

Soils and Geology
Report
For
Warner Subdivision
17350 W. Goshawk Road
Colorado Springs, Colorado 80908
October 15, 2021



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The following presents the Soils and Geology Evaluation for the Warners' (Applicants) 40 Acre parcel zoned RR-5 located in the Northeast $\frac{1}{4}$ of the Northwest $\frac{1}{4}$ of Section 23, Township 11 South, Range 65 West, of the 6th P.M. ("Property"). The Property is situated within the Kiowa Bijou Designated Groundwater Basin having the address 17350 W. Goshawk Road, Colorado Springs Colorado, 80908, in El Paso County. (Figure 1).

1.0 Summary of the Proposed Subdivision

The 40 acre property will be subdivided to create a four-lot minor subdivision. Lots 1 and 2 are vacant and will be 5-acres each; Lot 3 has an existing home with a well (Permit 95869) completed into the Dawson aquifer and an individual non-evaporative septic system and leach field and will be 19.96 acres; and Lot 4 is vacant and will be 10.0 acres. The water supply for Lots 1, 2 and 4 will also be from individual wells, and wastewater will be treated by individual non-evaporative septic systems (Figure 2).

GEOLOGY and HYDROLOGY

The Project Site is located within the Black Forest Quadrangle near the southeastern portion of the Denver Basin, a geologic structural depression (Thorson 2003a, b). This asymmetrical structural basin is shallow-dipping toward the northeast. The uppermost materials are that of the Dawson Formation deposited during the early to possibly middle Eocene. Historically, braided streams eastwardly carried and deposited gravel, sand, silt and clays derived from weathered Precambrian Pike Peak Granite from the uplifted areas to the west.

Facies Unit 5 (TKda5) is the uppermost facies of the Dawson Formation and is mapped over the Project Site (Figure 3). Facies Unit 5 is described as generally permeable, well drained, with good foundation characteristics.

The Property is located at the headwaters of the Kiowa-Bijou Basin. The topographic relief is about 3 to 6 percent across the Property. Drainage direction varies across the property and is generally to the northeast and southeast) Figure 4.

SOILS - NRCS

The National Resource Conservation Service (NRCS) identified one soil type, Elbeth Sandy Loam.

Type	Description	Percent Coverage
25	Elbeth Sandy Loam , 3 to 8 percent slopes	97
26	Elbeth Sandy Loam, 8 to 15 percent slopes	0.3

Attachment 1 provides a complete description of the soils. All proposed buildable land is located within the area identified as Elbeth Sandy Loam with less than a 30% slope. The drainage class is described as well drained and in Hydrologic Soil Group B which is defined as having a moderate infiltration rate and moderately fine to course textures. Runoff potential is medium. Soils are derived from the Dawson formation which include arkosic sands with interbedded clays.

Soils encountered in 2017 on proposed lot 4 in profile pit locations PP1 and PP2 (Figure 2) were identified as USDA soil texture sandy loam, soil type 2, consistent with the NRCS soil type. Soils encountered to a depth of 8 feet as part of the septic system soils investigation include sandy clay, sandy loam and sand.

FIELD INVESTIGATIONS

Two Profile Pits (PP1 and PP1, Figure 2) were completed and evaluated by Geoquest LLC (Geoquest) in 2017 on proposed Lot 4 to evaluate parameters for septic system. Both test holes were completed to 8 feet bgs. Geoquest determined that an engineered septic system would be needed for this location due to encountering bedrock at 40 and 30-inches in PP1 and PP2 respectively as well as encountering groundwater. It is understood that the groundwater identified is not a water table condition but water collected at the soil/bedrock interface. This perched water is easily mitigated using standard engineering practices. In addition to the profile pits, two Test Holes (TH-1 and TH-1 Figure 2) were completed to a depth of 15 feet and evaluated by Geoquest in 2017 for a foundation (Figure 2). Laboratory testing was used to

classify and determine the soils engineering characteristics. Attachment 3 is the report along with engineering design recommendations.

In 2020 RMG conducted an investigation on Lots 1, 2 and 4 for the purpose of evaluating suitability for onsite wastewater treatment systems. Three profile test pits were excavated to a maximum depth of 8 feet below ground surface to evaluate suitability for onsite wastewater treatment systems. Reportedly, groundwater was not encountered in the test pits and bedrock/limiting layers were encountered on Lot 1 at a depth of 7 feet and on Lot 4, at a depth of 5 feet (RMG 2020). Soils encountered include sandy clay, sandy loam, and sand (Attachment 4).

More extensive soils and foundation investigations will be necessary on Lots 1 and 2 to characterize soil and bedrock for foundations and septic systems once home locations are determined. The investigations will include drilling, sampling, lab testing for the purpose of characterizing soil and bedrock engineering properties included but not limited to density, strength, water content, swell/consolidation potential and bearing capacity for foundation and subsurface drainage design purposes.

GEOLOGIC HAZARDS

The Project Site was evaluated for geologic hazards that may impact development. Hazards identified in the El Paso County Land Development Code including: Mining, wildfire, polluted water, landfills, fill areas in buildable areas, contamination; airports and major utility facilities, fill areas and landslides were not identified on the Project Site. The National Flood Hazard map delineated the Property and surrounding area an “area of Minimal Flood Hazard” (FEMA 2018).

Erosion

The surface topography across the Project Site is predominately flat aside from the low hill in the southeast portion of the Property. On June 11, 2013 the Black Forest fire significantly changed the landscape across western portion of the Project Site. Once covered with mature ponderosa pines with a canopy covering a significant area of the property, the fire reduced the canopy and trees in the vicinity of proposed lots 1 and 2 Pine needles,

vegetation, and other organic material that once covered the forest floor are no longer present and standing dead trees have been removed. Unimpeded rainfall and snow melt will likely result in surface erosion of the weathered sandstone. In addition, excavation will expose the highly erodible surfaces of the Dawson Formation.

Hydrocompaction and Expansive Soils

Site specific sampling results did not indicate expansive soils within profile pits excavated to evaluate suitability for OWTS design. However, soils at Lots 1, 2 and 4 will need to be investigated by 20 foot borings prior to initiating foundation groundwork and again upon completion of the foundation excavation and prior to the placement of any framework. Over-excavation and replacement with structural fill, sub-excavation and replacement with on-site moisture-conditioned soils, and/or the use of a geogrid reinforced fill are typical methods to remedy issues with expansive soils as well as loose hydrocompactive soils.

Groundwater and Surface Water

Groundwater was not encountered during excavation of the 3 profile pits. There is a possibility is a possibility for periodic high moisture condition. RMG reviewed soils samples collected in 2017 and states that redoximorphic features were suggested indicating the fluctuation of groundwater or higher ground water levels between 36 to 40 inches below the surface. Additional investigations will be needed by a certified geotechnical engineer in the areas where foundations are planned to design appropriate subdrain systems.

Seismic

Structural Engineers Association of California's and California's Office of Statewide Health Planning and Development developed an open-source web interface that uses the USGS web services to retrieve the seismic design data and presents it in a report format. Approximately 16 miles to the west of the Property is Ute Pass Fault. The fault is not active in recent times but earthquakes within the area have occurred as recent as 2007.



MINERAL RESOURCES

The Project Site is not included in the maps of aggregate deposits or known mineral resources. Colorado Geological Mineral Resources Derivative Map indicates a low potential to contain economically viable mineral resources.

CONCLUSION

The Project Site is compatible with the proposed development of single-family rural residential lots. Geologic hazards were not identified at the Project Site that would inhibit the proposed expansion of rural residential use. Soil samples collected on site were for the use in evaluating the suitability for individual onsite wastewater treatment systems on all three vacant lots as well as foundation suitability on proposed lot 4. Additional borings will be needed on each vacant lot for design of the foundation, subsurface drainage, etc. The Project Site appears safe for the intended purpose free from topographical constraints and geologic hazards.

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RMG Job No. 173099 Wastewater Study Warner 4-lot Minor Subdivision October 15, 2020

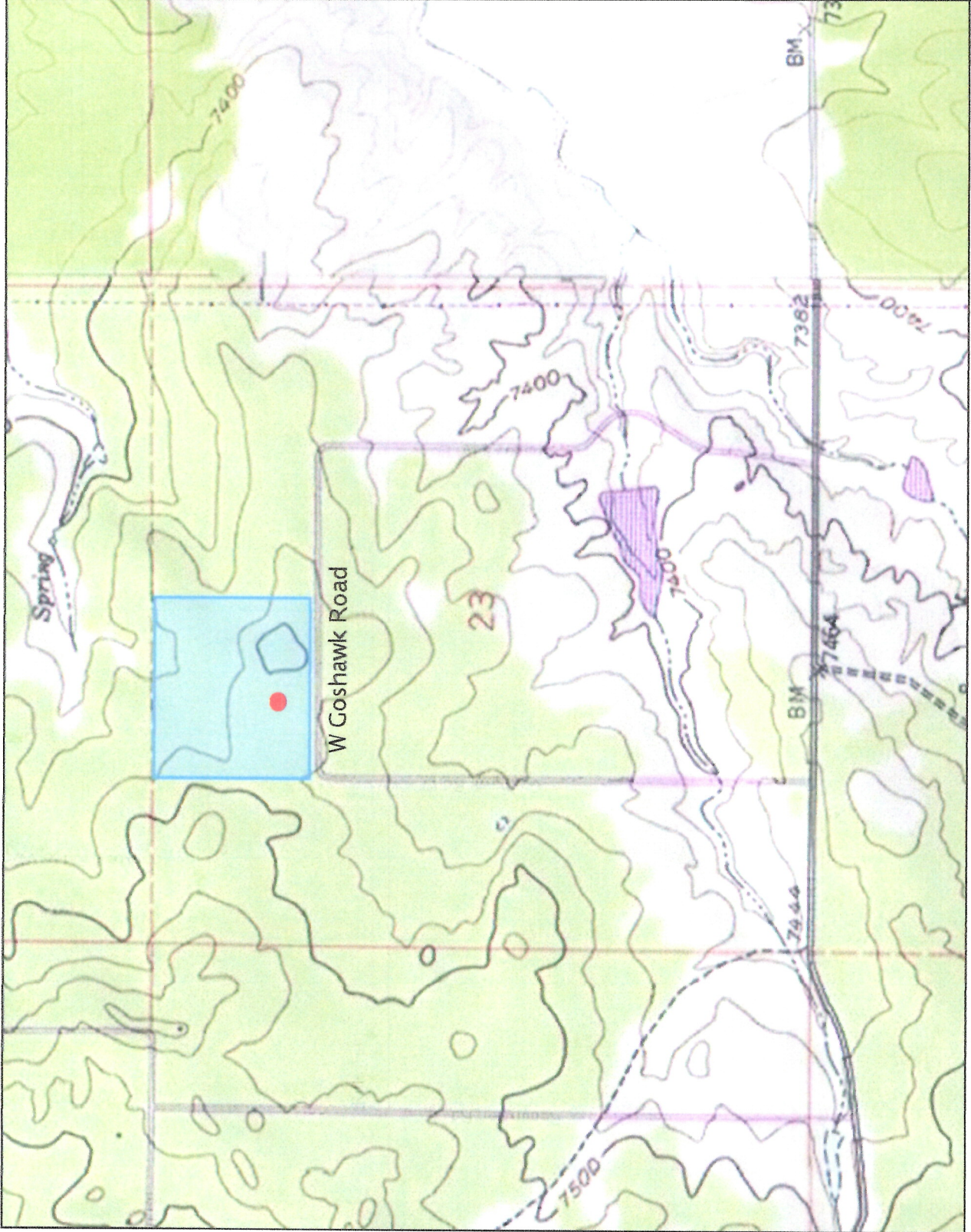
Schwochow, S.D; et al. 1974. Atlas of Sand, Gravel, and Quarry Aggregate Resources, Colorado Front Range Counties. Colorado Geological Survey, Special Publication 5-B.

Thorson, Jon P., 2003a. *Geologic Map of the Black Forest Quadrangle, El Paso County, Colorado*. Colorado Geological Survey Open -File Report 03-06. Map Scale 1:24,000.

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Colorado Active Water Level Network.

<https://earthquake.usgs.gov/hazards/designmaps/>; [SEAOC/OSHPD Seismic Design Maps Tool](#)

Warner Subdivision



Legend

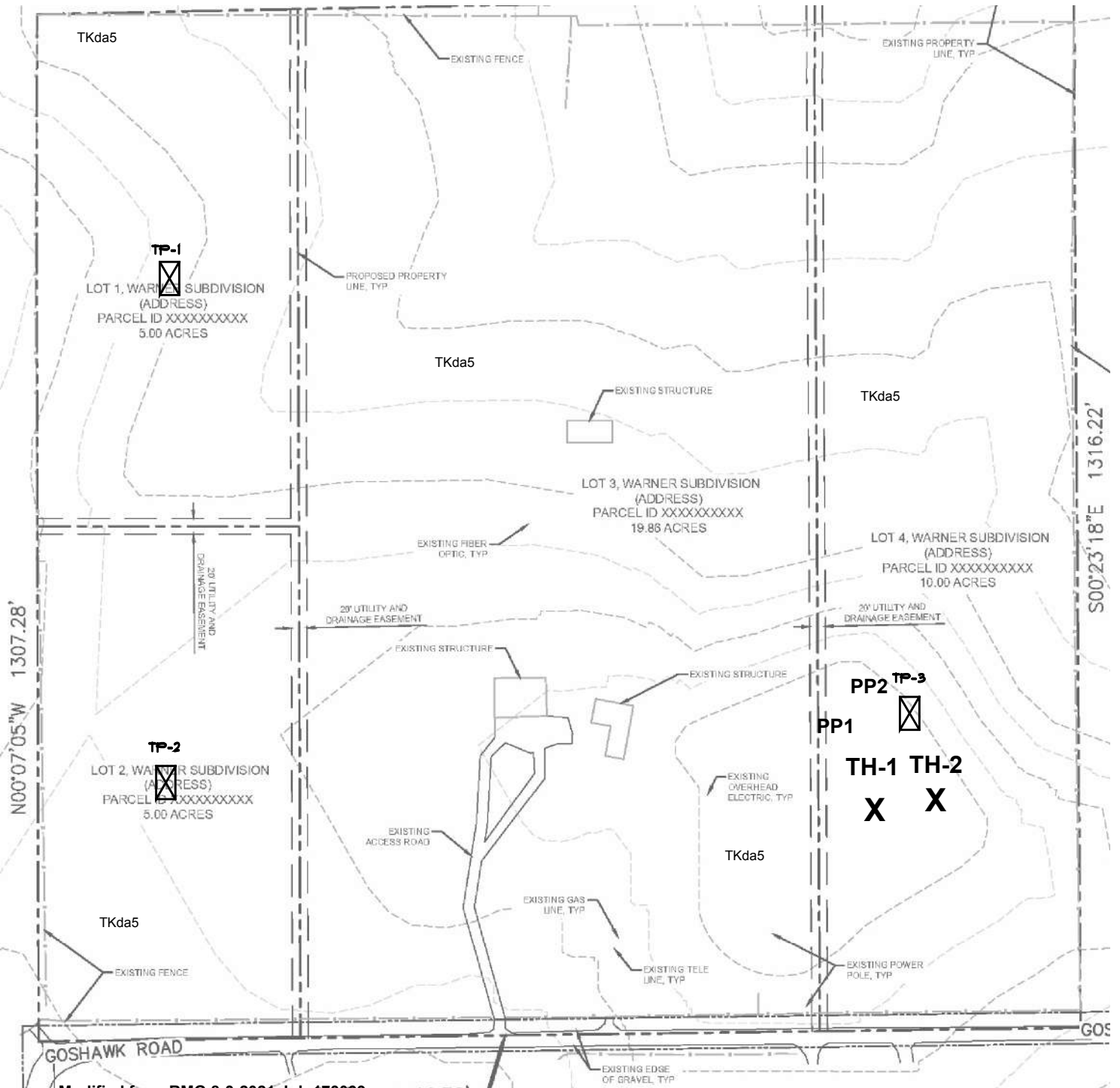
- County
- Well Location

Location

Notes

NE4 NW4 S23 T11S R65W

FIGURE 1



Modified from RMG 8-3-2021 Job 173099



TKda5 Facies Unit 5 is the uppermost facies of the Dawson Formation and is described as generally permeable, well drained, with good foundation characteristics.

TP-1 Test Pit Location By RMG

TH-1 Test Pit location (approx) Geoquest 2017

PP-1 Profile pit location (approx) Geoquest 2017

FIGURE 3

NOT TO SCALE



ROCKY MOUNTAIN GROUP

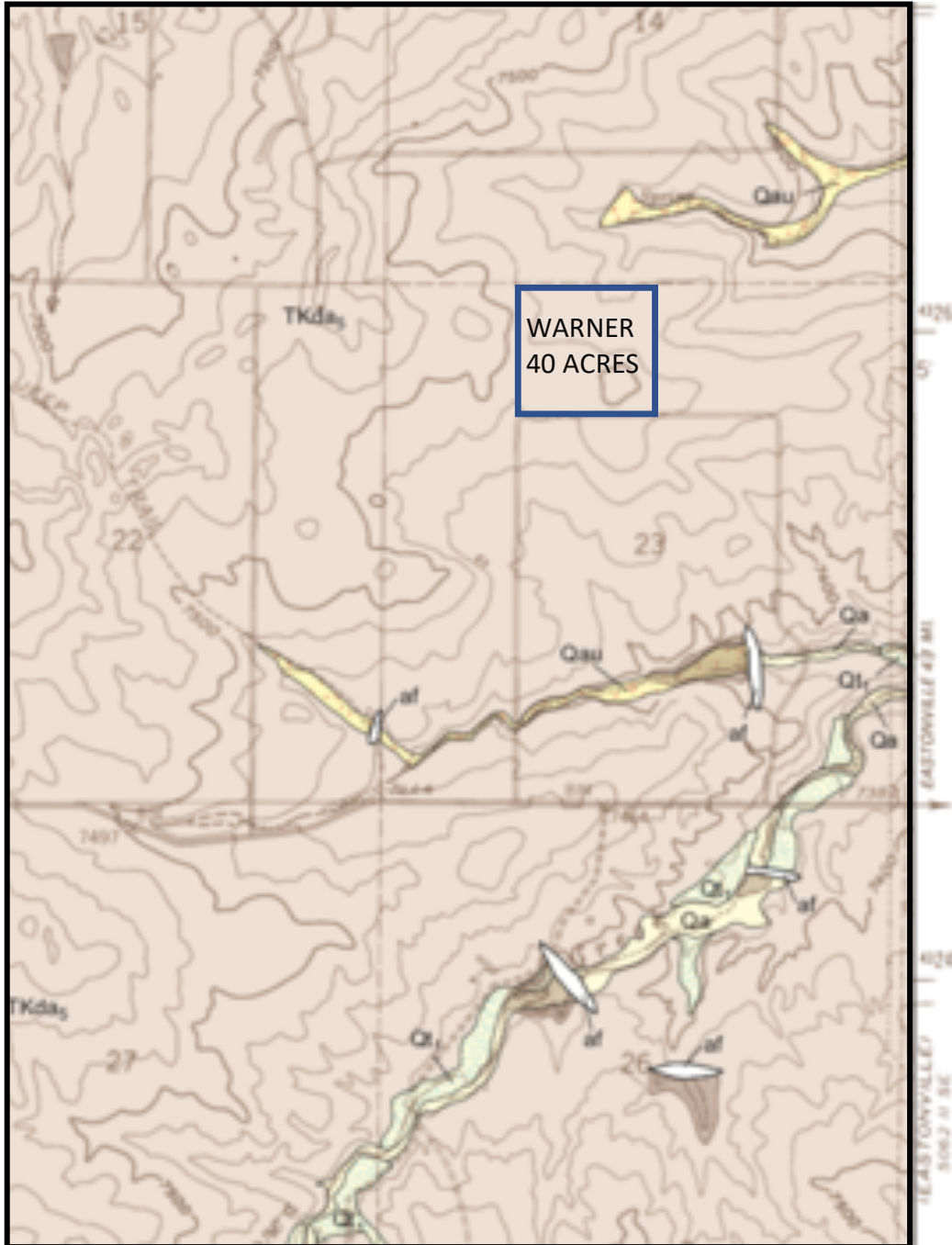
Southern Office
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Central Office:
 Englewood, CO 80112
 (303) 688-9475
Northern Office:
 Greeley / Evans, CO 80620
 (970) 330-1071

**TEST PIT
 LOCATIONS**
 WARNER 4-LOT SUBDIVISION
 GOSHAWK ROAD
 EL PASO COUNTY, CO
 BRIAN WARNER

JOB No. 173099

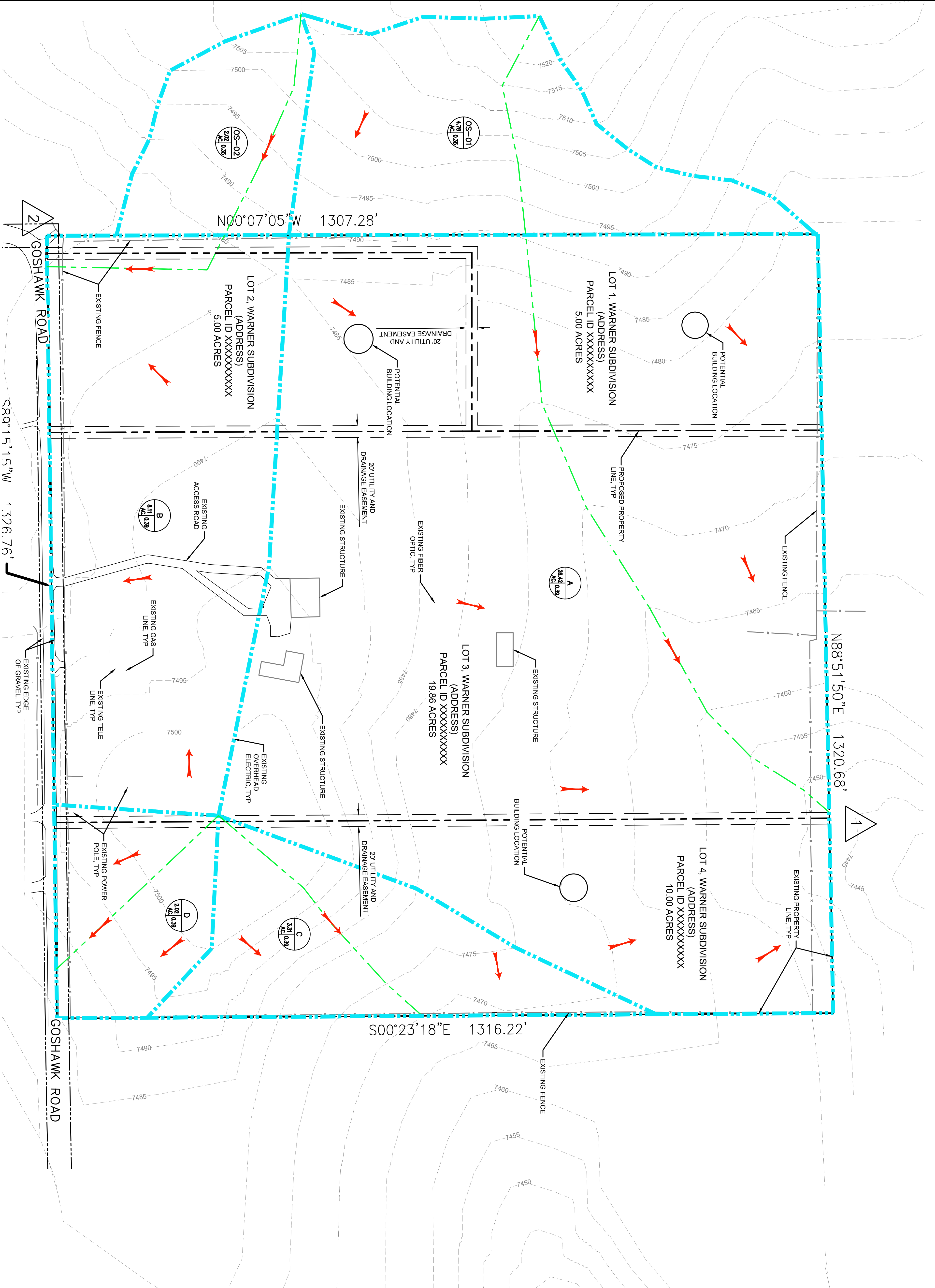
FIG No. 2

DATE 10-14-2020
 Revised 8-3-2021



Black Forest Quadrangle -Thorson OF-30-6
NE1/4 NW1/4 T11S R65W

FIGURE 3
GEOLOGY MAP



1
C-01
DRAINAGE BASIN PLAN
SCALE: 1"=20'

GRAPHIC SCALE
0' 40' 80' 160' 240'
Scale: 1"=80'

LEGEND:

- DESIGN POINT
- BASIN LINE
- PROPERTY LINE
- TIME OF CONCENTRATION PATH
- FLOW DIRECTION
- BASIN DESIGNATION
- BASIN AREA (ACRES)

FIGURE 4

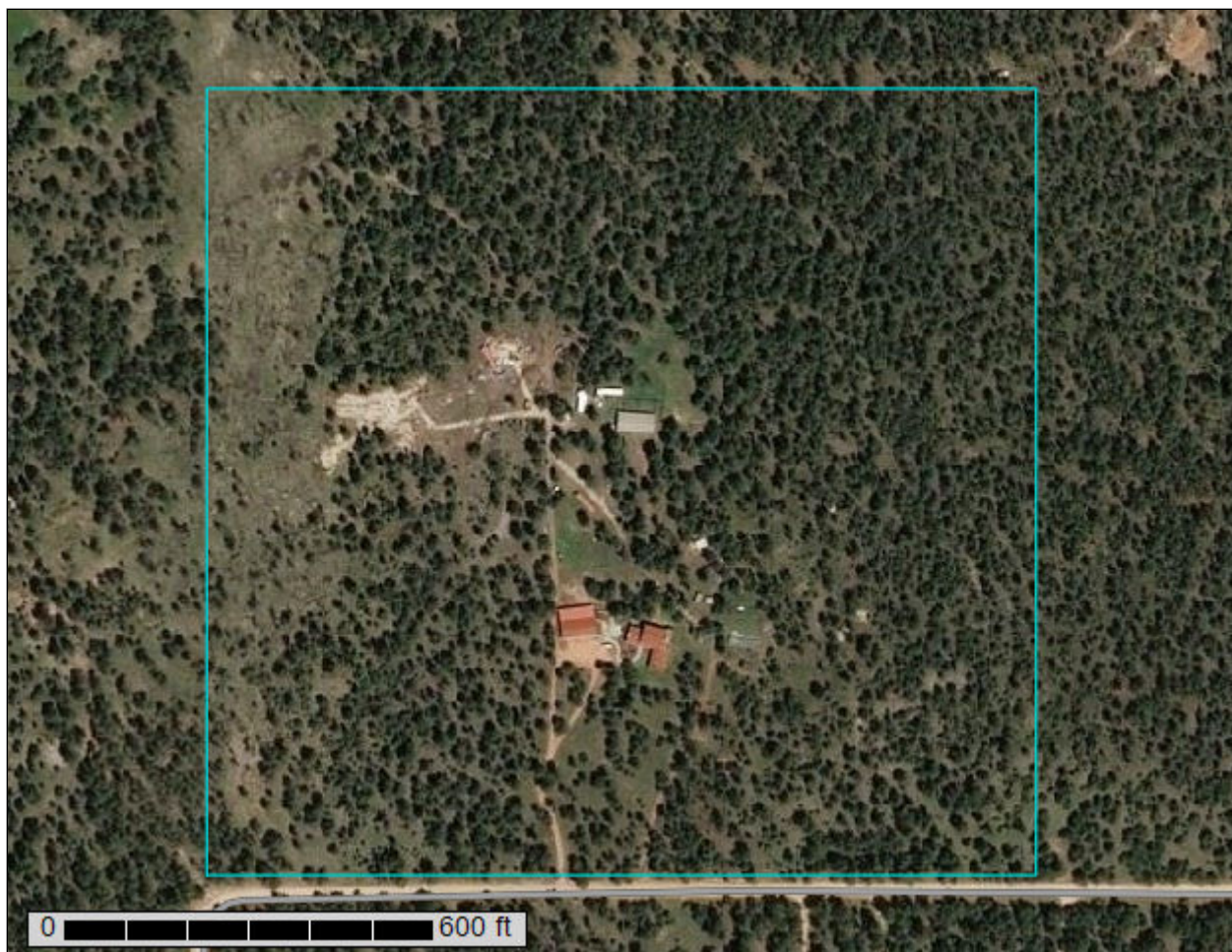
SHEET NO: C-01 DATE: 08/19/2021 PAGE NO: 1 OF 1	4-LOT MINOR SUBDIVISION PROPOSED CONDITIONS DRAINAGE MAP	OWNER BRIAN WARNER COLORADO SPRINGS, CO	PROJECT NO: 04-18-0026 DRAWN: C. BURBA DESIGNED: C. BURBA APPROVED: C. BURBA QA/QC: J. MOORE	FORSGREN Associates Inc. 56 Inverness Drive East, Suite 112, Englewood, CO 80112 PH: 720.214.5884 FAX: 720.000.0000	<table border="1"> <thead> <tr> <th>NO.</th> <th>REVISIONS</th> <th>BY</th> <th>DATE</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> <p>This document or any part thereof in detail or design concept is the property of Forsgren Associates Inc. and shall not be copied without the written authorization of Forsgren Associates Inc.</p>	NO.	REVISIONS	BY	DATE				
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1 C-01 DRAINAGE BASIN PLAN SCALE: 1"=20'													

ATTACHMENT 1



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 El Paso County Area, Colorado



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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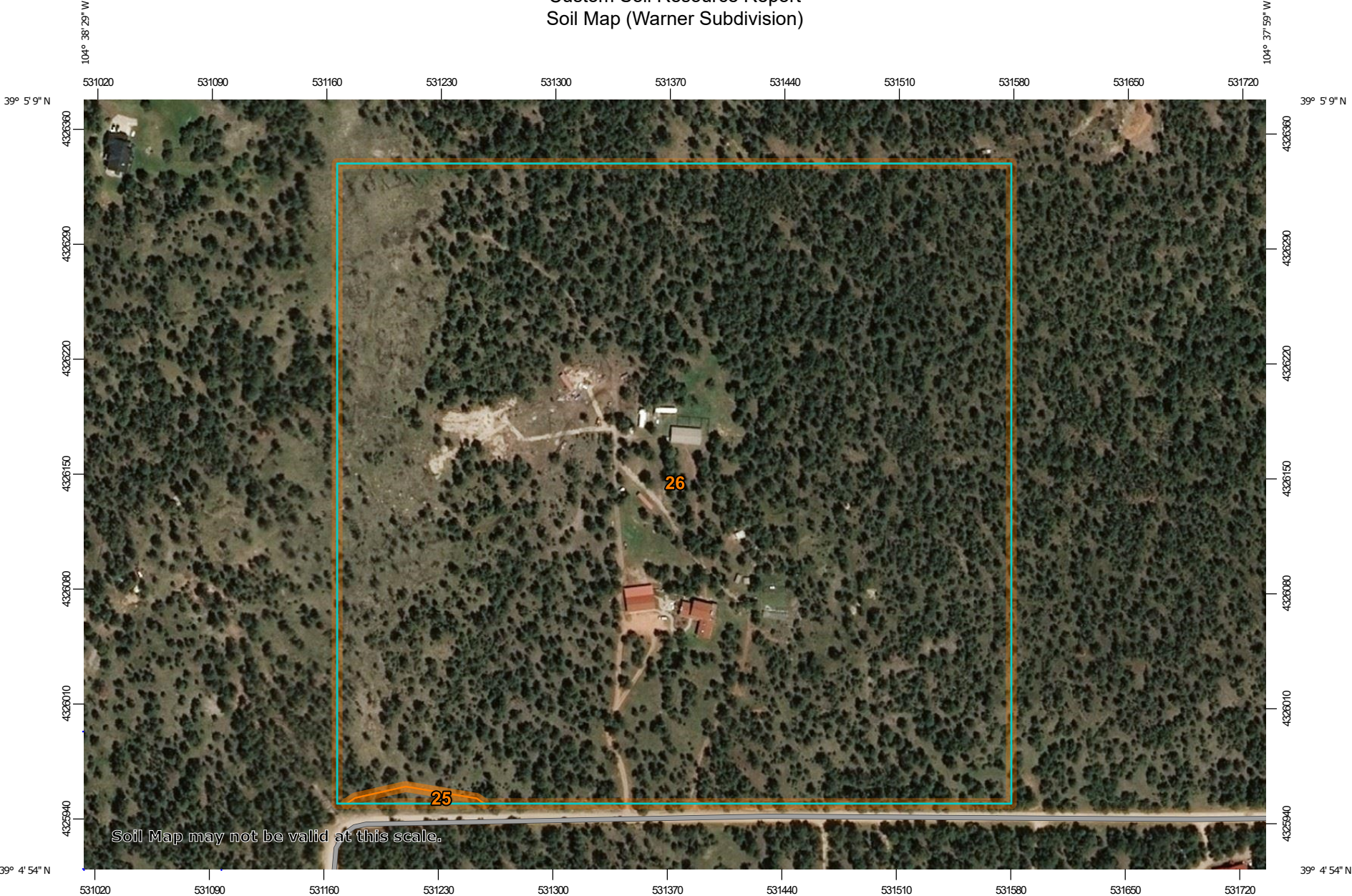
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Soil Map

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 (Warner Subdivision)



Soil Map may not be valid at this scale.

Map Scale: 1:3,300 if printed on A landscape (11" x 8.5") sheet.

0	45	90	180	270
Meters				
0	150	300	600	900
Feet				

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N 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: El Paso County Area, Colorado
 Survey Area Data: Version 17, Sep 13, 2019

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

Date(s) aerial images were photographed: Sep 8, 2018—May 26, 2019

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 (Warner Subdivision)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
25	Elbeth sandy loam, 3 to 8 percent slopes	0.1	0.3%
26	Elbeth sandy loam, 8 to 15 percent slopes	39.7	99.7%
Totals for Area of Interest		39.9	100.0%

Map Unit Descriptions (Warner Subdivision)

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

Custom Soil Resource Report

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.

El Paso County Area, Colorado

25—Elbeth sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 367x
Elevation: 7,300 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

Elbeth and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Elbeth

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkose

Typical profile

A - 0 to 3 inches: sandy loam
E - 3 to 23 inches: loamy sand
Bt - 23 to 68 inches: sandy clay loam
C - 68 to 74 inches: sandy clay loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

26—Elbeth sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 367y
Elevation: 7,300 to 7,600 feet
Farmland classification: Not prime farmland

Map Unit Composition

Elbeth and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Elbeth

Setting

Landform: Hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkose

Typical profile

A - 0 to 3 inches: sandy loam
E - 3 to 23 inches: loamy sand
Bt - 23 to 68 inches: sandy clay loam
C - 68 to 74 inches: sandy clay loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Custom Soil Resource Report

Pleasant

Percent of map unit:

Landform: Depressions

Hydric soil rating: Yes

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Colorado Springs, CO 80908
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PROFILE PIT EVALUATION

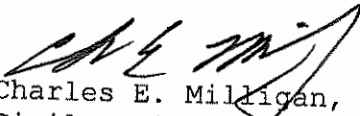
FOR

BRIAN WARNER

JOB #17-0410

17350 Goshawk Road,
El Paso County,
Colorado

Respectfully submitted,


Charles E. Milligan, P.E.
Civil Engineer



PROFILE PIT FINDINGS

Enclosed are the results of the profile pit for the septic system to be installed at **17350 Goshawk Road, El Paso County, Colorado**. The location of the test pit was determined by Brian Warner. The residence will not be on a public water system. The number of bedrooms in the design for the residence is unknown. Due to the natural slope of the property, the entire system will feed to the northeast at approximately 6% at least 20 feet. All applicable portions of the El Paso County Health Department Onsite Wastewater Treatment System Regulations (OWTS) must be complied with for the installation of the treatment system.

The inspection was performed on May 19, 2017, in accordance with Table 10-1 of the **E.P.C.P.H. OWTS Regulations**.

Soil Profile #1:

- 0 to 4" - Topsoil- loam, organic composition.
- 4" to 40" - USDA soil texture sandy loam, soil type 2, structure shape granular, structure grade 2, non-cemented, LTAR 0.60, light brown in color, 7.5 YR 5/4.
- 40" to 8' - USDA soil texture sandy loam, soil type 2, structure shape granular, structure grade 2, very weakly cemented, LTAR 0.60, brown in color, 7.5 YR 5/4, redoximorphic features at 40 inches, Dawson sandstone.

Soil Profile #2:

- 0 to 4" - Topsoil- loam, organic composition.
- 4" to 36" - USDA soil texture sandy loam, soil type 2, structure shape granular, structure grade 2, non-cemented, LTAR 0.60, light yellowish brown in color, 10 YR 7/4.
- 36" to 8' - USDA soil texture sandy loam, soil type 2, structure shape granular, structure grade 2, very weakly cemented, LTAR 0.60, very pale brown in color, 10 YR 7/4, redoximorphic at 36 inches, Dawson sandstone.

Groundwater evidence was encountered at 40 inches in Profile Pit #1 and at 36 inches in Profile Pit #2 during the inspection. Bedrock was encountered at the depth of 40 inches in Profile Pit #1 and at 36 inches in Profile Pit #2 during the inspection. No known wells were observed within 100 feet of the proposed system. **All setbacks shall conform to county regulations.**

Due to encountering bedrock and groundwater evidence, the septic system to be installed on this site shall be designed by a Colorado Licensed Engineer. Based on the observed conditions, we feel a design based on an LTAR of 0.60, GPD/SF (USDA 2, treatment soil, treatment level 1) is reasonable. An above grade uniformly pressure dosed soil treatment area is required.

If during construction of the field itself, subsurface conditions change considerably or if the location of the proposed field changes, this office shall be notified to determine whether the conditions are adequate for the system as designed or whether a new system needs to be designed.

Weather conditions at the time of the test consisted of cloudy skies with cool temperatures.

PROFILE PIT LOG - Profile Pit #1

JOB#: 17-0410
 DATE EVALUATED: 19 May 2017
 EQUIPMENT USED: MINI-EXCAVATOR

0"-4" TOPSOIL

Loam
 Organic Composition

4"- 40" Sand

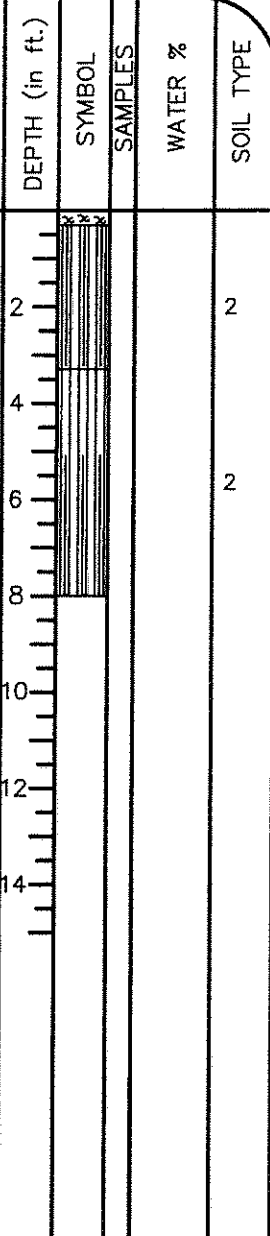
Fine-coarse Grained
 Moderate Density
 Moderate Moisture Content
 Low Clay Content
 Low Cohesion
 Low Plasticity
 Light Brown Color
 7.5YR 5/4

USDA Soil Type: 2
 USDA Soil Texture: Sandy Loam
 USDA Structure Shape: Granular
 USDA Structure Grade: 2
 Cementation Class: Non-Cemented
 Long Term Acceptance Rate (LTAR, Treatment Level 1): 0.60

40"- 8' Dawson Sandstone

Fine-coarse Grained
 High Density
 Moderate Moisture Content
 Low Clay Content
 Low Cohesion
 Low Plasticity
 Brown Color
 7.5YR 5/4

USDA Soil Type: 2
 USDA Soil Texture: Sandy Loam
 USDA Structure Shape: Granular
 USDA Structure Grade: 2
 Cementation Class: Very-Weakly Cemented
 Long Term Acceptance Rate (LTAR, Treatment Level 1): 0.60
 Redox @ 40"



LTAR to be Used for OWTS Sizing: 0.60GPD/SF (USDA Type 2, Treatment soil, Treatment Level 1)
Depth to Groundwater (Permanent or Seasonal): Seasonal @ 40"
Depth to Bedrock and Type: Dawson Sandstone @ 40"
Depth to Proposed Infiltrative Surface from Ground Surface: Above Grade (Uniformly Pressure dosed STA)
Soil Treatment Area Slope and Direction: NE @ 6%

Note: See El Paso County Board of Health Regulation Chapter 8: On-Site Wastewater Treatments Systems (OWTS) Regulations for Additional Information. Refer to Table 10-1 for Corresponding LTAR if Treatment Level 2, 2N, 3, or 3N will be Implemented in the Design of the OWTS. System Sizing Depends on a Number of Factors (i.e. LTAR, # of Bedrooms, Type of Soil Treatment Area (STA), Method of Transfer to the STA (Gravity, Dosed, or Pressure Dosed), and Type of Storage / Distribution Media Used in the STA)

Project: 17-0410	Project Name and Address Brian Warner 17350 Goshawk Road Sch. No. 5123000037 El Paso County, Colorado
Sheet: 1 of 2	
Date: 6 Jun 2017	
Scale: 1/4" = 1'	
Drawn by: tcw	
Checked by: cem	

GEOQUEST, LLC.
 6825 SILVER PONDS HEIGHTS
 SUITE 101
 COLORADO SPRINGS, CO
 80908
 OFFICE: (719) 481-4560
 FAX: (719) 481-9204

PROFILE PIT LOG - Profile Pit #2

JOB#: 17-0410
 DATE EVALUATED: 19 May 2017
 EQUIPMENT USED: MINI-EXCAVATOR

0"-4" TOPSOIL

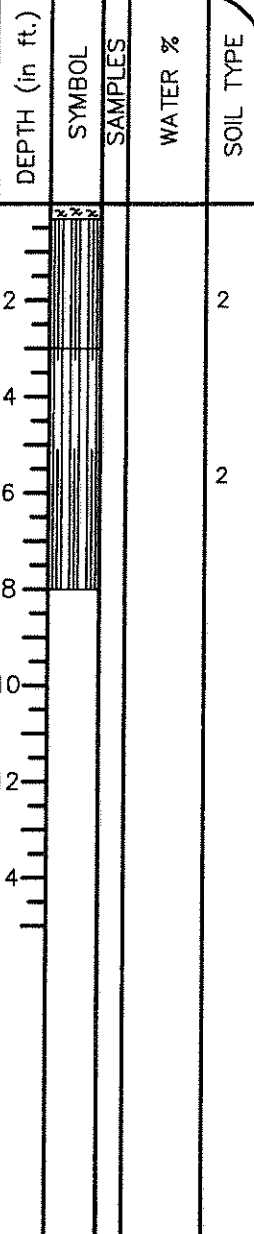
Loam
 Organic Composition

4"- 36" Sand

Fine-coarse Grained	USDA Soil Type: 2
Moderate Density	USDA Soil Texture: Sandy Loam
Moderate Moisture Content	USDA Structure Shape: Granular
Low Clay Content	USDA Structure Grade: 2
Low Cohesion	Cementation Class: Non-Cemented
Low Plasticity	Long Term Acceptance Rate (LTAR, Treatment Level 1): 0.60
Light Yellowish Brown Color	
10YR 6/4	

36"- 8' Dawson Sandstone

Fine-coarse Grained	USDA Soil Type: 2
High Density	USDA Soil Texture: Sandy Loam
Moderate Moisture Content	USDA Structure Shape: Granular
Low Clay Content	USDA Structure Grade: 2
Low Cohesion	Cementation Class: Very-Weakly Cemented
Low Plasticity	Long Term Acceptance Rate (LTAR, Treatment Level 1): 0.60
Very Pale Brown Color	Redox @ 36"
10YR 7/4	



LTAR to be Used for OWTS Sizing: 0.60GPD/SF (USDA Type 2, Treatment soil, Treatment Level 1)
Depth to Groundwater (Permanent or Seasonal): Seasonal @ 36"
Depth to Bedrock and Type: Dawson Sandstone @ 36"
Depth to Proposed Infiltrative Surface from Ground Surface: Above Grade (Uniformly Pressure dosed STA)
Soil Treatment Area Slope and Direction: NE @ 6%

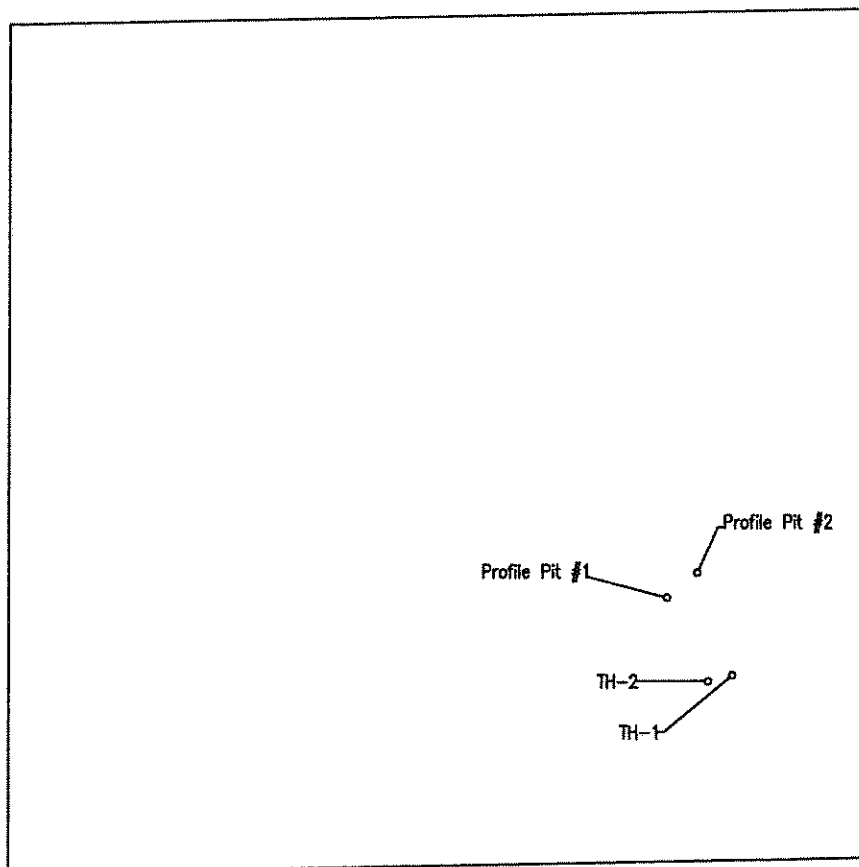
Note: See El Paso County Board of Health Regulation Chapter 8: On-Site Wastewater Treatments Systems (OWTS) Regulations for Additional Information. Refer to Table 10-1 for Corresponding LTAR if Treatment Level 2, 2N, 3, or 3N will be Implemented in the Design of the OWTS. System Sizing Depends on a Number of Factors (i.e. LTAR, # of Bedrooms, Type of Soil Treatment Area (STA), Method of Transfer to the STA (Gravity, Dosed, or Pressure Dosed), and Type of Storage / Distribution Media Used in the STA)

Project: 17-0410	Project Name and Address Brian Warner 17350 Goshawk Road Sch. No. 5123000037 El Paso County, Colorado
Sheet: 1 of 2	
Date: 6 Jun 2017	
Scale: 1/4" = 1'	
Drawn by: tcw	
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GEOQUEST, LLC.	
6825 SILVER PONDS HEIGHTS SUITE 101 COLORADO SPRINGS, CO 80908	
OFFICE: (719) 481-4560 FAX: (719) 481-9204	

GEOQUEST LLC
SITE MAP

17350 Goshawk Road
El Paso County,
Colorado,
Job #17-0410



Goshawk Road

Location from Southeast Lot Corner to Profile Pit #1:

N. 38° W. - 509'

Location from Profile Pit #1 to Profile Pit #2:

N. 50° E. - 60'

GPS Coordinates:

Pit 1; N. 39° 04' 59.31" W. 104° 38' 09.51"

Pit 2; N. 39° 04' 59.62" W. 104° 38' 09.03"



0 100 200 300
GRAPHIC SCALE IN FEET
SCALE: 1" = 300'

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf



6825 Silver Ponds Heights #101
Colorado Springs, CO 80908
(719) 481-4560

SOILS REPORT

FOR

BRIAN WARNER

JOB #17-0410

17350 Goshawk Road,
El Paso County,
Colorado

Respectfully submitted,


Charles E. Milligan, P.E.
Civil Engineer



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INTRODUCTION

The owners must be made aware of the contents of this report. If there are any questions or concerns regarding the information in this report please contact us. This is to ensure that the recommendations and requirements of the report, especially regarding the surface drainage, are acknowledged and followed. This report is prepared for **Brian Warner, 170410 Goshawk Road, El Paso County, Colorado**. It is my understanding that a single-family residence is planned for this site. The site is currently vacant.

CONCLUSIONS

A satisfactory foundation for this structure is a properly designed shallow foundation system consisting of foundation components resting directly on undisturbed materials. Foundation components resting directly on undisturbed moderately dense materials shall be designed for a loading of not greater than **2,000 pounds per square foot**. Foundation components resting directly on undisturbed moderately dense materials shall be designed for a loading of not greater than **4,000 pounds per square foot**. **Any design by any engineer is subject to revision based on the results of the open hole observation.** The compressibility of this material is low. This bearing capacity is calculated with a safety factor of three. The type of foundation configuration used depends on the building loads applied. The depth of foundation elements shall be determined by the foundation engineer, but should be at least as deep as the minimum depth required by the governing building authority. The laboratory testing revealed that the on-site soil is silty sand with underlying clayey sand (U.S.C. Classification Symbol SM, SC). The unit weight of equivalent fluid soil pressure of this material is 40 (SM), 45 (SC) pounds per cubic foot. **The owners shall be made aware that movement will occur if surface or subsurface water is allowed to collect around the foundation wall.**

GENERAL

The investigation was made to reveal important characteristics of the soils and of the site influencing the foundation design. Also evaluated during the investigation were subsurface conditions that affect the depth of the foundation and subsequent loading design, such as ground water levels, soil types, and other factors which affect the bearing capacity of the soils. Design loadings are based on soils characteristics and represent the maximum permissible loads for these conditions.

FIELD AND LABORATORY INVESTIGATION

Two exploratory holes were drilled on May 19, 2017, at the location shown on the enclosed site map. The location of these test holes were determined by Brian Warner. The test holes were drilled with a 4-inch diameter auger. At intervals anticipated to be the foundation depths, and as determined by the soils conditions, the drill tools were removed and samples were taken by the use of a 2-inch split barrel sampler connected to a 140 pound drop-hammer. This hammer is dropped 30 inches to drive the penetration sampler into the soil (**ASTM D-1586**). The depths and descriptions of the materials encountered in each test boring at which the samples were taken are shown on the enclosed log sheets. All samples were classified both in the field and in the laboratory to evaluate the physical and mechanical properties of the materials encountered.

TOPOGRAPHY

The topography of this site is that of an incline sloping down towards the northeast at 6%.

WEATHER

The weather at the time of the soil examination consisted of cloudy skies with cool temperatures.

DESIGN AND CONSTRUCTION CONSIDERATIONS

Residential basement slabs-on-grade may move and crack. Vertical slab movement of one to three inches is considered normal for soils of low to moderate expansion potential and for compacted structural fill after removal of highly expansive soils. In some cases vertical movement may exceed this range. If movement and associated damage to basement floors and finish cannot be tolerated, a structural floor system should be installed. If compaction is not performed, settlement may occur causing cracking of foundation walls and floors. Soil located beneath concrete walls shall be compacted to at least 95% Modified Proctor density. Soil located beneath concrete floors shall be compacted to at least 85% Modified Proctor density. Special care is to be taken to re-compact the material above utility lines to a minimum of 85% Modified Proctor density. During construction, conditions that could cause settlement shall be eliminated. Interior non-bearing partition walls shall be constructed such that they do not transmit floor slab movement to the roof or overlying floor. The gap or void (1.5" min.) installed in these non-bearing partitions may require re-construction over the life of the structure to re-establish the gap or void to allow for vertical slab movement. Stairwells, doorways and sheeted walls should be designed for this movement. The following are general recommendations of on-grade slabs:

1. Slabs shall be placed on well-compacted, non-expansive materials, and all soft spots shall be thoroughly excavated and replaced with non-expansive fill materials as stated above.
2. Separate the slab from all foundation walls, load bearing members, and utility lines.
3. At intervals not to exceed 12 feet in each direction, provide control joints to reduce problems with shrinkage and curling as recommended by the American Concrete Institute (ACI). Moisten the ground beneath the slab prior to placement of concrete.
4. All concrete placed must be cured properly as recommended by the American Concrete Institute (ACI). Separate load bearing members from slabs, as discussed above. Care must be exercised to prevent excess moisture from entering the soil under the structure, both during and after construction.

DESIGN AND CONSTRUCTION CONSIDERATIONS (CONTINUED)

5. Due to the exposure of exterior concrete to variations in moisture fluctuations, heaving and cracking of exterior slabs-on-grade should be expected. Placement of at least 3 feet of non-expansive fill beneath the slabs can help to reduce the impact of differential movement and cracking but may not eliminate movement.
6. The soil has been analyzed for its expansion and/or consolidation potential. Basement slabs, garage slabs, and all concrete floor slabs, however, exert a very low dead-load pressure on the soil. Since almost any soil contains at least a small amount of expansion potential, slabs will crack and heave or settle if excess water is allowed to penetrate the sub-grade. For example, column openings to pads below the placed slab, if exposed to precipitation during construction, will conduct water to the sub-grade, possibly causing it to expand. Also, if the slab is placed with concrete too wet, expansion may occur. We recommend 3,000 psi concrete placed at a maximum slump of 4 inches.

RECOMMENDATION REMARKS

The recommendations provided in this report are based upon the observed soil parameters, anticipated foundation loads, and accepted engineering procedures. The recommendations are intended to minimize differential movement resulting from the heaving of expansive soil or from the settlement induced by the application of loads. **It must be recognized that the foundation will undergo some movement on all soil types.** In addition, concrete floor slabs will move vertically, therefore, adherence to those recommendations which isolate floor slabs from columns, walls, partitions or other structural components is extremely important, if damage to the superstructure is to be minimized. Any subsequent owners should be apprized of the soil conditions and advised to maintain good practice in the future with regard to surface and subsurface drainage and partition framing, drywall and finish work above floor slabs.

Geoquest, LLC does not assure that the contractor and/or homeowner will comply with the recommendations provided in this report. Geoquest, LLC provides recommendations and requirements only and does not supervise, direct or control the implementation of such.

COLD TEMPERATURE CONSIDERATIONS

1. Concrete shall not be placed upon frozen soil.
2. Concrete shall be protected from freezing until it has been allowed to cure for at least 7 days after placement in forms.
3. Snow or other frozen water shall not be allowed in the forms during placement of concrete.

COLD TEMPERATURES CONSIDERATIONS (CONTINUED)

4. Concrete shall be cured in forms for at least 72 hours.
5. The site shall be kept well drained at all times.

SURFACE DRAINAGE

After construction of foundation walls, the backfill material shall be well compacted to 80% Modified Proctor density, to prevent future settlement. Any areas that settle after construction shall be filled to eliminate ponding of water adjacent to the foundation walls. The finished grade shall have a positive slope away from the structure with an initial slope of 6" in the first 10'. If a 10' zone is not possible on the upslope side of the structure, then a well-defined swale should be created a minimum of 5' from the foundation and sloped parallel with the wall at a 2% grade to intercept the surface water and carry it around and away from the structure. Homeowners shall maintain the surface grading and drainage installed by the builder to prevent water directed in the wrong direction. All downspouts shall have splash blocks that will remove runoff to outside the foundation area and carried across backfill zones. No irrigation devices shall be placed within 7' of the foundation. Shrubs and plants requiring minimal watering shall be established in this area. Irrigated grass shall not be located within 5' of the foundation. Sprinklers shall not discharge water within 5' of the foundation. Irrigation should be limited to the minimum amount sufficient to maintain vegetation. Application of more water will increase likelihood of floor slab and foundation movement.

SUBSURFACE DRAINAGE

The necessity for perimeter drains will be determined at the time of the Open Hole Observation.

REINFORCING

The concrete foundation walls shall be properly reinforced as per the specific design for this foundation by a Professional Engineer. Exact requirements are a function of the design of the structure. Questions concerning the specific design requirements shall be referred to the design engineer.

FOOTING DESIGN

The design for footings for this structure is determined by applying the dead load and full live load to the foundation walls.

CONSTRUCTION DETAILS

It is necessary with any soils investigation to assume that the materials from the test holes are representative of the materials in the area. On occasion variations in the subsurface materials do occur, therefore, should such variations become apparent during construction, the owner is advised to contact this office for a determination as to whether these variations will affect the design of the structure's foundation. If clay layers are observed during the excavation for the dwelling, this office should be contacted to determine whether the layers will adversely affect the design.

MINIMUM MATERIALS SPECIFICATIONS

1. Minimum materials specifications of the concrete, reinforcing, etc., shall be determined by the Professional Engineer.
2. Compact beneath foundation walls a minimum of 95% Modified Proctor density to prevent settlement.
3. Compact all backfill material located around the perimeter of the foundation to a minimum of 80% Modified Proctor density.
4. Concrete shall be vibrated or rodded in forms to avoid segregation and cold joints.
5. The site shall be kept well drained at all times.

OPEN HOLE OBSERVATION (added cost)

If anyone other than Geoquest performs the Open Hole Observation, that person/company assumes liability for the soils, and any possible changes to the foundation design.

The owner, or a representative of the construction company shall contact **Geoquest, LLC** a minimum of **24 hours** prior to excavating for the foundation. An Open Hole Observation must be performed on each individual structure prior to the placement of concrete, and preferably prior to the placement of forms in the excavated area. **The failure to request or obtain an Open Hole Observation prior to the placement of foundation components may result in this Soils Report being declared null and void.** This is to insure that soft areas, anomalies, etc., are not present in the foundation region. At the time of the open hole observation the **foundation type recommendations, maximum allowable bearing capacity may be revised** according to soil conditions found at that time. If revisions are made to the Soils Report Due to the soil conditions of the excavation, **the Foundation Design Engineer must be notified of all revisions.**



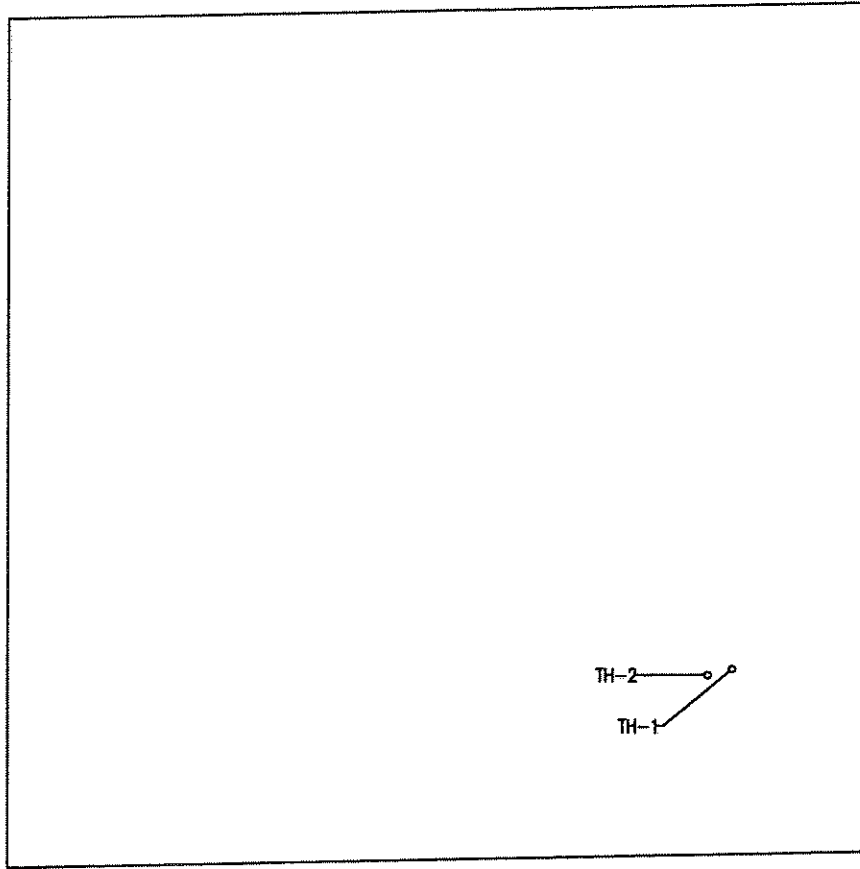
DRILL LOGS

JOB #: 17-0410	DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
TEST BORING NO.: TH-1						
DATE: 5/19/2017						
<u>0"-5" Topsoil</u> <u>5"-4' Sand</u>	0-5	X X X				
Fine-coarse grained Moderate density Moderate moisture content Low clay content Low plasticity Brown color	2-4			<u>27</u> 12"	9.8	
<u>4'- 15' WxSandstone (SM)</u>	4-15					
Fine-coarse grained High density Low-moderate moisture content Low clay content Low plasticity Light Brown color	4-12			<u>45</u> 12"	5.0	SM
	12-14					
	14-16					
	16-18					
	18-20					

JOB #: 17-0410	DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
TEST BORING NO.: TH-2						
DATE: 5/19/2017						
<u>0"-5" Topsoil</u> <u>5"-3' Sand</u>	0-5	X X X				
Fine-coarse grained Moderate density Moderate moisture content Low clay content Low plasticity Brown color	2-4					
<u>3'- 15' WxSandstone (SC)</u>	4-15					
Fine-coarse grained High density Low-moderate moisture content Low clay content Low plasticity Light Brown color Zones of Clay	4-12			<u>33</u> 12"	10.2	SC
	12-14					
	14-16					
	16-18					
	18-20					
	20-22					
	22-24					
	24-26					
	26-28					
	28-30					
	30-32					
	32-34					
	34-36					
	36-38					
	38-40					
	40-42					
	42-44					
	44-46					
	46-48					
	48-50					
	50-52					
	52-54					
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	56-58					
	58-60					
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	68-70					
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	80-82					
	82-84					
	84-86					
	86-88					
	88-90					
	90-92					
	92-94					
	94-96					
	96-98					
	98-100					

GEOQUEST LLC
SITE MAP

17350 Goshawk Road
El Paso County,
Colorado,
Job #17-0410

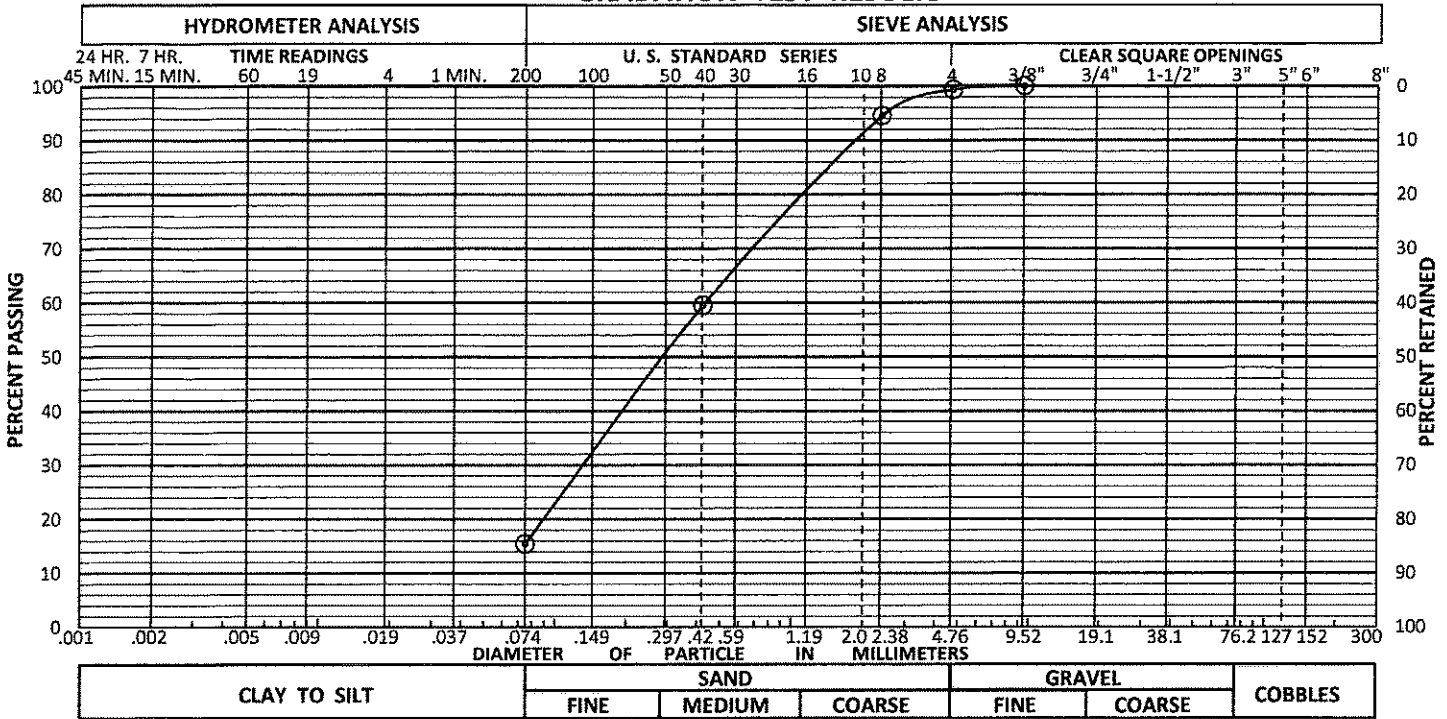


Goshawk Road



0 100 200 300
GRAPHIC SCALE IN FEET
SCALE: 1" = 300'

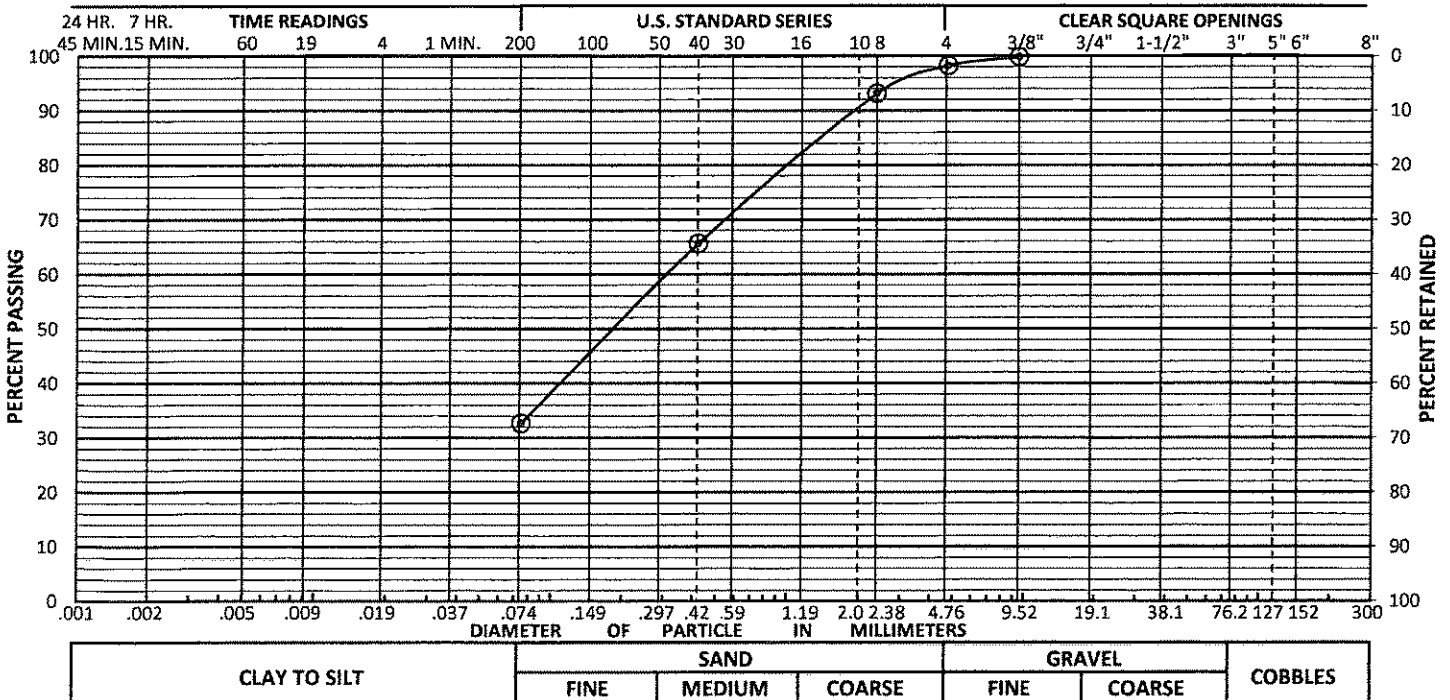
GEOQUEST LLC GRADATION TEST RESULTS



CLASSIFICATION SM
 GRAVEL 0.6 %
 SAND 84.0 %
 FINES 15.4 %

NOTES: 5.0 % Moisture Content

SAMPLE # 1 HOLE # TH-1 DEPTH 12 FEET



CLASSIFICATION SC
 GRAVEL 1.8 %
 SAND 65.5 %
 FINES 32.7 %

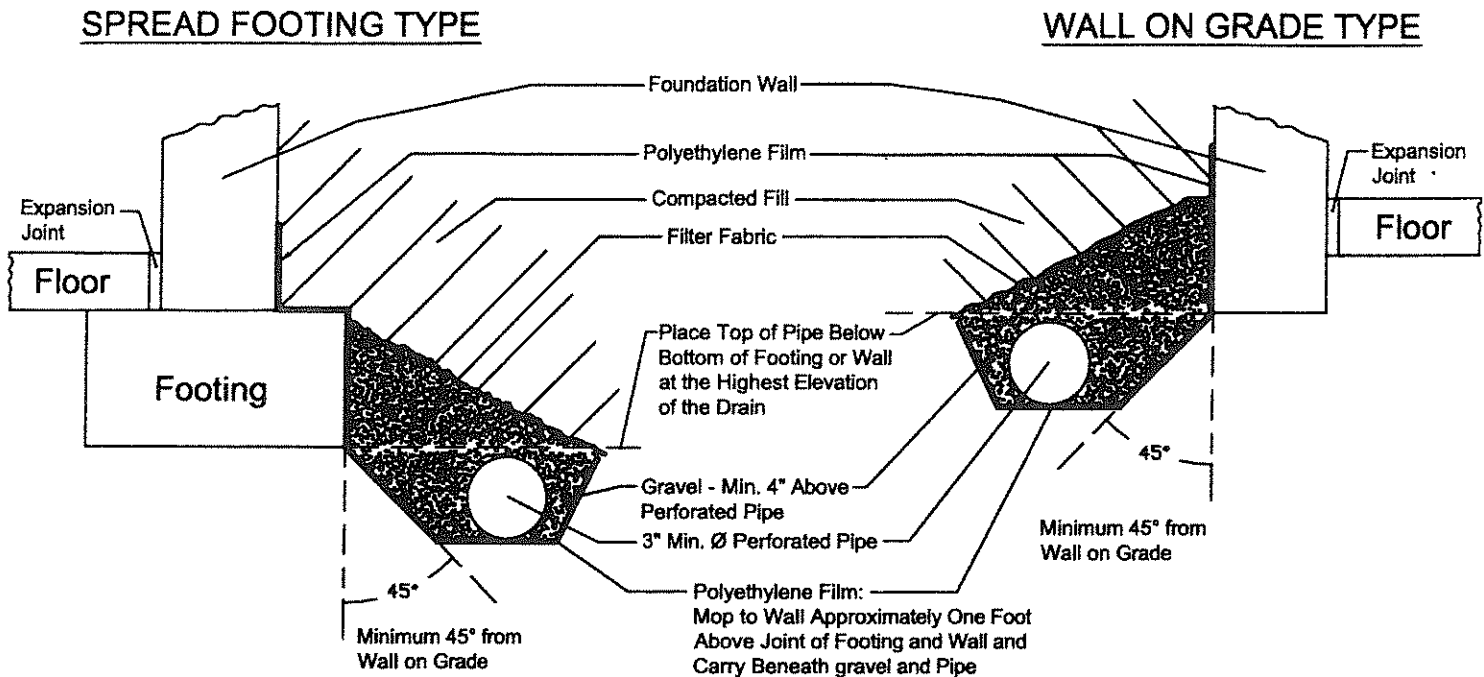
NOTES: 10.2% Moisture Content

SAMPLE # 1 HOLE # TH-2 DEPTH 4 FEET

Job #: 17-0410 By: MJ 5/19/2017



EXTERIOR DRAIN DETAIL



1. Gravel to be Not More Than 1-1/2" and Not Less Than 1/2" Diameter.
2. Perforated Pipe Diameter Varies With Expected Seepage. 3" \emptyset and 4" \emptyset are Most Common. ABS and PVC are Most Common Materials for Pipe.
3. Pipe to be Laid out in a Minimum Slope of 1" in 10'.
4. Gravity Outfall is Desired if Possible. Portion of Pipe in Area Not Drained Shall be Non-Perforated. Daylight Must be Maintained Clear of Debris in Order to Function Properly.
5. If Gravity Outfall is Not Possible, Provide a Sump With Operational Pump. Pump May Not Connect to Any Sanitary or Storm Sewer.
6. Soil Backfill Should be Compacted to at Least 80% of the Modified Proctor Density in the Upper Three Feet of Fill.
7. Filter Fabric to be Mirafi 140s or Approved Equivalent. Roofing Felt and Sheet Plastic are Not Acceptable.
8. Drain Pipe Shall be Laid Below Protected Area, as Shown in The Detail Above.
9. Mop Polyethylene Film to Wall Approximately One Foot Above Joint of Footing and Wall and Carry Beneath Gravel and Pipe.
10. The Polyethylene Film Shall be Continued to the Edge of the Excavation.

LIMITATIONS

This report is issued based on the understanding that the owner or his representative will bring the information, data, and recommendations contained in this report to the attention of the project engineer and architect, in order that they may be incorporated into the plans for the structure. It is also the owner's responsibility to ensure that all contractors and sub-contractors carry out these recommendations during the construction phase.

This report was prepared in accordance with generally accepted professional geotechnical/engineering methods. However, Geoquest, LLC makes no other warranty, express or implied, as to the findings, data, specifications, or professional advice rendered hereunder.

This report is considered valid as of the present date. The owner acknowledges, however, that changes in the conditions of the property might occur with the passage of time, such as those caused by natural effects or man-made changes, both on this land and on abutting properties. Further, changes in acceptable tolerances or standards might arise as the result of new legislative actions, new engineering advances, or the broadening of geotechnical knowledge. Thus certain developments beyond our control may invalidate this report, in whole or in part.

This report and its recommendations do not apply to any other site than the one described herein and are predicated on the assumption that the soil conditions do not deviate from those described. In the event that any variations or undesirable conditions should be detected during the construction phase or if the proposed construction varies from that planned as of this report date, the owner shall immediately notify Geoquest, LLC in order that supplemental recommendations can be provided, if so required.

TX Result Report

P 1
 06/07/2017 11:51
 Serial No. AOED013009996
 TC: 185646

Addressee	Start Time	Time	Prints	Result	Note
1	06-07 11:50	00:00:56	000/012	No Ans	

Note TMR: Timer TX, POL: Polling, ORG: Original Size Setting, FME: Frame Erase TX,
 MIX: Mixed Original TX, CALL: Manual TX, CSRC: CSRC, FWD: Forward, PC: PC-Fax,
 BND: Double-Sided Binding Direction, SP: Special original, FCODE: F-code, RTX: Re-TX,
 RLY: Relay, MBX: Confidential, BUL: Bulletin, SIP: SIP Fax, IPADR: IP Address Fax,
 I-FAX: Internet Fax

Result OK: Communication OK, S-OK: Stop Communication, PW-OFF: Power Switch OFF,
 TEL: RX from TEL, NG: Other Error, Cont: Continue, No Ans: No Answer,
 Refuse: Receipt Refused, Busy: Busy, M-Full:Memory Full,
 LOVR:Receiving length Over, POVR:Receiving page Over, FIL:File Error,
 DC:Decode Error, MDN:MDN Response Error, DSN:DSN Response Error.



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 Colorado Springs, CO 80908
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SOILS REPORT

FOR

BRIAN WARNER

JOB #17-0410

17350 Goshawk Road,
 El Paso County,
 Colorado

Respectfully submitted,

Charles E. Milligan, P.E.
 Civil Engineer

ATTACHMENT 4

Architecture
Structural
Geotechnical



Materials Testing
Forensic
Civil/Planning

ROCKY MOUNTAIN GROUP
EMPLOYEE OWNED

Job No. 173099

October 15, 2020

Brian Warner
17350 W. Goshawk Rd
El Paso County, CO 80908

Re: Wastewater Study
Warner 4-lot Minor Subdivision
Goshawk Rd
El Paso County, Colorado

Ref: *Development Plan*, prepared by Forsgren Associates, Inc., Project No. 04-18-0026, last dated June 1, 2020.

Dear Mr. Warner:

As requested, personnel of RMG – Rocky Mountain Group performed a preliminary investigation and site reconnaissance at the above referenced address. The parcel included in this study is:

- EPC Schedule No. 5123000037, currently addressed as 17350 Goshawk Road and is zoned *RR-5 - Residential Rural*.

It is our understanding the 40-acre parcel is to be subdivided into four lots of approximately 5.00 to 19.86 acres each. An existing single-family residence with a septic and well are to remain on Lot 3. The proposed site development is to consist of one single family residence with a well and an on-site wastewater treatment system on the remaining three lots. The Proposed Lot Layout (Figure 1) presents the general boundaries of our investigation.

This letter is to provide information per the On-Site Wastewater Treatment Systems (OWTS) Regulations of the El Paso County Board of Health pursuant to Chapter 8.

The following are excluded from the scope of this report including (but not limited to) foundation recommendations, site grading/surface drainage recommendations, subsurface drainage recommendations, geologic, natural and environmental hazards such as landslides, unstable slopes, seismicity, snow avalanches, water flooding, corrosive soils, erosion, radon, wild fire protection, hazardous waste and natural resources.

Previous Studies and Field Investigation

Reports reviewed in conjunction with this site were available for our review and are listed below:

1. *Soils Report, 17350 Goshawk Road, El Paso County, Colorado*, prepared by Geoquest, LLC, Job #17-0410, dated June 8, 2017.

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Colorado Springs, CO 80918
719.548.0600

Central Office:
Englewood, CO 80112
303.688.9475

Northern Office:
Evans, CO 80620
970.330.1071

Fort Collins: 970.616.4364
Monument: 719.488.2145
Woodland Park: 719.687.6077

2. *Profile Pit Evaluation, 17350 Goshawk Road, El Paso County, Colorado*, prepared by Geoquest, LLC, Job #17-0410, dated June 8, 2017.

The findings, conclusions and recommendations contained in this reports were considered during the preparation of this report.

SITE CONDITIONS

Personnel of RMG performed a reconnaissance visit on September 24, 2020. The purpose of the reconnaissance visit was to evaluate the site surface characteristics including topography, vegetation, natural and cultural features, and current and historic land uses. Three 8-foot deep test pits were performed across the site, during our reconnaissance visit. The Test Pit Locations are presented in Figure 2.

The site surface characteristics were observed to consist of low lying grasses and weeds across the entire site. No deciduous trees are located on the property.

The following conditions were observed with regard to the 40-acre parcel:

- A well currently **does** exist on the 40-acre site.
- Runoff and irrigation features do not exist on the property.
- The entire site lies outside of areas designated as 100-year and 500-year floodway or floodplain.
- Slopes greater than 20 percent **do not** exist on the site; and
- Significant man-made cuts **do not** exist on the site.

Treatment Areas

Treatment areas at a minimum must achieve the following:

- The treatment areas must be 4 feet above groundwater or bedrock as defined by the Definitions 8.3.4 of the Regulations of the El Paso County Board of Health, Chapter 8, *OWTS Regulations*, effective July 7, 2018;
- Prior to construction of an OWTS, an OWTS design prepared per *the Regulations of the El Paso County Board of Health, Chapter 8, OWTS Regulations* will need to be completed. A scaled site plan and engineered design will also be required prior to obtaining a building permit.
- Comply with any physical setback requirements of Table 7-1 of the El Paso County Department of Health and Environment (EPCHDE);
- Treatment areas are to be located a minimum 100 feet from any well (existing or proposed), including those located on adjacent properties per Table 7-2 per the EPCHDE;
- Treatment areas must also be located a minimum 50 feet from any spring, lake, water course, irrigation ditch, stream or wetland, and 25 feet from dry gulches.
- Other setbacks include the treatment area to be located a minimum 10 feet from property lines, dry gulches, cut banks and fill areas (from the crest).
- Each new lot shall be laid out to insure that a minimum of 2 sites are appropriate for an OWTS and do not fall within any restricted areas, (e.g. utility easements, right of ways). Based on the test pit observations performed, each new lot has a minimum of two locations for the OWTS, as presented on the OWTS Suitability Map, Figure 3.

Contamination of surface and subsurface water resources should not occur if the treatment areas are evaluated and installed according to El Paso County Health Department and State Guidelines in conjunction with proper maintenance.

DOCUMENT REVIEW

RMG has reviewed the above referenced site plan and identified the soil conditions anticipated to be encountered during construction of the proposed OWTS, which included a review of documented Natural Resource Conservation Service - NRCS data provided by websoilsurvey.nrcs.usda.gov. The results of our review are presented below. A review of FEMA Map No. 08041C0310G, effective December 7, 2018 indicates that the proposed treatment areas are not located within an identified floodplain.

SOIL EVALUATION

Personnel of RMG performed a soil evaluation to include three 8-foot deep test pits on September 24, 2020 (Test Pits TP-1, TP-2 and TP-3), utilizing the visual and tactile method for the evaluation of the site soils. The test pits were excavated in areas that appeared most likely to be used for residential construction.

The U.S. Soil Conservation Service along with USDA has identified the soils on the property as:

- 26 – Elbeth sandy loam, 8 to 15 percent slopes. Elbeth sandy loam was mapped by the USDA to encompass the majority of the site. Properties of the Elbeth sandy loam include, well-drained soil, depth of the water table is anticipated to be greater than 80 inches, runoff is anticipated to be low, frequency of flooding and ponding is none, and landforms are depressions. The hydrologic soil group of the unit is B. The USDA Soil Survey Map is presented in Figure 4.

Groundwater was not encountered in the test pits observed by RMG. However, bedrock/ limiting layers were encountered in TP-2 at a depth of 7 feet and in TP-3 at a depth of 5 feet.

An OWTS is proposed for each proposed new lot and should conform to the recommendations presented in an OWTS site evaluation, performed in accordance with the applicable health department codes prior to construction. This report may require additional test pits in the vicinity of the proposed treatment field. A minimum separation of 4 feet shall be maintained from groundwater and bedrock to the infiltrative surface.

Redoximorphic features indicating the fluctuation of groundwater or higher ground water levels were not observed in the test pits observed by RMG. However, evidence of groundwater was observed by Geoquest, LLC as stated in their Profile Pit Evaluation letter, referenced above. Redoximorphic features were observed between 36 to 40 inches below the surface. The Test Pit Logs are presented in Figures 5 and 6.

CONCLUSIONS

In summary, it is our opinion the site is suitable for individual on-site wastewater treatment systems within the cited limitations. Due to encountering bedrock/limiting layers and the potential for redoximorphic features, it is anticipated the OWTS for each lot will need to be designed by a Colorado Licensed Engineering. There are no foreseeable or stated construction related issues or land use changes proposed at this time. The proposed new lots are each anticipated to be suitable for an individual OWTS.

LIMITATIONS

The information provided in this report is based upon the subsurface conditions observed in the test pit excavations and accepted engineering procedures. The subsurface conditions encountered in the excavation for the treatment area may vary from those encountered in the test pit excavations. Therefore, depth to limiting or restrictive conditions, bedrock, and groundwater may be different from the results reported in this letter.

Additional test pits will be required if the treatment areas are not located in the locations assumed for the purpose of this report. If an OWTS is proposed for 17350 Goshawk Road, an additional OWTS site evaluation will need to be performed in accordance with the applicable health department codes prior to construction.

I hope this provides the information you have requested. Should you have questions, please feel free to contact our office.

Cordially,

RMG – Rocky Mountain Group

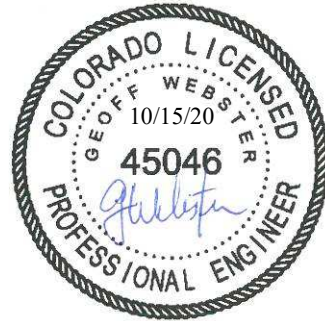


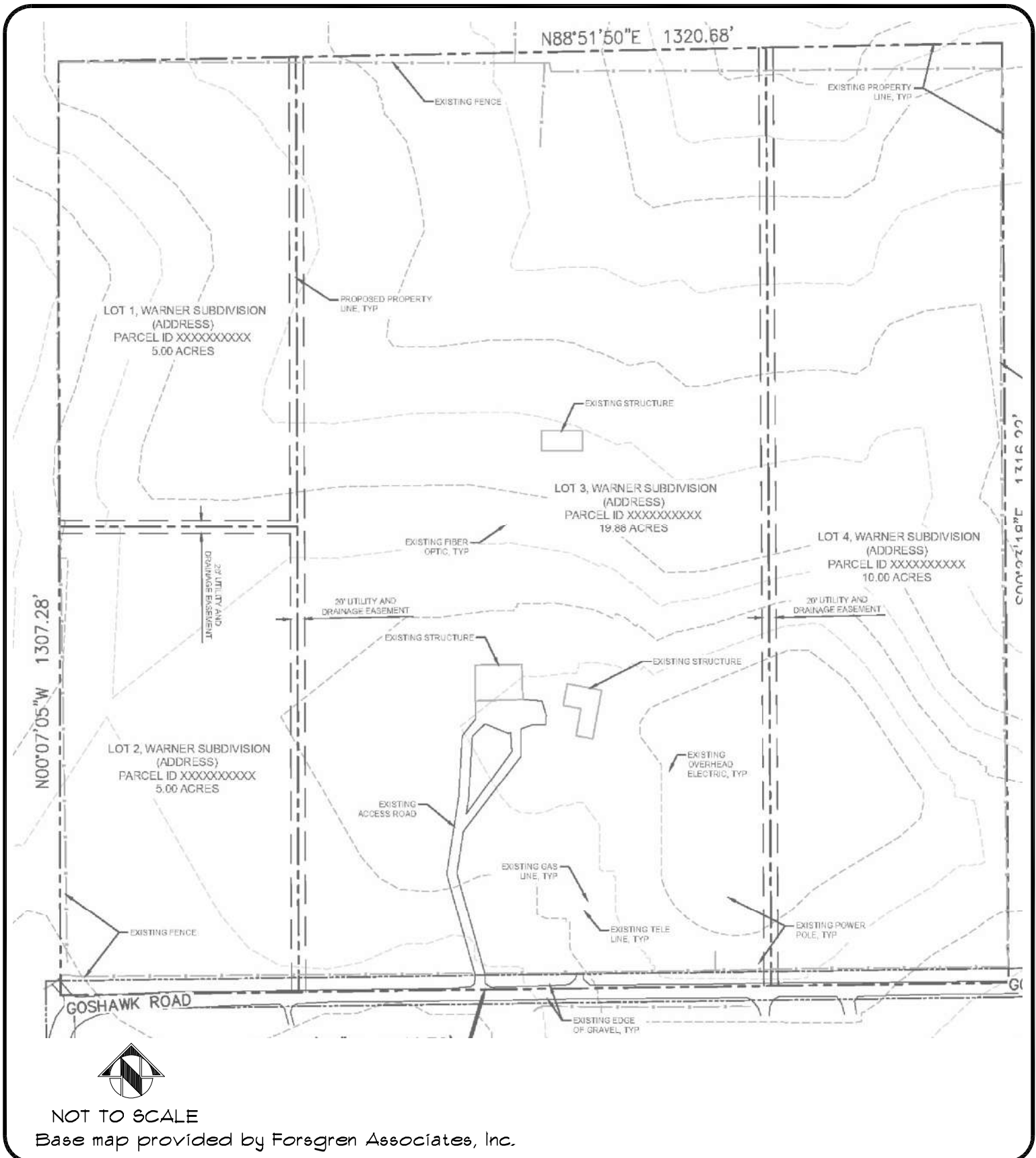
Kelli Zigler
Project Geologist

Reviewed by,

RMG – Rocky Mountain Group

Geoff Webster, P.E.
Sr. Geotechnical Project Engineer





NOT TO SCALE

Base map provided by Forsgren Associates, Inc.



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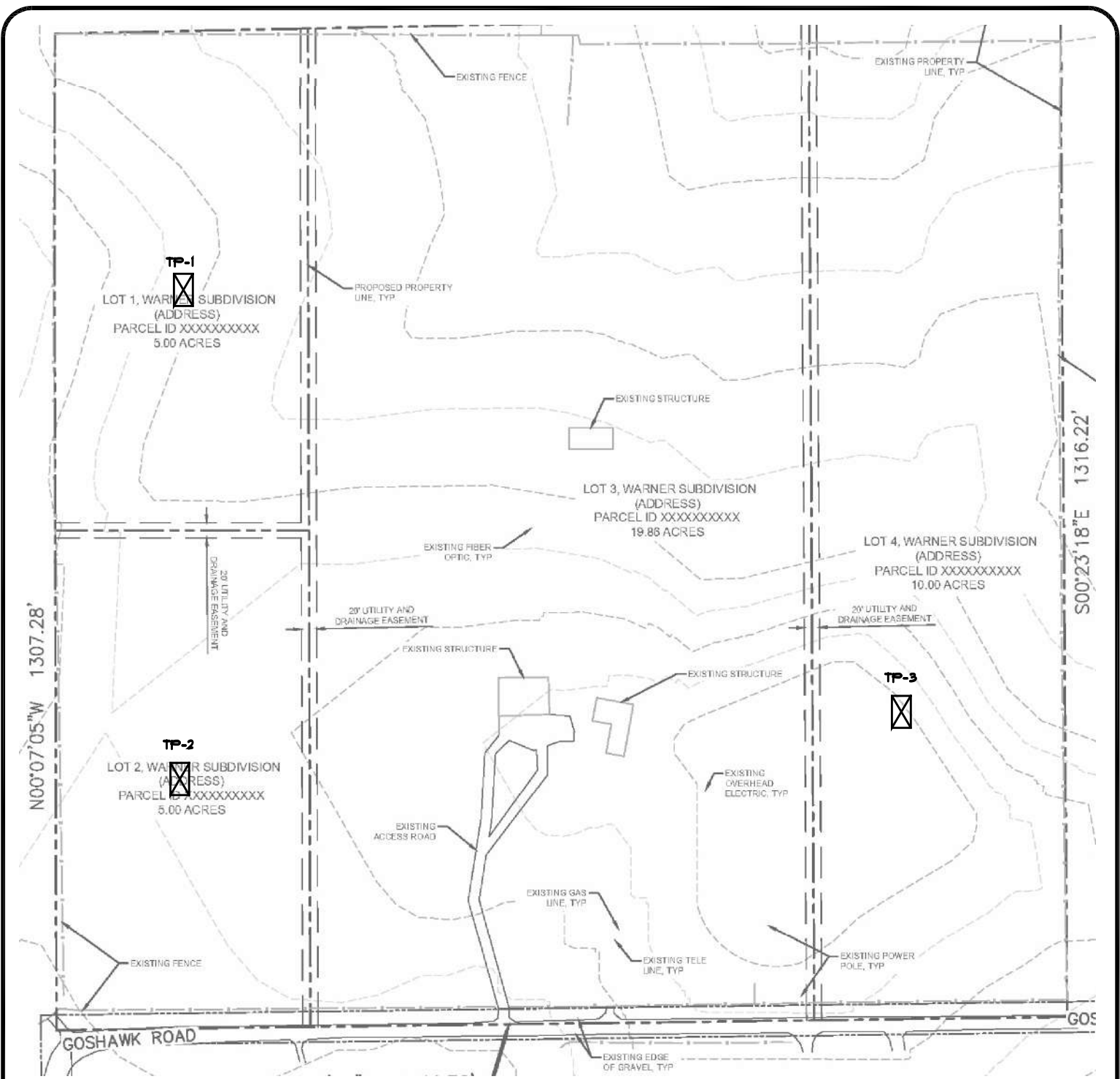
PROPOSED LOT LAYOUT

WARNER 4-LOT SUBDIVISION
 GOSHAWK ROAD
 EL PASO COUNTY, CO
 BRIAN WARNER

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FIG No. 1

DATE 10-14-2020



NOT TO SCALE



DENOTES ANTICIPATED LOCATION OF HOUSE



DENOTES ANTICIPATED LOCATION(S) OF OWTS



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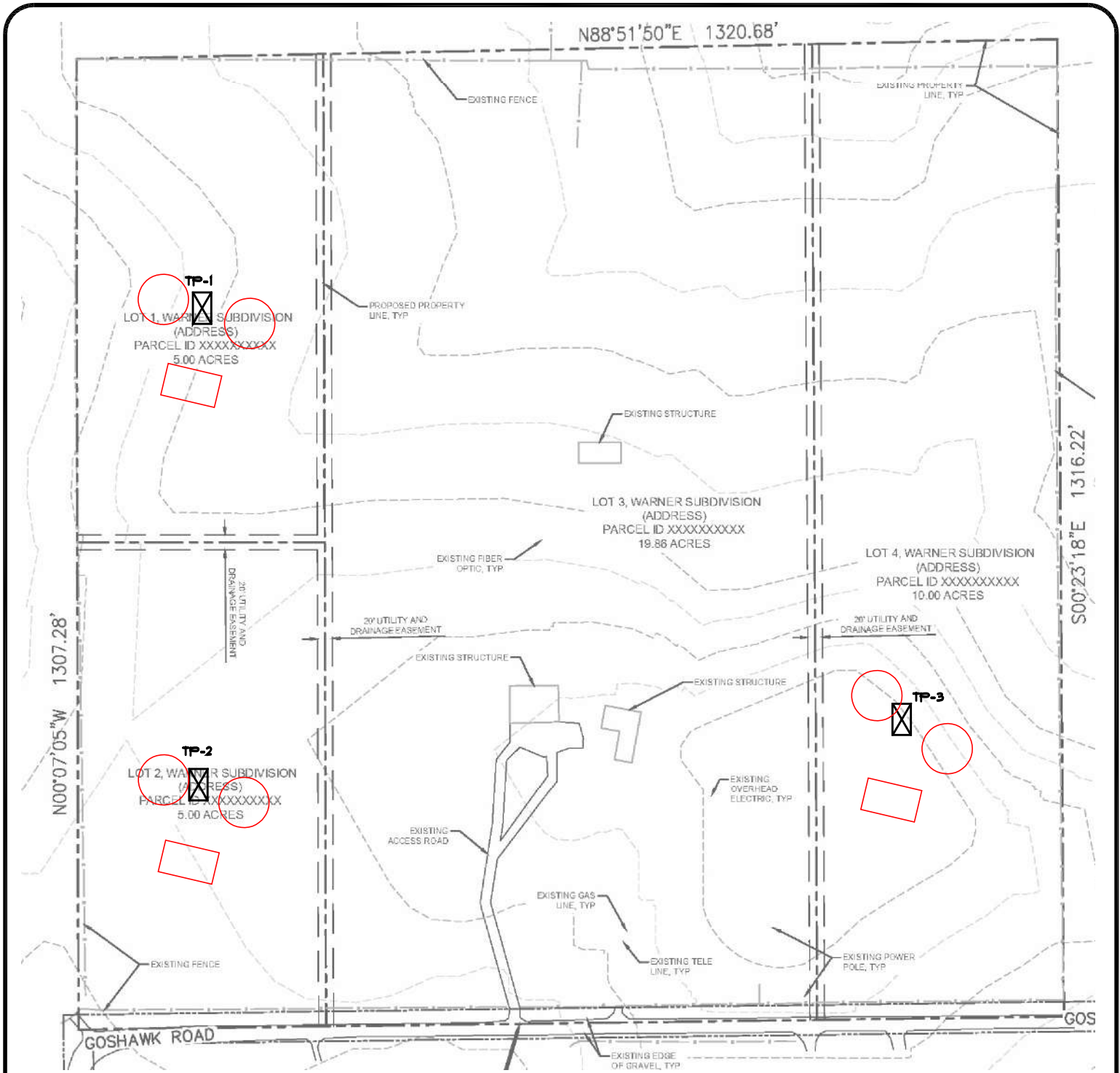
OWTS SUITABILITY MAP

WARNER 4-LOT SUBDIVISION
GOSHAWK ROAD
EL PASO COUNTY, CO
BRIAN WARNER

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FIG No. 2

DATE 10-14-2020



NOT TO SCALE



DENOTES ANTICIPATED LOCATION OF HOUSE



DENOTES ANTICIPATED LOCATION(S) OF OWTS



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OWTS SUITABILITY MAP

WARNER 4-LOT SUBDIVISION
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FIG No. 3

DATE 10-14-2020



71—Pring coarse sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369k
 Elevation: 6,800 to 7,800 feet
 Farmland classification: Not prime farmland

Map Unit Composition

Pring and similar soils: 85 percent
 Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pring

Setting

Landform: Hills
 Landform position (three-dimensional): Side slope
 Down-slope shape: Linear
 Across-slope shape: Linear
 Parent material: Arkosic alluvium derived from sedimentary rock

Typical profile

A - 0 to 14 inches: coarse sandy loam
 C - 14 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
 Depth to restrictive feature: More than 80 inches
 Drainage class: Well drained
 Runoff class: Low
 Capacity of the most limiting layer to transmit water (Ksat)
 (2.00 to 6.00 in/hr)
 Depth to water table: More than 80 inches
 Frequency of flooding: None
 Frequency of ponding: None
 Available water capacity: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
 Land capability classification (nonirrigated): 3e
 Hydrologic Soil Group: B
 Ecological site: R048AY222CO
 Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:
 Landform: Depressions
 Hydric soil rating: Yes



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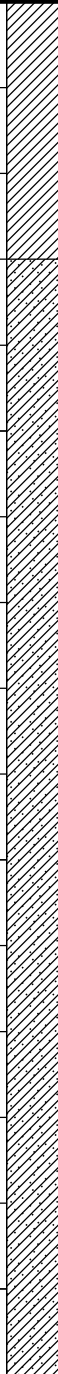

**USDA SOIL
 SURVEY MAP**

**WARNER 4-LOT SUBDIVISION
 GOSHAWK ROAD
 EL PASO COUNTY, CO
 BRIAN WARNER**

JOB No. 173099

FIG No. 4

DATE 10-14-2020

TEST PIT No.: TP-1 DATE DRILLED: 9/24/20 REMARKS: NO GROUNDWATER ON 9/24/20	DEPTH (FT)	SYMBOL	SAMPLES	WATER CONTENT %	SOIL TYPE	TEST PIT No.: TP-2 DATE DRILLED: 9/24/20 REMARKS: NO GROUNDWATER ON 9/24/20	DEPTH (FT)	SYMBOL	SAMPLES	WATER CONTENT %	SOIL TYPE
USDA Soil Texture: Sandy Loam USDA Soil Type: 2 USD Structure Shape: Moderate USDA Structure Grade: Strong						USDA Soil Texture: Sandy Loam USDA Soil Type: 2 USD Structure Shape: Granular USDA Structure Grade: Strong					
USDA Soil Texture: Sandy Clay USDA Soil Type: 4 USD Structure Shape: Blocky USDA Structure Grade: Moderate	2.5			USDA Soil Texture: Sandy Clay USDA Soil Type: 4 USD Structure Shape: Blocky USDA Structure Grade: Moderate	2.5						
	5.0			USDA Soil Texture: Sand USDA Soil Type: R-0 USD Structure Shape: Single-Grain USDA Structure Grade: Structureless	5.0						
	7.5			Limiting Layer at 7 feet - 44% > 2mm	7.5						

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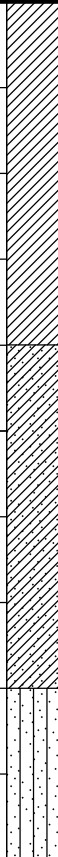
SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO

TEST PIT LOGS

JOB No. 173099

FIGURE No. 5

DATE 10/15/20

TEST PIT No.: TP-3 DATE DRILLED: 9/24/20 REMARKS: NO GROUNDWATER ON 9/24/20	DEPTH (FT)	SYMBOL	SAMPLES	WATER CONTENT %	SOIL TYPE
USDA Soil Texture: Sandy Laom USDA Soil Type: 2 USD Structure Shape: Blocky USDA Structure Grade: Moderate					
USDA Soil Texture: Sandy Clay USDA Soil Type: 4 USD Structure Shape: Blocky USDA Structure Grade: Moderate	2.5				
USDA Soil Texture: Sandy Clay USDA Soil Type: R-1 USD Structure Shape: Granular USDA Structure Grade: Moderate	5.0				
Limiting Layer at 5 feet - 45% > 2mm	7.5				

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SOUTHERN COLORADO, DENVER METRO, NORTHERN COLORADO

TEST PIT LOGS

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FIGURE No. 6

DATE 10/15/20