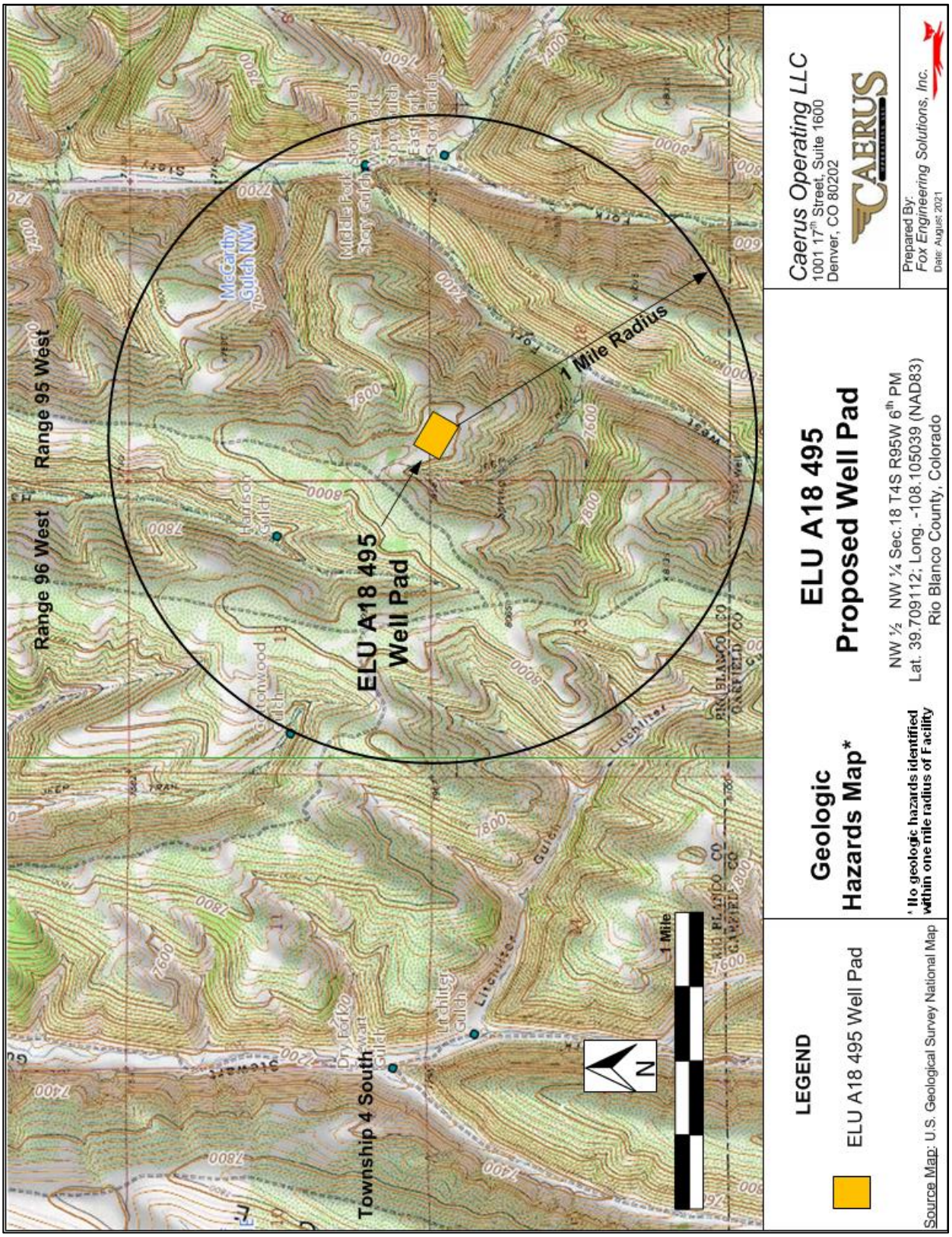
Figure 1


Range 95 West
Range 96 West
Township 4 South
ELU A18 495
Well Pad
1 Mile Radius
1 Mile
N
LEGEND
ELU A18 495 Well Pad
Geologic
Hazards Map*
* No geologic hazards identified within one mile radius of Facility
ELU A18 495
Proposed Well Pad
NW ¼ NW ¼ Sec.18 T4S R95W 6th PM
Lat. 39.709112; Long. -108.105039 (NAD83)
Rio Blanco County, Colorado
Caerus Operating LLC
1001 17th Street, Suite 1600
Denver, CO 80202
CAERUS
Prepared By:
Fox Engineering Solutions, Inc.
Date: August 2021
Source Map: U.S. Geological Survey National Map

September 2, 2021

Mike Leibovitz
Lead Geologist
Caerus Operating LLC
1001 17th Street, Suite 1600
Denver, CO 80202

Re: ELU A18 495 Well Pad
Geologic Hazards – COGCC Rules 304.b.(7).I. and 304.c.(21)
NW ¼ NW ¼ Section 18, Township 4 South, Range 95 West, 6th P.M, Rio Blanco County, CO

Mr. Leibovitz,

As requested, Fox Engineering Solutions ("FES") has prepared this report to address the requirements of Rules 304.b.(7).I. and 304.c.(21), of the Colorado Oil and Gas Conservation Commissions rules, effective January 15, 2021. It is FES's understanding that Caerus Operating LLC is proposing to construct the ELU A18 495 well pad along with the installation of associated oil and gas production equipment at the site.

COGCC Rule 304.b.(7).I. requires the Operator to submit a map identifying any geologic hazards within a 1 mile radius of the proposed working pad surface. For any identified geologic hazard that extends beyond the 1 mile radius, a second map scaled to show the extent of that hazard in relation to the proposed oil and gas location shall be submitted. If the Operator identifies any Geologic Hazards pursuant to Rule 304.b.(7).I, the Operator will submit a Geologic Hazard plan per Rule 304.c.(21) describing proposed mitigation measures.

This report summarizes FES's investigation into the geology and potential geologic hazards associated with the proposed ELU A18 495 well pad ("Pad"). The investigation included a review of available geologic maps and reports, U.S. Geological Survey and Colorado Geological Survey literature and mapping, Rio Blanco County's 2019 Multi-Jurisdictional Hazard Mitigation Plan, and data from the National Resource Conservation Service's ("NRCS") Customized Soil report. Additionally, FES performed a field reconnaissance of the Pad site on August 25, 2021.

Location and Topography

The proposed Pad will be located in a remote area of rural Rio Blanco County, Colorado in the NW ¼ NW ¼ of Section 18, T4S, R95W of the 6th P.M. in Rio Blanco County, Colorado. The site is in the Piceance Creek Basin and sits atop a rolling hill area at an elevation of about 8029 ft. in non-crop rangeland. The total construction disturbance area is estimated at 11.7 acres

Moving off the hill site, the gradient increases to 25% to 35% along the ridge sideslopes as they descend into the Story Gulch drainage to the south and east. The West Fork of Story Gulch is located 0.40 miles to the southeast and flows into Piceance Creek six miles to the north. The Town of Parachute is approximately 19 miles to the south.

No natural drainages are located within the Pad boundary. Localized drainage is provided by sheet flow across native vegetation. Vegetation within the Pad site consists mainly of mountain mahogany, oak brush and sage brush interspersed with grasses and bare ground. This area has historically been used for cattle grazing and natural gas/oil extraction.

Geology

The proposed Pad will be located in the Piceance Basin. The Piceance Basin is the major structural geologic feature in the region. It is bound to the east by the Grand Hogback monocline, the White River Uplift to the northeast, the Gunnison Uplift to the south, the Uncompahgre Uplift to the southwest, the Douglas Creek Arch to the west-northwest, and the axial basin uplift to the north (Grout and Verbeek, 1992). The Grand Hogback monocline is a feature comprised of Upper Cretaceous age bedrock of the Mesaverde Group, which includes the Williams Fork Formation and the underlying Mancos Shale. The Grand Hogback forms part of the boundary between the Colorado Plateau and the Rocky Mountains.

The Piceance Basin was formed by crustal warping caused by tectonic forces associated with the Laramide orogeny that down-warped the earth's crust resulting in the uplift of the Colorado Rocky Mountains. Areas on all sides of the Piceance Basin have been uplifted by these same tectonic forces. During the Eocene epoch, Lake Uinta formed, covering a large area of northwest Colorado and northeastern Utah. As time passed, there was considerable ancient sediment deposition. The weight of the overlying sediments consolidated the lake deposits forming sandstones, siltstone and marlstone of the Uinta Formations. Portions of the marlstone contained organic material which was converted to a solid hydrocarbon called kerogen. Marlstone rich in kerogen is commonly referred to as oil shale.

The USGS Geologic map of the McCarthy Gulch Quadrangle (O'Sullivan, et al 1981) identifies the Pad location geologically as Eocene Uinta Formation bedrock consisting of dominantly light brown to light gray sandstone and siltstone with minor beds of mudstone, shale and marlstone. Total Uinta bedrock formation thickness is estimated at 985 ft. The Green River and Wasatch Formations are beneath the Uinta.

Unconsolidated Soils

The National Resource Conservation Service ("NRCS") classifies three soil types within the Pad site. These include the Starman-Vandamore complex, encompassing 96.7% of the site area; Parachute loam, with 2.7% and the Irigul channery loam on the remaining 0.5% of the site.

The Starman portion of the Starman-Vandamore complex is described as residuum from weathered shale. The typical soil profile is 0 – 4 inches of channery loam; 4 - 25 inches of very channery loam, very channery fine sandy loam and extremely channery loam; and 4 -25 inches of unweathered bedrock. The Starman has a very low available water capacity of about 1.7 inches and a moderately low to high infiltration rate range of 0.6 to 2.0 inches per hour. The Starman is classified as hydrologic soil Group D - having very slow infiltration rates when thoroughly wet.

The Vandamore portion of the Starman-Vandamore complex is described as residuum from weathered shale. The typical soil profile is 0 – 2 inches of channery loam; 2 - 17 inches of very channery loam and extremely channery loam; and 2 -17 inches of unweathered bedrock. The Vandamore has a very low available water capacity of about 5.0 inches and a moderately low to high infiltration rate range of 0.6 to 2.0 inches per hour. The Vandamore is classified as hydrologic soil Group B - having moderate infiltration rates when thoroughly wet.

The Uniform Soils Classification System classifies the Starman-Vandamore complex as GC-GM, gravels comprising more that 12% fines. They consist of clayey and silty gravels with gravel-sand-clay mixtures.

The Parachute loam is described as residuum weathered from sandstone. The typical soil profile is 0 to 4 inches of loam; 4 – 24 inches of loam, channery loam, channery sandy loam, and extremely channery sandy loam; and 24 – 38 inches of unweathered bedrock. The Parachute loam has a high available water capacity of about 9.9 inches and a low to moderately high infiltration rate range of 0.6 to 2.0 inches per hour. The Parachute loam is classified as hydrologic soil Group C - having a slow infiltration rate when thoroughly wet. Additionally, the Uniform Soils Classification System classifies the Parachute loam as CL - inorganic clays with low to medium plasticity.

The Irigul channery loam is described as residuum weathered from sandstone and shale. The typical soil profile is 0 to 5 inches of channery loam; 5 – 12 inches of very channery loam, very channery clay loam, and extremely channery loam; and 5 - 16 inches of unweathered bedrock. The Irigul channery loam has a very low available water capacity of about 2.1 inches with a very low to non-existent infiltration rate estimate of 0.0 inches per hour. The Irigul channery loam is classified as hydrologic soil Group D - having a very slow infiltration rate when thoroughly wet. Additionally, the Uniform Soils Classification System classifies the Irigul channery loam as CL – ML, inorganic clays and silt with low plasticity.

During the FES site visit, exposed bedrock was observed on the surface of the south side of the Pad site as well as in the wheel ruts along a two-track road traversing the site. FES site observations agree with the soil characteristics reported by NRCS. The customized soil report for the ELU M18 495 Well Pad is attached to this report.

Geologic Hazards

Colorado Revised Statute (C.R.S.) 24-65.1-103(8) defines a Geologic Hazard as a “geologic phenomenon which is so adverse to past, current, or foreseeable construction or land use as to constitute a significant hazard to public health, safety, or to property.” Additionally, the Colorado State legislature in 1974 passed House Bill 1041 defining geologic hazards that, if present, may pose a threat to life or property. For the purposes of this report, geologic hazards, as outlined in House Bill 1041, are discussed below.

1. Radioactivity: Radon is a naturally occurring, odorless and colorless radioactive gas that is produced by the radioactive decay of radioactive minerals present in the soils and bedrock. Although no radiological or radon testing was conducted, other than the initial construction activities, the well pad does not have buildings or areas that will be occupied throughout the work day. The potential presence of radon is not expected to represent a geologic hazard or a significant worker exposure issue that would affect the design or operations of the well pad.

2. Seismic Considerations: According to the Colorado Geological Survey (“CGS”), there have been 21 earthquakes in or near Rio Blanco County between the years of 1966 and 2017. There were no reported damages or injuries associated with these minor earthquake events. The Rio Blanco County Multi-Jurisdictional Hazard Mitigation Plan and CGS’s mapping indicates that there are two faults located in the far northeast corner of the County more than 60 miles to the northeast of the Pad. These two faults are also shown on the USGS’s Geologic Hazards Science Center Quaternary Faults map. The most likely areas to experience an earthquake are those near fault lines. Seismic activity is not expected to impact the design or operations at the well pad.

3. Ground Subsidence: Ground subsidence is the sinking of land over human caused or natural underground voids and the settlement of native low density soils. As noted in the NRCS soils

report, surface soil are described as residuum weathered from shale with unweathered bedrock located 2 to 17 inches below the surface. FES site observations agree with the soil characteristics reported by NRCS and no evidence of ground subsidence was observed. The BLM's General Land Office Records show that no mining patents have been filed or awarded at the Pad's location.

The Pad will be constructed on Uinta Formation bedrock. Ground subsidence is not a geologic hazard at this site.

4. Landslides: Landslides are downhill or lateral movements of rock, debris, or soil mass. Figure 25 of Rio Blanco County Multi-Jurisdictional Hazard Mitigation Plan, entitled "Landslide Occurrences" shows Colorado Geological Survey's mapped areas which have experienced landslides. FES field reconnaissance of the Pad site indicated no evidence of current or historic landslide activity. Additionally, the site sits at the top of a rolling hill with no significantly higher terrain. The Pad site is not within a landslide area.

5. Avalanche: The Rio Blanco County Multi-Jurisdictional Hazard Mitigation Plan did not identify avalanches as a major hazard. The Colorado Geological Survey indicates that steeply sloped areas (30 to 45 degrees) are highly subject to avalanches primarily on south exposed slopes where unstable snow conditions are likely to occur. The Pad site sits at the top of a rolling hill with no significantly higher terrain. Based on site and upland slope conditions, avalanches are not a geologic hazard at this site.

6. Rockfall: The Rio Blanco County Multi-Jurisdictional Hazard Mitigation Plan defines landslides as downward or lateral movements of rock, debris or soil mass. The Pad sits near the top of a rolling hill with no adjacent rock outcroppings. FES field reconnaissance of the Pad site indicated no evidence of rock outcrops above, in or adjacent to the site. Rockfalls are not a geologic hazard at this site.

7. Flood: The Pad is located in an upland area with no natural drainages within the site boundary. Localized drainage is provided by sheet flow across native vegetation. The NRCS reports that the Flood Frequency for the Pad location is "None", meaning that the chance of flooding is nearly 0% in any year. The site may be subject to sheet flow from precipitation events, however, storm water control measures will be in place to mitigate or prevent storm water from entering the Pad and disrupting operations. Flooding is not a geologic hazard at this site.

8. Mudflow and Debris Fans: The Rio Blanco County Multi-Jurisdictional Hazard Mitigation Plan defines mud and landslides as downward or lateral movements of rock, debris or soil mass (mudflow). The Pad sits at the top of a rolling hill with no adjacent natural drainages. The NRCS reports that the Flood Frequency for the Pad location is "None" for the site. FES field reconnaissance of the Pad site indicated no evidence of mudflows or debris fans above, in or adjacent to the site. Mudflow and debris fans are not a geologic hazard at this site.

9. Expansive Soil and Rock: The NRCS reports that the Starman-Vandamore complex, encompassing 96.7% of the site area; is classified under the Uniform Soils Classification System as GC-GM, gravels with more that 12% fines. They consist of clayey and silty gravels with gravel-sand-clay mixtures. Unweathered bedrock is reported by NRCS to be 2 to 17inches below the surface. FES site observations agree with the soil characteristics reported by NRCS. The proposed uses, design and operations at the Pad are not impacted by expansive soils or rock.

10. Unstable Slopes: The Pad will be constructed on a level upland site. As noted in the NRCS soils report, unweathered bedrock is located 2 to 17 inches below the surface of the Pad. The USGS Geologic map of the McCarthy Gulch Quadrangle (O'Sullivan, et al 1981) identifies the underlying geology of the Pad location as Eocene Uinta Formation bedrock with total bedrock formation thickness estimated at 985 ft. No unstable slopes were evident or identified during FES's field reconnaissance of the Pad site. Unstable slopes are not a geologic hazard at this site.

Additional Soil Considerations

NRCS reports that the risk of concrete corrosion is low for the Pad site. Corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens concrete. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Concrete structures or foundations are not planned within the Pad Site.

NRCS reports that the risk of steel corrosion is moderate for the Pad site. Corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. Production equipment is coated and will be placed on gravel foundations with cathodic protection implemented on an as-needed basis.

NRCS reports that the Erosion factor K (whole soil) ranges between 0.17 and 0.24 for the Pad site. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. Stormwater BMPs will be implemented to control soil erosion.

NRCS mapping indicates that none of the soils within the footprint of the ELU A18 495 well pad site are hydric. Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation. No hydric soil conditions were observed during FES's field reconnaissance of the Pad site. The proposed development is not impacted by hydric soils.

Conclusion

Based on FES's preliminary review of published geologic date, information obtained from the Colorado Geological Survey, U.S. Geological Survey and Rio Blanco County along with NRCS soils data and a field reconnaissance of the Pad site, it is FES's opinion that there are no known geologic hazards at the proposed site of the ELU A18 495 well pad that would impact the design or operations of the well pad. As such, a geologic hazard plan, per COGCC Rule 304.c.(21), is not warranted. As required by COGCC Rule 304.b.(7).I., a geologic hazards map, denoted as Figure 1, is attached.

Limitations

This report is intended for preliminary evaluation purposes only for geologic hazards, as contained in this report, in the project vicinity.

Respectfully submitted,

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Fruita, CO 81521
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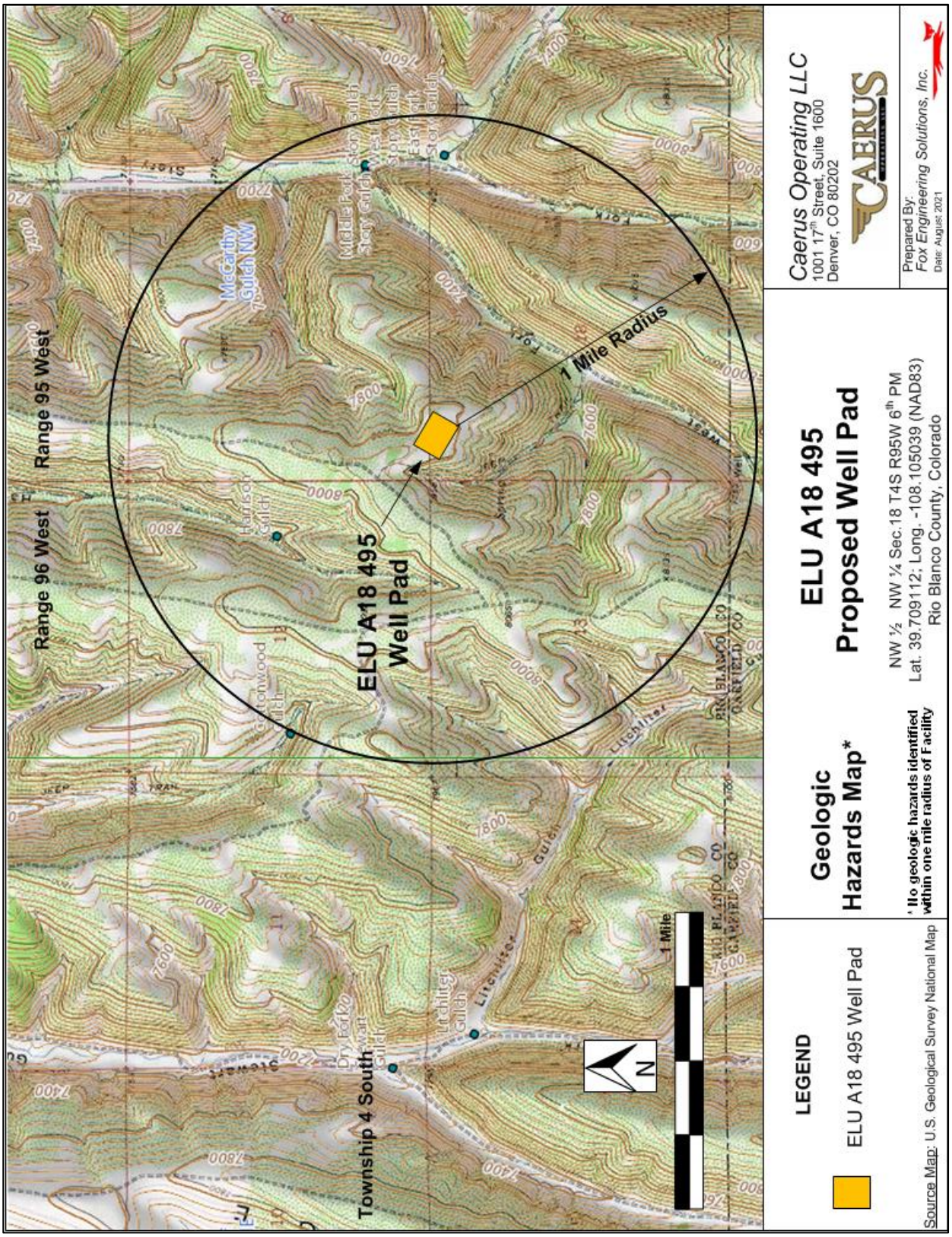
Email: david.fox.fes@gmail.com

Figure 1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Prepared By:
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Date: August 2021
Source Map: U.S. Geological Survey National Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Rio Blanco County Area, Colorado

Caerus Operation LLC ELU A18 495 Well Pad

August 23, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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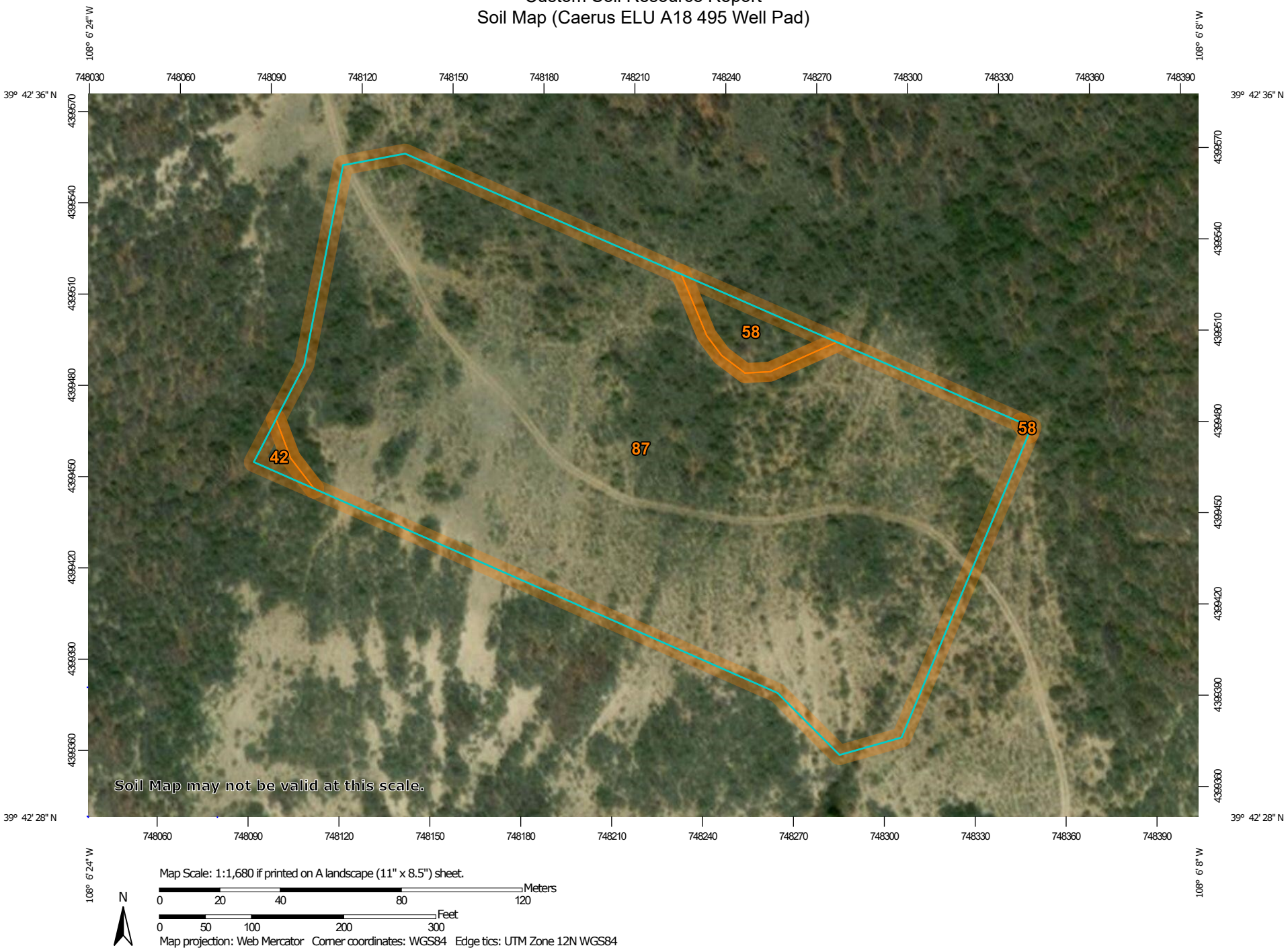
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map (Caerus ELU A18 495 Well Pad)



Map Scale: 1:1,680 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rio Blanco County Area, Colorado
Survey Area Data: Version 15, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 12, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend (Caerus ELU A18 495 Well Pad)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
42	Irigul channery loam, 5 to 50 percent slopes	0.0	0.5%
58	Parachute loam, 25 to 75 percent slopes	0.2	2.7%
87	Starman-Vandamore complex, 5 to 40 percent slopes	6.4	96.7%
Totals for Area of Interest		**6.6**	**100.0%**

Map Unit Descriptions (Caerus ELU A18 495 Well Pad)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Rio Blanco County Area, Colorado

42—Irigul channery loam, 5 to 50 percent slopes

Map Unit Setting

National map unit symbol: jp51
Elevation: 7,600 to 8,700 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 37 to 39 degrees F
Frost-free period: 45 to 75 days
Farmland classification: Not prime farmland

Map Unit Composition

Irigul and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Irigul

Setting

Landform: Ridges, mountainsides
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 5 inches: channery loam
H2 - 5 to 12 inches: very channery loam, very channery clay loam, extremely channery loam
H2 - 5 to 12 inches: unweathered bedrock
H2 - 5 to 12 inches:
H3 - 12 to 16 inches:

Properties and qualities

Slope: 5 to 50 percent
Depth to restrictive feature: 5 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R048AY303CO
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 15 percent

Hydric soil rating: No

58—Parachute loam, 25 to 75 percent slopes

Map Unit Setting

National map unit symbol: jp5l
Elevation: 7,500 to 8,700 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 37 to 39 degrees F
Frost-free period: 45 to 75 days
Farmland classification: Not prime farmland

Map Unit Composition

Parachute and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Parachute

Setting

Landform: Mountainsides, ridges
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Residuum weathered from sandstone

Typical profile

H1 - 0 to 4 inches: loam
H2 - 4 to 24 inches: loam, channery loam
H2 - 4 to 24 inches: very channery loam, very channery sandy loam, extremely channery sandy loam
H3 - 24 to 38 inches: unweathered bedrock
H3 - 24 to 38 inches:
H3 - 24 to 38 inches:
H4 - 38 to 42 inches:

Properties and qualities

Slope: 25 to 75 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: C
Ecological site: R048AY238CO
Hydric soil rating: No

Minor Components

Other soils
Percent of map unit: 15 percent
Hydric soil rating: No

87—Starman-Vandamore complex, 5 to 40 percent slopes

Map Unit Setting
National map unit symbol: jp6m
Elevation: 7,500 to 8,900 feet
Mean annual precipitation: 18 to 22 inches
Mean annual air temperature: 37 to 39 degrees F
Frost-free period: 45 to 75 days
Farmland classification: Not prime farmland

Map Unit Composition
Starman and similar soils: 50 percent
Vandamore and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Starman

Setting
Landform: Ridges, ridges
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Residuum weathered from shale

Typical profile
H1 - 0 to 2 inches: channery loam
H2 - 2 to 17 inches: very channery loam, extremely channery loam
H2 - 2 to 17 inches: unweathered bedrock
H3 - 17 to 21 inches:

Properties and qualities
Slope: 5 to 20 percent
Depth to restrictive feature: 3 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R048AY235CO - Dry Exposure
Hydric soil rating: No

Description of Vandamore

Setting

Landform: Ridges
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from shale

Typical profile

H1 - 0 to 4 inches: channery loam
H2 - 4 to 25 inches: very channery loam, extremely channery loam, very channery fine sandy loam
H2 - 4 to 25 inches: unweathered bedrock
H2 - 4 to 25 inches:
H3 - 25 to 29 inches:

Properties and qualities

Slope: 5 to 40 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: R048AY235CO - Dry Exposure
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 10 percent
Hydric soil rating: No

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Building Site Development

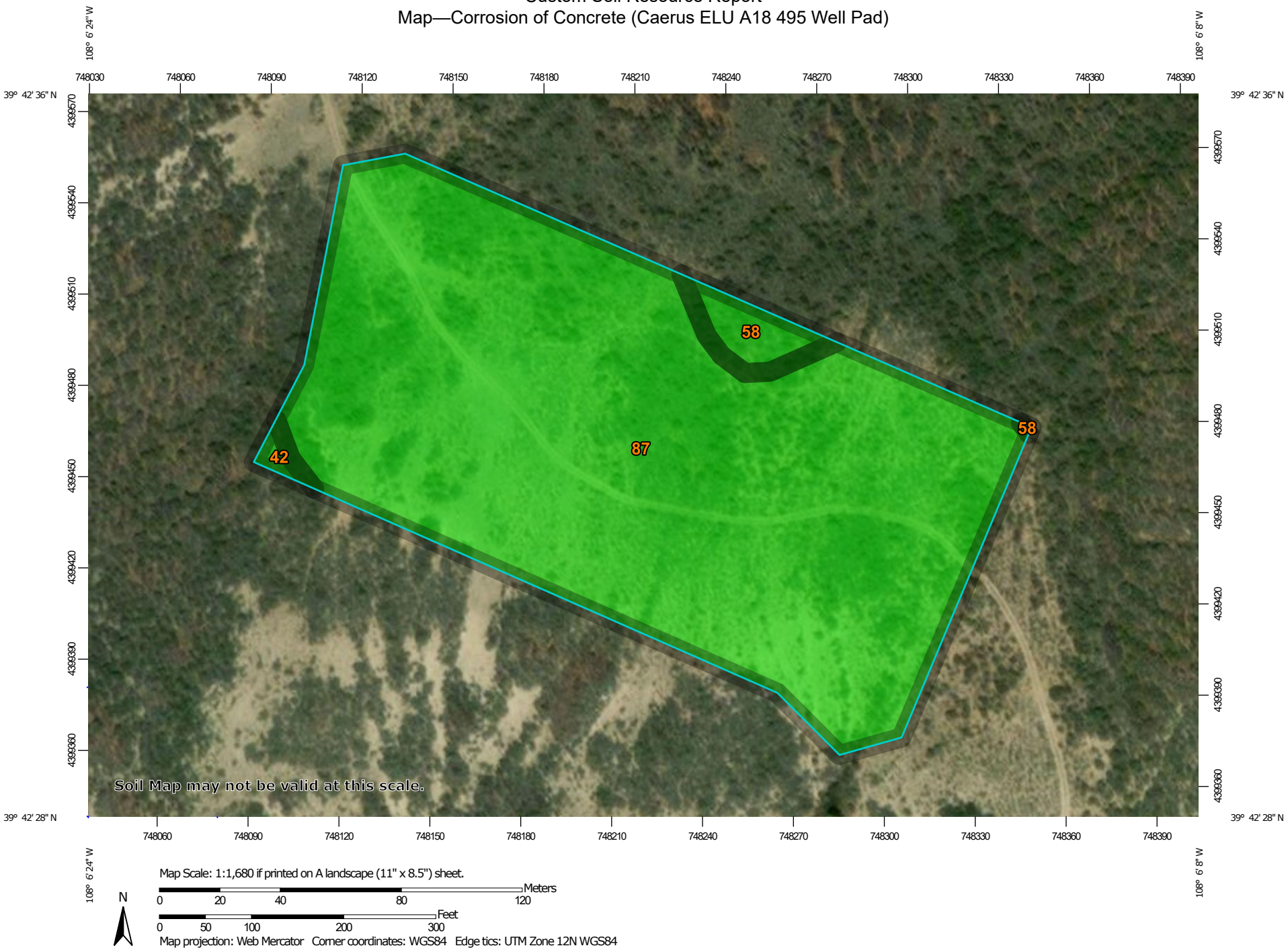
Building site development interpretations are designed to be used as tools for evaluating soil suitability and identifying soil limitations for various construction purposes. As part of the interpretation process, the rating applies to each soil in its described condition and does not consider present land use. Example interpretations can include corrosion of concrete and steel, shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping.

Corrosion of Concrete (Caerus ELU A18 495 Well Pad)

"Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens concrete. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the concrete in installations that are entirely within one kind of soil or within one soil layer.

The risk of corrosion is expressed as "low," "moderate," or "high."

Custom Soil Resource Report
Map—Corrosion of Concrete (Caerus ELU A18 495 Well Pad)



Map Scale: 1:1,680 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

High

Moderate

Low

Not rated or not available

Soil Rating Lines

High

Moderate

Low

Not rated or not available

Soil Rating Points

High

Moderate

Low

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rio Blanco County Area, Colorado
Survey Area Data: Version 15, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 12, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Corrosion of Concrete (Caerus ELU A18 495 Well Pad)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
42	Irigul channery loam, 5 to 50 percent slopes	Low	0.0	0.5%
58	Parachute loam, 25 to 75 percent slopes	Low	0.2	2.7%
87	Starman-Vandamore complex, 5 to 40 percent slopes	Low	6.4	96.7%
Totals for Area of Interest			**6.6**	**100.0%**

Rating Options—Corrosion of Concrete (Caerus ELU A18 495 Well Pad)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

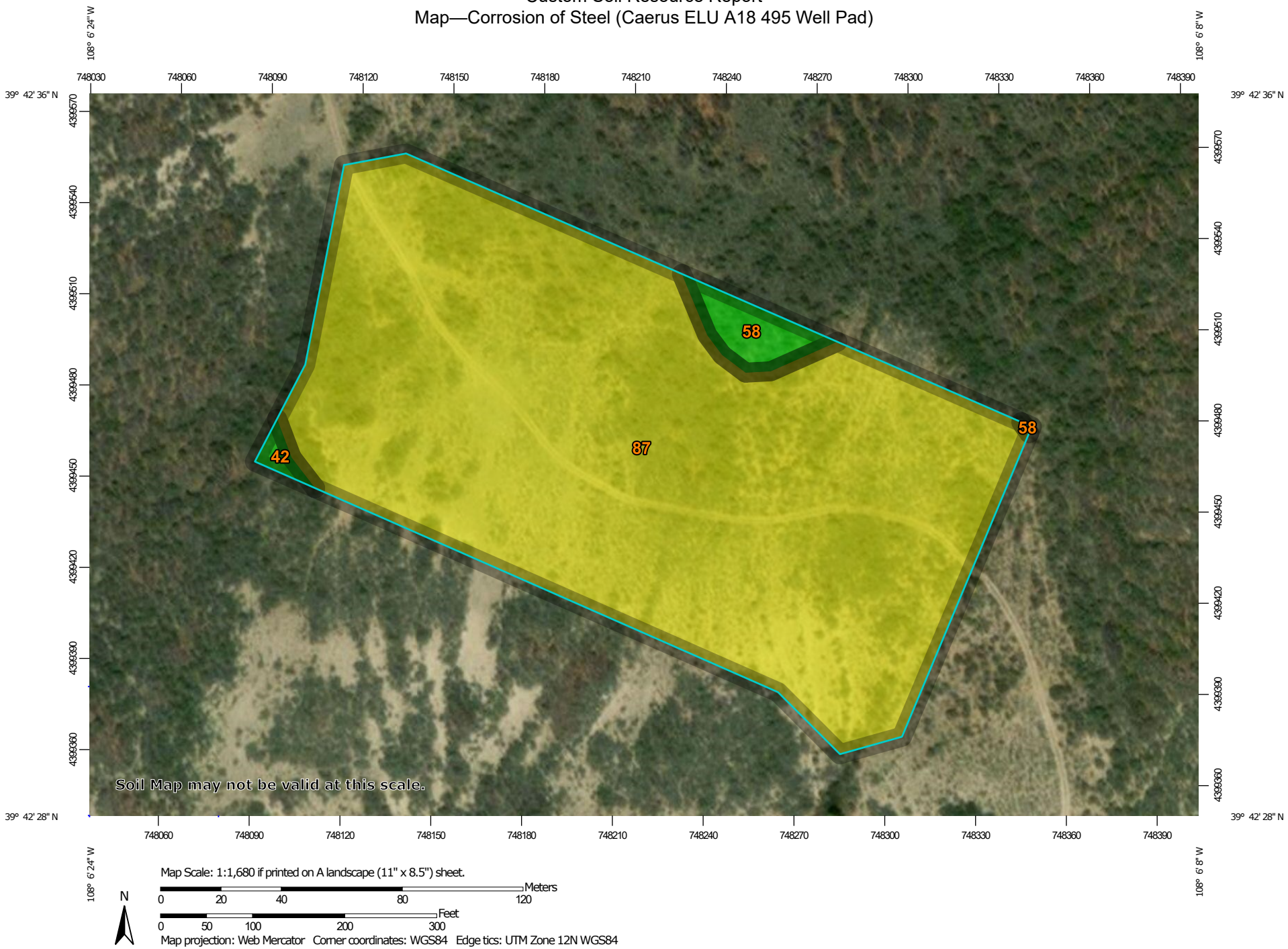
Tie-break Rule: Higher

Corrosion of Steel (Caerus ELU A18 495 Well Pad)

"Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel in installations that are entirely within one kind of soil or within one soil layer.

The risk of corrosion is expressed as "low," "moderate," or "high."

Custom Soil Resource Report
Map—Corrosion of Steel (Caerus ELU A18 495 Well Pad)



Map Scale: 1:1,680 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- High
- Moderate
- Low
- Not rated or not available

Soil Rating Lines

- High
- Moderate
- Low
- Not rated or not available

Soil Rating Points

- High
- Moderate
- Low
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 15, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 12, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Corrosion of Steel (Caerus ELU A18 495 Well Pad)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
42	Irigul channery loam, 5 to 50 percent slopes	Low	0.0	0.5%
58	Parachute loam, 25 to 75 percent slopes	Low	0.2	2.7%
87	Starman-Vandamore complex, 5 to 40 percent slopes	Moderate	6.4	96.7%
Totals for Area of Interest			**6.6**	**100.0%**

Rating Options—Corrosion of Steel (Caerus ELU A18 495 Well Pad)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Hydric Rating by Map Unit (Caerus ELU A18 495 Well Pad)

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

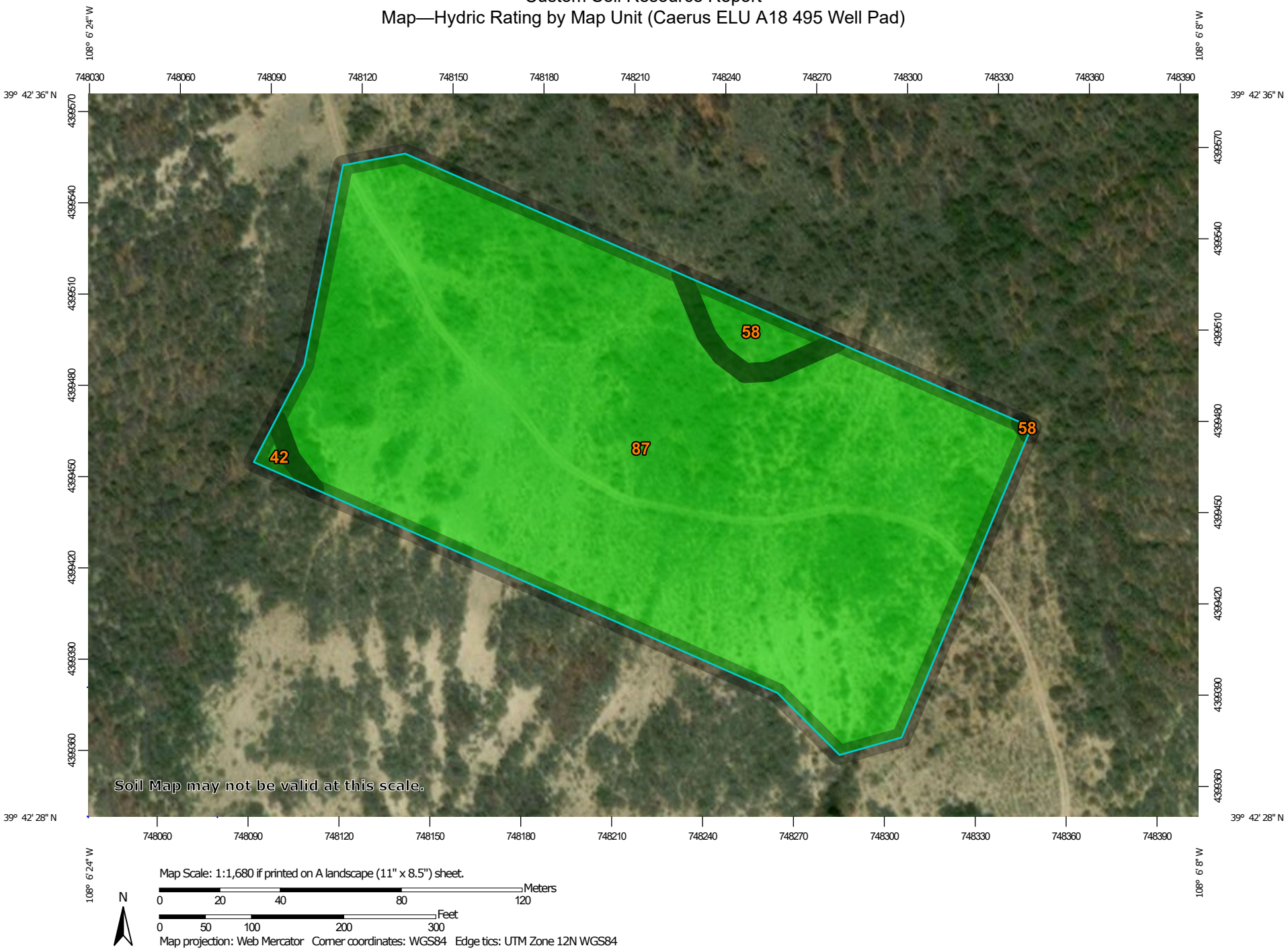
Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Custom Soil Resource Report
Map—Hydric Rating by Map Unit (Caerus ELU A18 495 Well Pad)



Map Scale: 1:1,680 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rio Blanco County Area, Colorado
Survey Area Data: Version 15, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 12, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydric Rating by Map Unit (Caerus ELU A18 495 Well Pad)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
42	Irigul channery loam, 5 to 50 percent slopes	0	0.0	0.5%
58	Parachute loam, 25 to 75 percent slopes	0	0.2	2.7%
87	Starman-Vandamore complex, 5 to 40 percent slopes	0	6.4	96.7%
Totals for Area of Interest			**6.6**	**100.0%**

Rating Options—Hydric Rating by Map Unit (Caerus ELU A18 495 Well Pad)

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Erosion Factors

Soil Erosion Factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

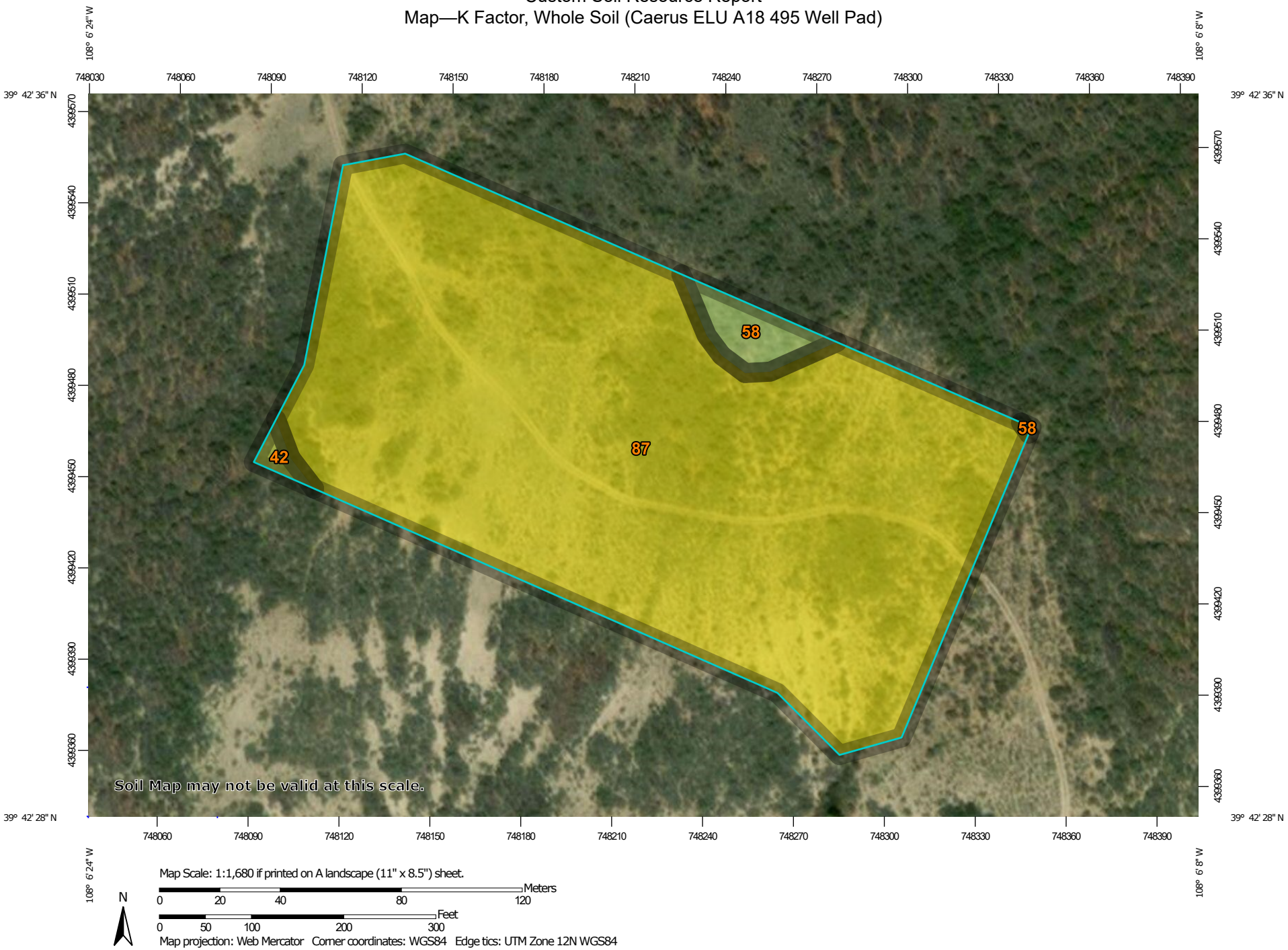
K Factor, Whole Soil (Caerus ELU A18 495 Well Pad)

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Factor K does not apply to organic horizons and is not reported for those layers.

Custom Soil Resource Report
Map—K Factor, Whole Soil (Caerus ELU A18 495 Well Pad)



Map Scale: 1:1,680 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Lines

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Soil Rating Points

.02
.05
.10
.15
.17
.20
.24
.28
.32
.37
.43
.49
.55
.64
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rio Blanco County Area, Colorado
Survey Area Data: Version 15, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 12, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—K Factor, Whole Soil (Caerus ELU A18 495 Well Pad)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
42	Irigul channery loam, 5 to 50 percent slopes	.20	0.0	0.5%
58	Parachute loam, 25 to 75 percent slopes	.24	0.2	2.7%
87	Starman-Vandamore complex, 5 to 40 percent slopes	.17	6.4	96.7%
Totals for Area of Interest			**6.6**	**100.0%**

Rating Options—K Factor, Whole Soil (Caerus ELU A18 495 Well Pad)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (Caerus ELU A18 495 Well Pad)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

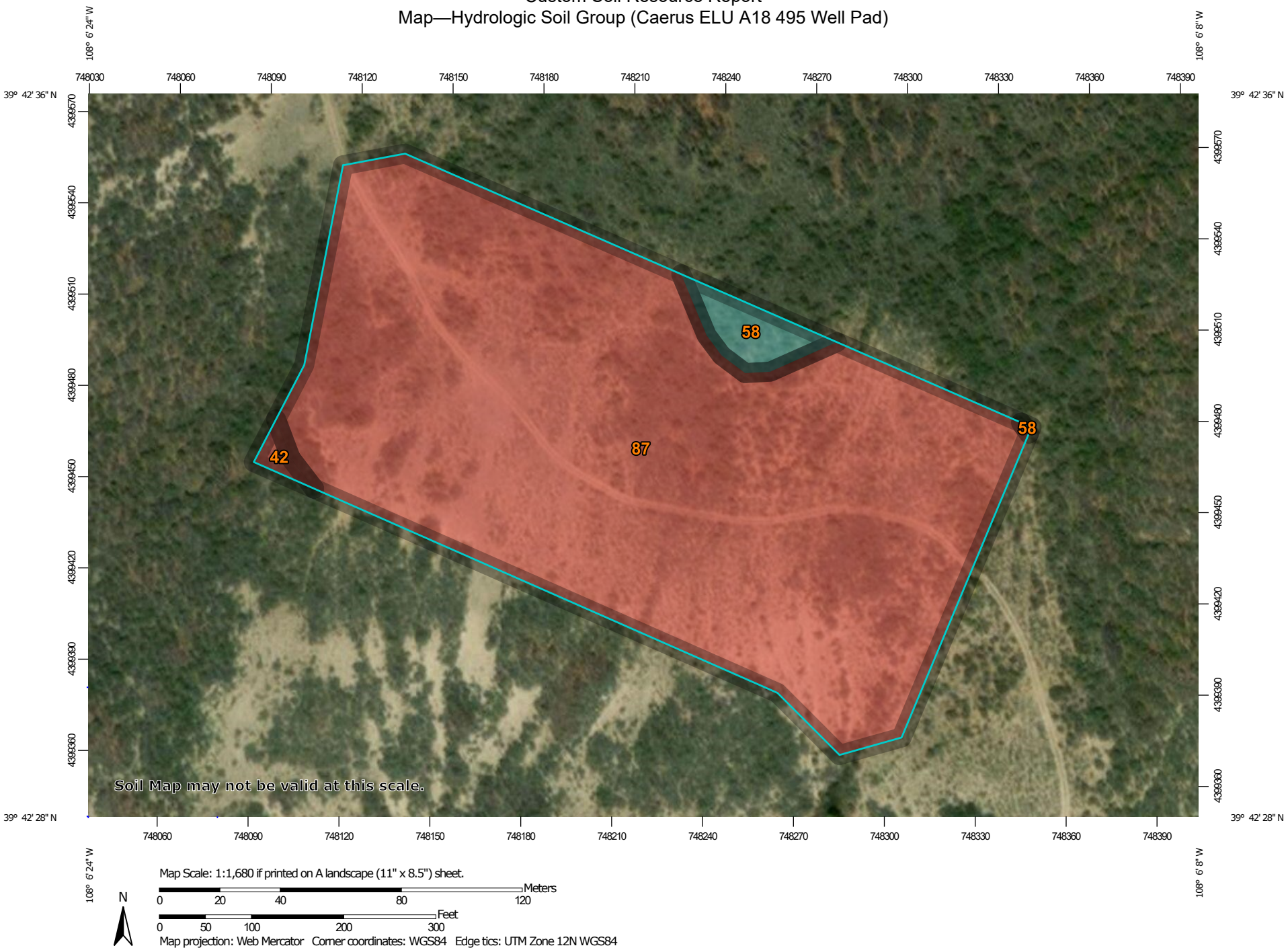
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group (Caerus ELU A18 495 Well Pad)



Map Scale: 1:1,680 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Rio Blanco County Area, Colorado
Survey Area Data: Version 15, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 12, 2017

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Table—Hydrologic Soil Group (Caerus ELU A18 495 Well Pad)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
42	Irigul channery loam, 5 to 50 percent slopes	D	0.0	0.5%
58	Parachute loam, 25 to 75 percent slopes	C	0.2	2.7%
87	Starman-Vandamore complex, 5 to 40 percent slopes	D	6.4	96.7%
Totals for Area of Interest			**6.6**	**100.0%**

Rating Options—Hydrologic Soil Group (Caerus ELU A18 495 Well Pad)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

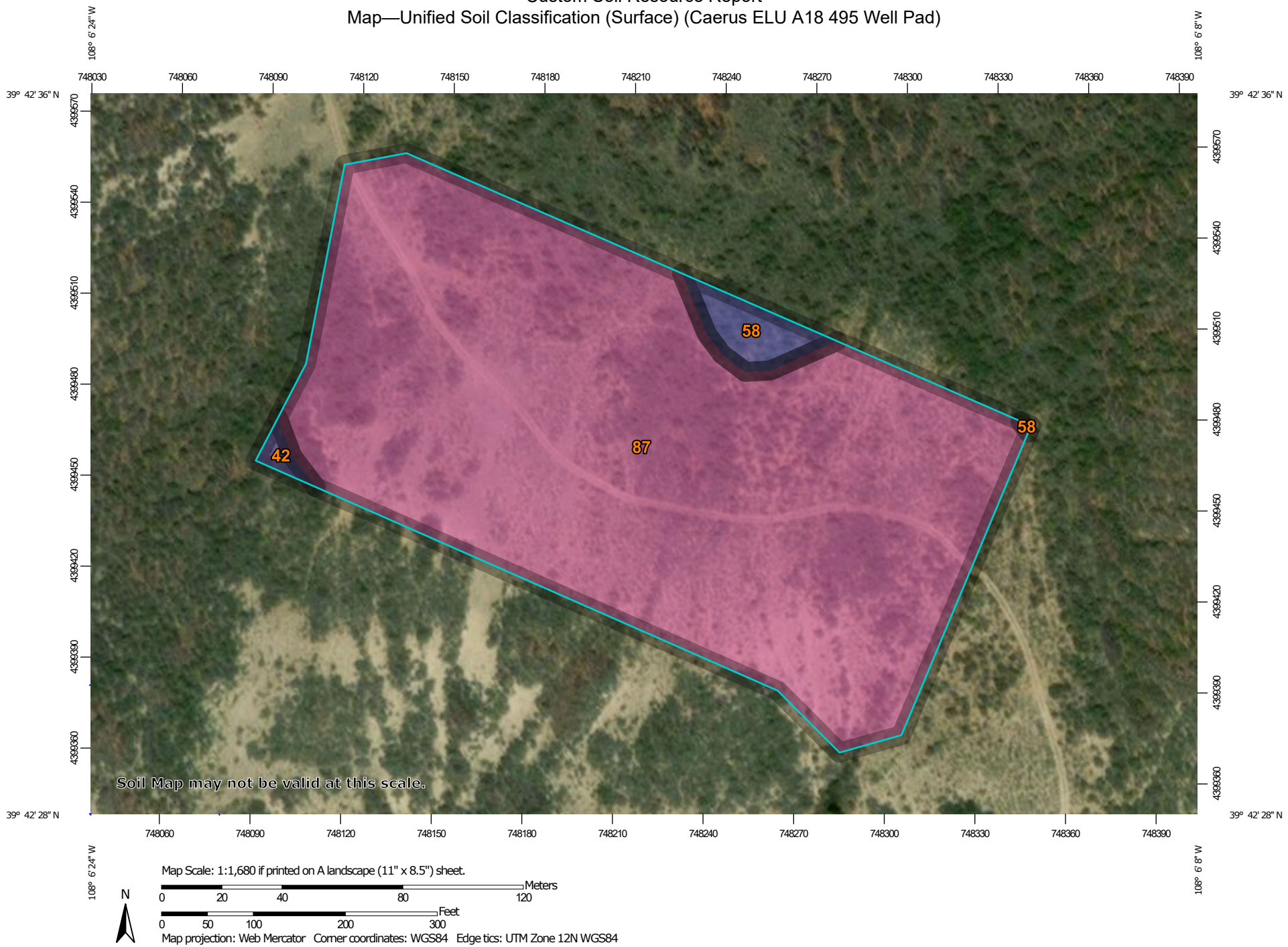
Unified Soil Classification (Surface) (Caerus ELU A18 495 Well Pad)

The Unified soil classification system classifies mineral and organic mineral soils for engineering purposes on the basis of particle-size characteristics, liquid limit, and plasticity index. It identifies three major soil divisions: (i) coarse-grained soils having less than 50 percent, by weight, particles smaller than 0.074 mm in diameter; (ii) fine-grained soils having 50 percent or more, by weight, particles smaller than 0.074 mm in diameter; and (iii) highly organic soils that demonstrate certain organic characteristics. These divisions are further subdivided into a total of 15 basic soil groups. The major soil divisions and basic soil groups are determined on the basis of estimated or measured values for grain-size distribution and Atterberg limits. ASTM D 2487 shows the criteria chart used for classifying soil in the Unified system and the 15 basic soil groups of the system and the plasticity chart for the Unified system.

The various groupings of this classification correlate in a general way with the engineering behavior of soils. This correlation provides a useful first step in any field or laboratory investigation for engineering purposes. It can serve to make some general interpretations relating to probable performance of the soil for engineering uses.

For each soil horizon in the database one or more Unified soil classifications may be listed. One is marked as the representative or most commonly occurring. The representative classification is shown here for the surface layer of the soil.

Custom Soil Resource Report
Map—Unified Soil Classification (Surface) (Caerus ELU A18 495 Well Pad)



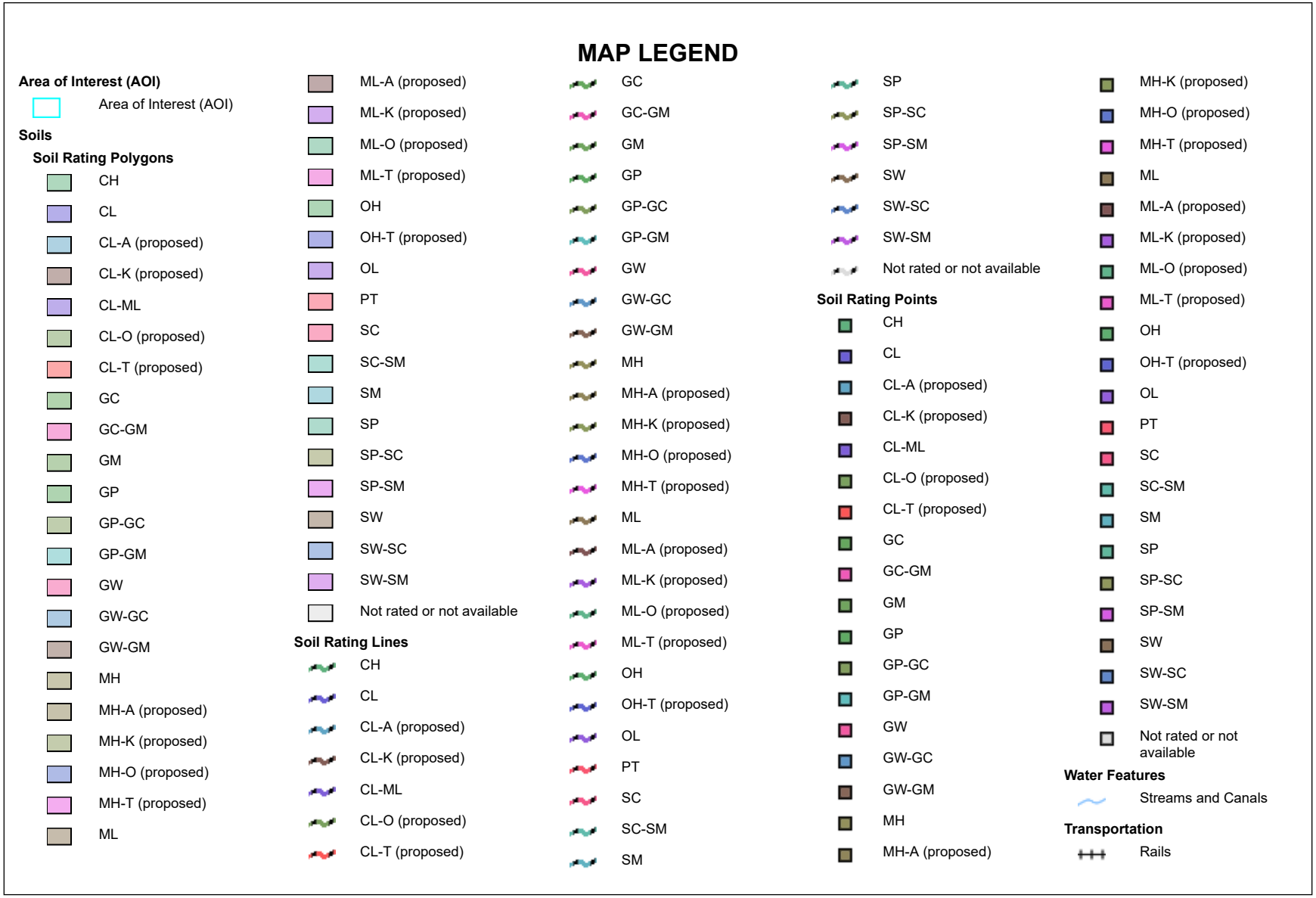
Map Scale: 1:1,680 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 20 40 80 120

Feet
0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84


MAP LEGEND
Area of Interest (AOI)
Area of Interest (AOI)
Soils
Soil Rating Polygons
CH
CL
CL-A (proposed)
CL-K (proposed)
CL-ML
CL-O (proposed)
CL-T (proposed)
GC
GC-GM
GM
GP
GP-GC
GP-GM
GW
GW-GC
GW-GM
MH
MH-A (proposed)
MH-K (proposed)
MH-O (proposed)
MH-T (proposed)
ML
ML-A (proposed)
ML-K (proposed)
ML-O (proposed)
ML-T (proposed)
OH
OH-T (proposed)
OL
PT
SC
SC-SM
SM
SP
SP-SC
SP-SM
SW
SW-SC
SW-SM
Not rated or not available
Soil Rating Lines
CH
CL
CL-A (proposed)
CL-K (proposed)
CL-ML
CL-O (proposed)
CL-T (proposed)
GC
GC-GM
GM
GP
GP-GC
GP-GM
GW
GW-GC
GW-GM
MH
MH-A (proposed)
MH-K (proposed)
MH-O (proposed)
MH-T (proposed)
ML
ML-A (proposed)
ML-K (proposed)
ML-O (proposed)
ML-T (proposed)
OH
OH-T (proposed)
OL
PT
SC
SC-SM
SM
SP
SP-SC
SP-SM
SW
SW-SC
SW-SM
Not rated or not available
Soil Rating Points
CH
CL
CL-A (proposed)
CL-K (proposed)
CL-ML
CL-O (proposed)
CL-T (proposed)
GC
GC-GM
GM
GP
GP-GC
GP-GM
GW
GW-GC
GW-GM
MH
MH-A (proposed)
MH-K (proposed)
MH-O (proposed)
MH-T (proposed)
ML
ML-A (proposed)
ML-K (proposed)
ML-O (proposed)
ML-T (proposed)
OH
OH-T (proposed)
OL
PT
SC
SC-SM
SM
SP
SP-SC
SP-SM
SW
SW-SC
SW-SM
Not rated or not available
Water Features
Streams and Canals
Transportation
Rails

MAP INFORMATION


Interstate Highways


US Routes

Major Roads

Local Roads

Background


Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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Soil Survey Area: Rio Blanco County Area, Colorado
Survey Area Data: Version 15, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 12, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Unified Soil Classification (Surface) (Caerus ELU A18 495 Well Pad)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
42	Irigul channery loam, 5 to 50 percent slopes	CL-ML	0.0	0.5%
58	Parachute loam, 25 to 75 percent slopes	CL	0.2	2.7%
87	Starman-Vandamore complex, 5 to 40 percent slopes	GC-GM	6.4	96.7%
Totals for Area of Interest			**6.6**	**100.0%**

Rating Options—Unified Soil Classification (Surface) (Caerus ELU A18 495 Well Pad)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Layer Options (Horizon Aggregation Method): Surface Layer (Not applicable)

Depth to a Selected Soil Restrictive Layer: Lithic bedrock (Caerus ELU A18 495 Well Pad)

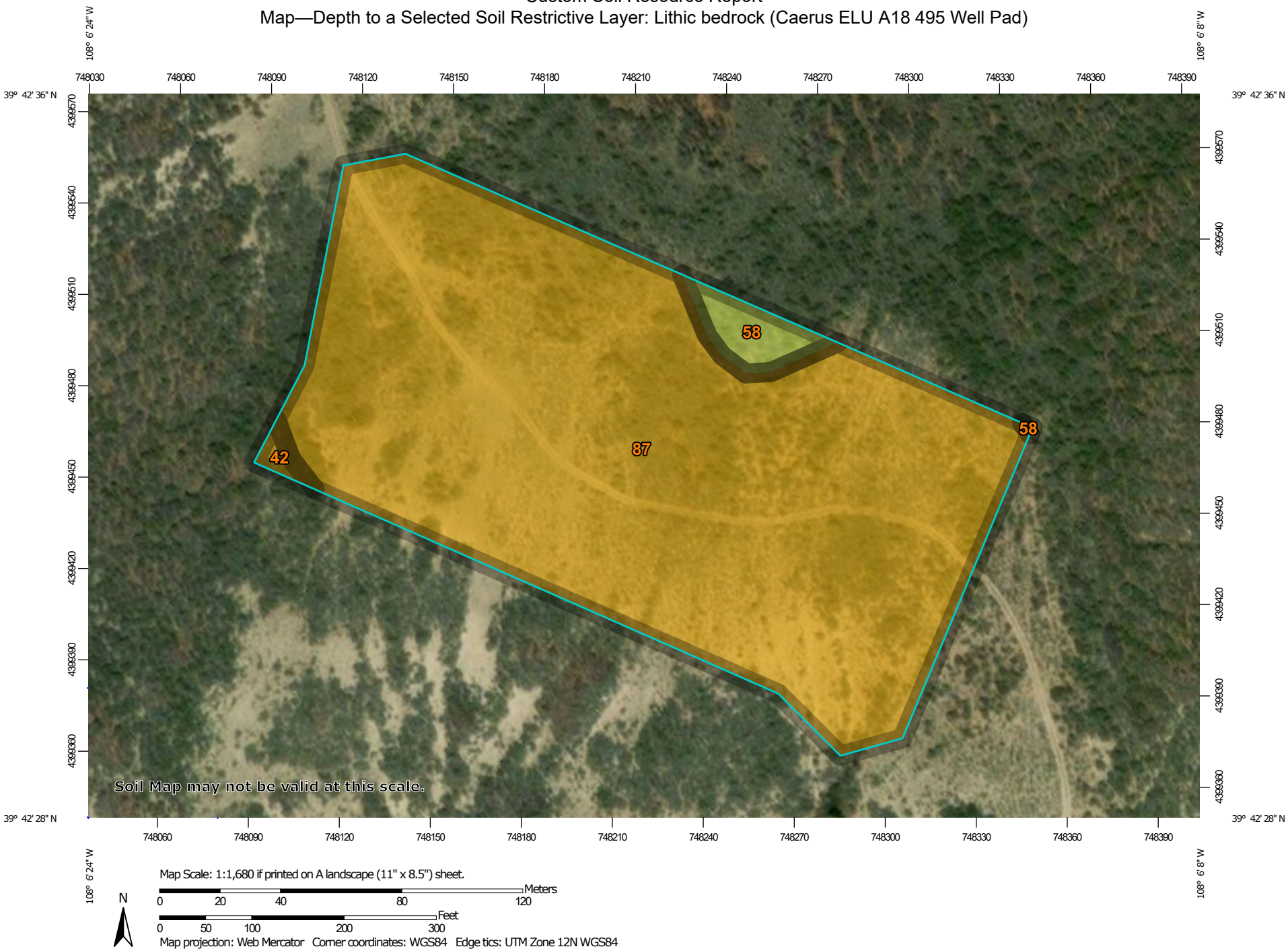
A "restrictive layer" is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers.

This theme presents the depth to the user selected type of restrictive layer as described in for each map unit. If no restrictive layer is described in a map unit, it is represented by the "greater than 200" depth class.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report

Map—Depth to a Selected Soil Restrictive Layer: Lithic bedrock (Caerus ELU A18 495 Well Pad)



Map Scale: 1:1,680 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Lines

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Points

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

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Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 15, Jun 5, 2020

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Date(s) aerial images were photographed: Dec 31, 2009—Oct 12, 2017

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Table—Depth to a Selected Soil Restrictive Layer: Lithic bedrock (Caerus ELU A18 495 Well Pad)

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
42	Irigul channery loam, 5 to 50 percent slopes	30	0.0	0.5%
58	Parachute loam, 25 to 75 percent slopes	96	0.2	2.7%
87	Starman-Vandamore complex, 5 to 40 percent slopes	43	6.4	96.7%
Totals for Area of Interest			**6.6**	**100.0%**

Rating Options—Depth to a Selected Soil Restrictive Layer: Lithic bedrock (Caerus ELU A18 495 Well Pad)

Units of Measure: centimeters

Restriction Kind: Lithic bedrock

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Water Features

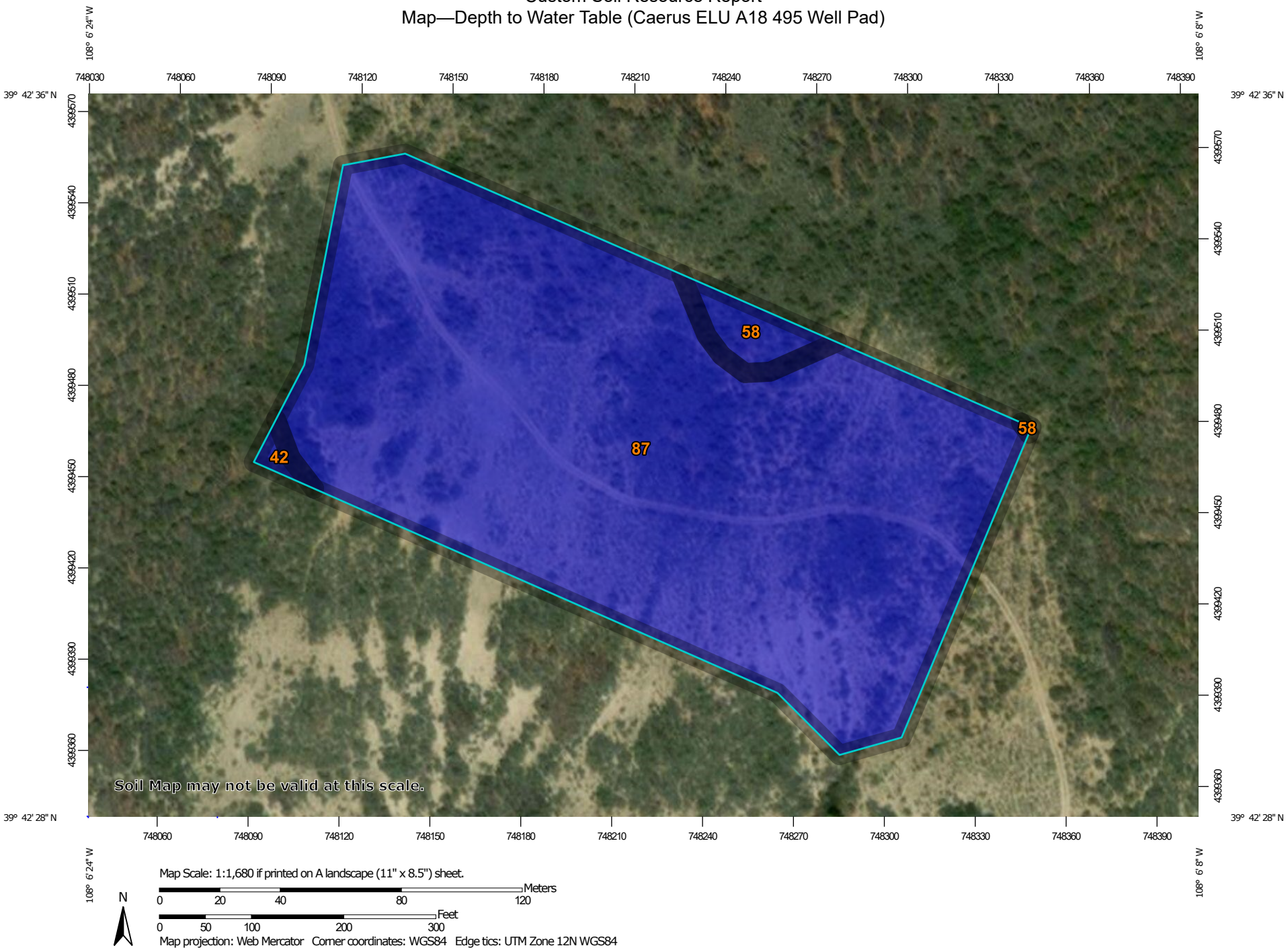
Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table (Caerus ELU A18 495 Well Pad)

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report
Map—Depth to Water Table (Caerus ELU A18 495 Well Pad)



Map Scale: 1:1,680 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Lines

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Points

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Table—Depth to Water Table (Caerus ELU A18 495 Well Pad)

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
42	Irigul channery loam, 5 to 50 percent slopes	>200	0.0	0.5%
58	Parachute loam, 25 to 75 percent slopes	>200	0.2	2.7%
87	Starman-Vandamore complex, 5 to 40 percent slopes	>200	6.4	96.7%
Totals for Area of Interest			**6.6**	**100.0%**

Rating Options—Depth to Water Table (Caerus ELU A18 495 Well Pad)

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

Flooding Frequency Class (Caerus ELU A18 495 Well Pad)

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

"None" means that flooding is not probable. The chance of flooding is nearly 0 percent in any year. Flooding occurs less than once in 500 years.

"Very rare" means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than 1 percent in any year.

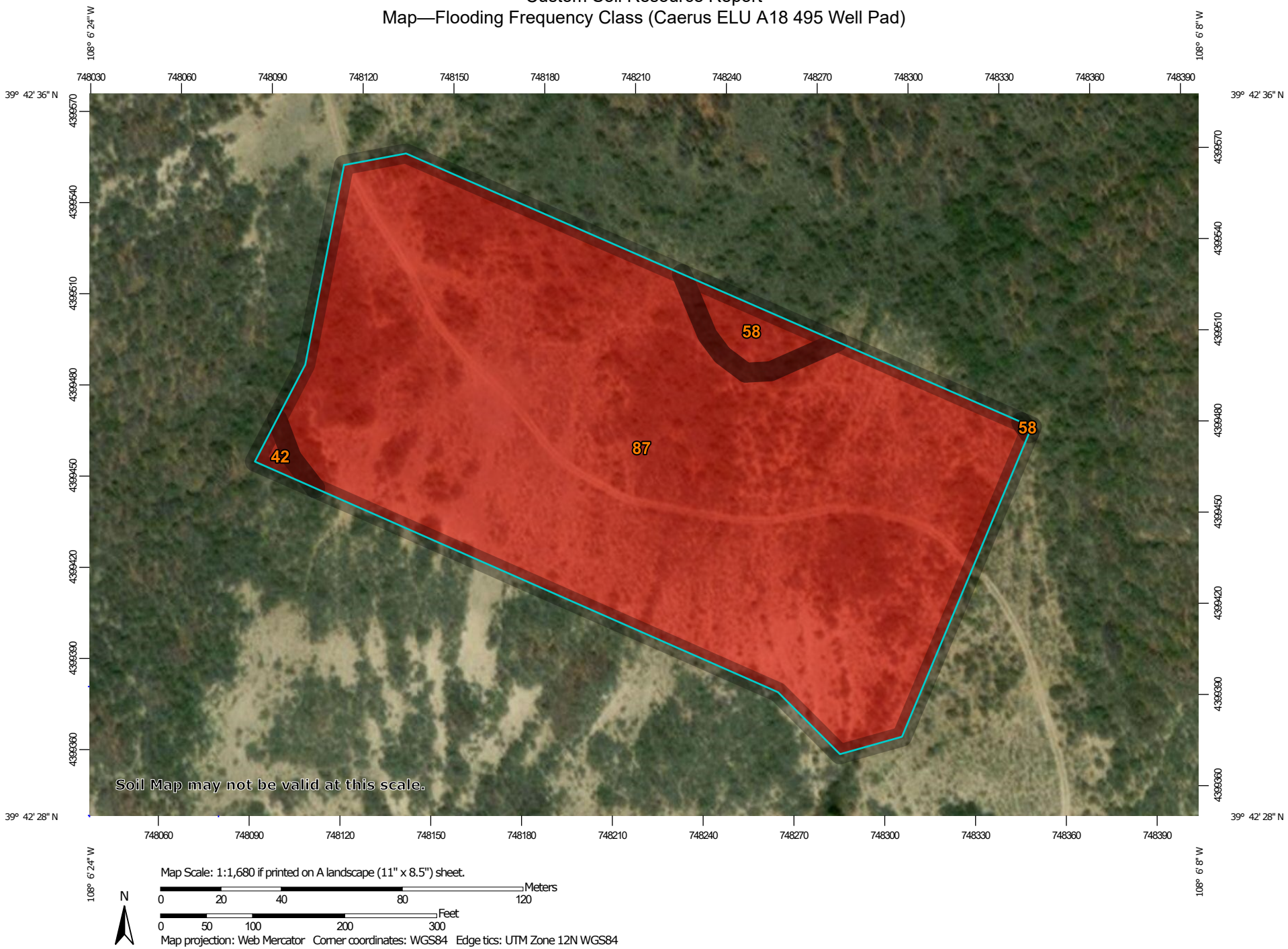
"Rare" means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is 1 to 5 percent in any year.

"Occasional" means that flooding occurs infrequently under normal weather conditions. The chance of flooding is 5 to 50 percent in any year.

"Frequent" means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year.

"Very frequent" means that flooding is likely to occur very often under normal weather conditions. The chance of flooding is more than 50 percent in all months of any year.

Custom Soil Resource Report
Map—Flooding Frequency Class (Caerus ELU A18 495 Well Pad)



Map Scale: 1:1,680 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Soil Rating Lines
- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Soil Rating Points
- None
- Very Rare
- Rare
- Occasional
- Frequent
- Very Frequent
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Date(s) aerial images were photographed: Dec 31, 2009—Oct 12, 2017

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Table—Flooding Frequency Class (Caerus ELU A18 495 Well Pad)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
42	Irigul channery loam, 5 to 50 percent slopes	None	0.0	0.5%
58	Parachute loam, 25 to 75 percent slopes	None	0.2	2.7%
87	Starman-Vandamore complex, 5 to 40 percent slopes	None	6.4	96.7%
Totals for Area of Interest			**6.6**	**100.0%**

Rating Options—Flooding Frequency Class (Caerus ELU A18 495 Well Pad)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: More Frequent

Beginning Month: January

Ending Month: December

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