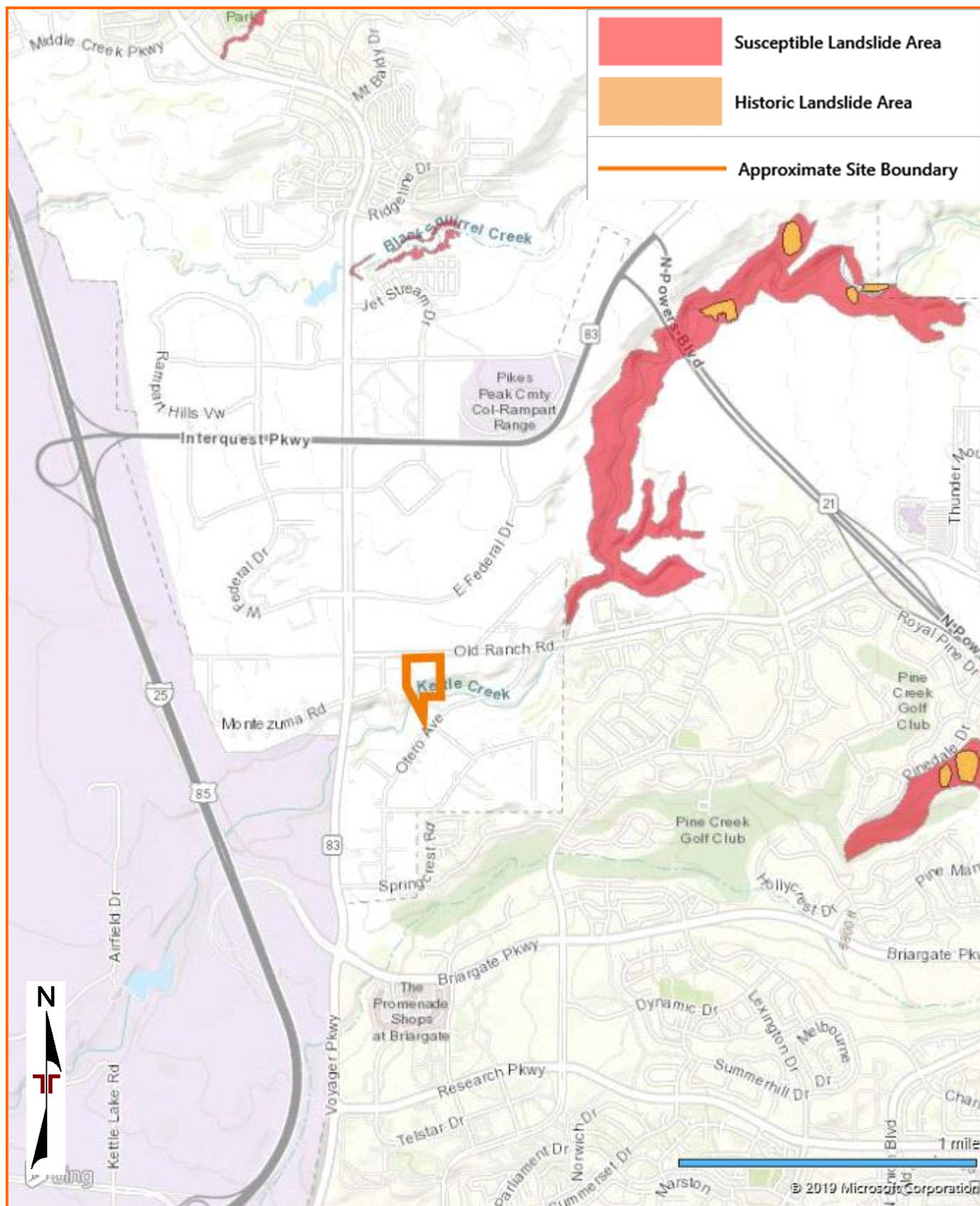


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS
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MAP PROVIDED BY COLORADO
GEOLOGIC SURVEY (CGS)

DEPTH TO WATER TABLE MAP

Peaks Recovery Center Geologic Hazard Study ■ Colorado Springs, CO
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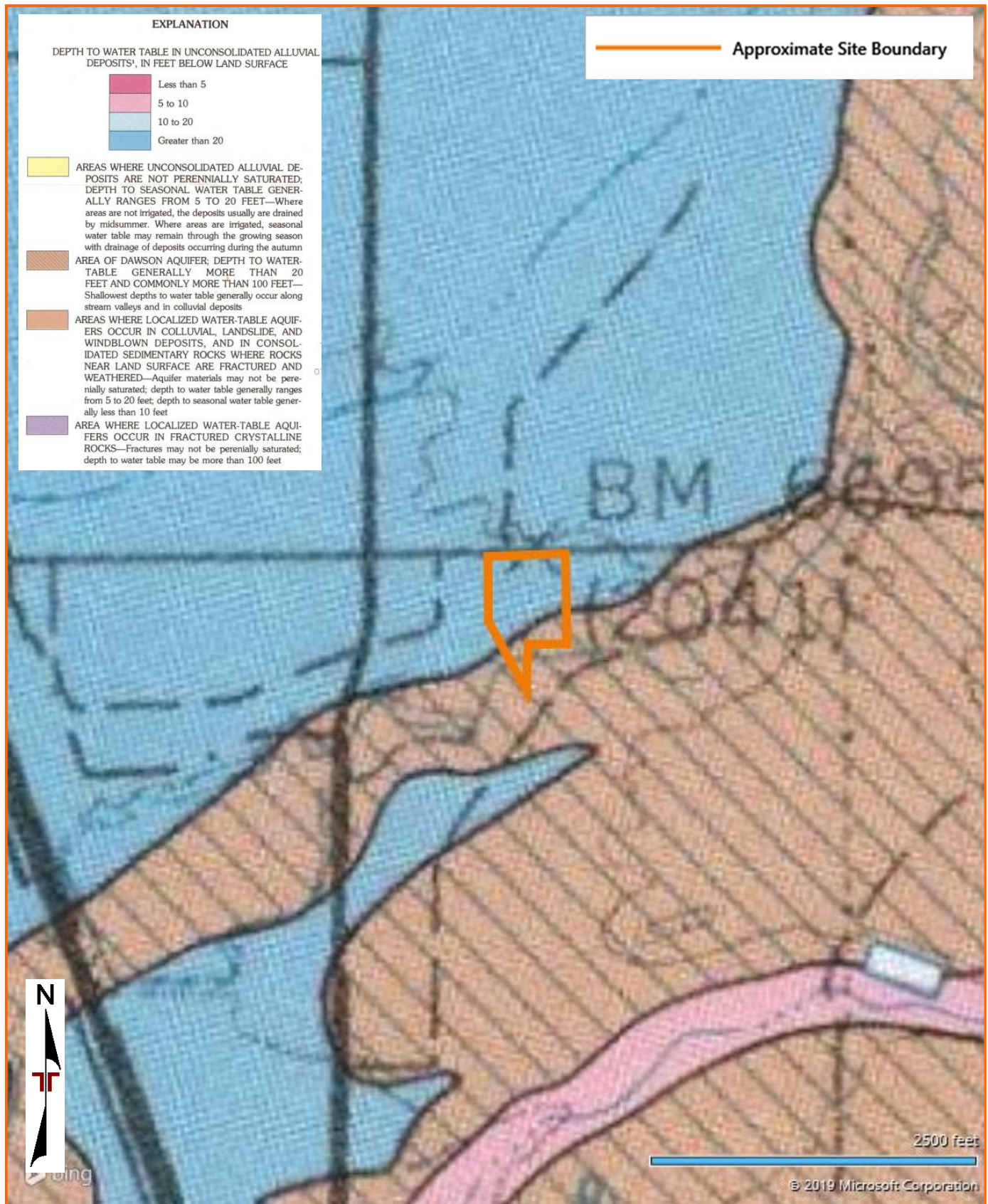


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

DEPTH TO THE WATER TABLE (1976-77) IN THE COLORADO SPRINGS-CASTLE ROCK AREA, FRONT RANGE URBAN CORRIDON, COLORADO (HILLIER AND HUTCHINSON, 1980)

FEMA FLOOD PRONE AREAS MAP

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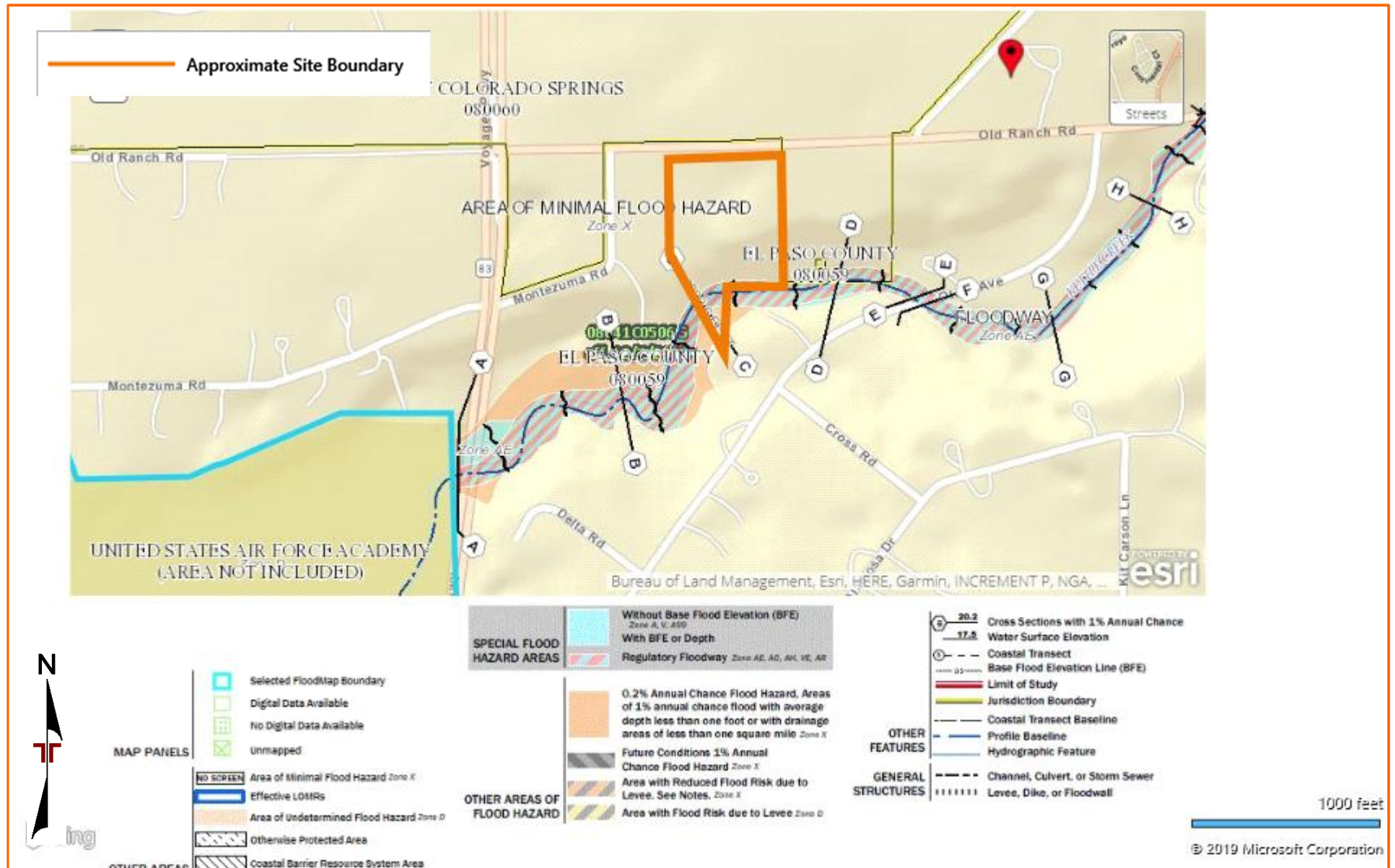


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT
INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY THE FEDERAL
EMERGENCY MANAGEMENT AGENCY

PHOTOGRAPHY LOG



Photo of northwest portion of western parcel looking north



Photo of western portion of western parcel looking west

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Photo of residence at western parcel looking west



Photo of residence at western parcel looking west

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Photo near center of site looking east towards residence on eastern parcel



Photo of northern portion of western parcel looking north

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Photo of southern portion of western parcel looking south



Photo of southern side of residence at western parcel looking west

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Photo of central portion of western parcel looking southeast



Photo of southern portion of western parcel looking west

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Photo of southern portion of western parcel looking east



Photo of southern portion of eastern parcel looking southwest

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Photo of southern portion of eastern parcel looking north



Photo of southern portion of eastern parcel looking east

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Photo of southern portion of eastern parcel looking southwest



Photo of swimming pool south of residence on eastern parcel

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Photo of driveway on eastern parcel looking northwest



Photo of residence on eastern parcel looking southwest