

SOILS AND GEOLOGY
Report
For
Colvin Heritage Farms
Minor Subdivision

AUGUST 16 2020

Report indicates evidence of shallow groundwater. Areas of shallow groundwater or potentially shallow groundwater will need to be depicted and designated as no-build areas.



Julia M. Murphy MS, PG
Professional Geologist



Groundwater Investigations LLC
11590 Black Forest Road Ste 15
Colorado Springs, CO 80908
(719) 338-1805



PROJECT DESCRIPTION

The following presents Soils, Geology and OTWS Report for the proposed Colvin Heritage Farms Minor Subdivision ("Project Site") (Figure 1). The 19.8 acre parcel is proposed to be subdivided to create two lots consisting of 10.1 acres (Lot 1 with an existing home and well) and 9.7 acres (Lot 2) having the respective addresses of 11660 and 11545 Green Acres Lane, Colorado Springs CO 80908 in El Paso County, Colorado (Attachment 1).

GEOLOGY

The Project Site is located within the Black Forest Quadrangle near the western edge of a geologic structural depression known as the Denver Basin. This asymmetrical structural basin is shallow-dipping toward the northeast within Black Forest. The uppermost materials are that of the Dawson Formation deposited during the early to possibly middle Eocene (Figure 2). 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 (Thorson, 2003).

Facies Unit 5 (TKda5) is the uppermost facies of the Dawson Formation and is mapped over the entire Project Site (Figure 2). This Facies is generally described as light-tan fine to medium grained feldspathic friable sandstone. The sandstone is poorly sorted and interbedded with lenses of sandy clays. Facies Unit 5 is described as generally permeable, well drained, with good foundation characteristics.

SOILS and OTWS

The National Resource Conservation Service (NRCS) has identified three soil types on the Property.

Type	Description
40	Kettle gravelly loamy sand, 3 to 8 % slopes
41	Kettle gravelly loamy sand, 8 to 40% slopes
71	Pring Coarse sandy loam 3 to 8 percent slope



Attachment 2 provides a complete detailed description of the soils. The natural drainage class is “somewhat extensively drained” (Type 40 and 41) to “well drained “ (Type 71). Runoff potential is low for Type 40 and 71 and moderate for Type 41 and (NRCS, 2018). All are Hydrologic Soil Group B described in part as having a moderately low runoff potential when thoroughly wet.

Soil Test Pits for OWTS

Is it feasible to install OWTS/Leachfield in the shallow groundwater? Provide exhibit showing limits of the shallow groundwater and provide recommended constraints/restrictions and mitigation within these areas.

of excavating two profile pits within Soil Type 40 on for an onsite wastewater treatment system (OWTS) ated to a maximum depth of 6 feet below ground ervals and evaluated for soil properties. Test Pit 1 Test Pit 2 encountered USDA soil Type 3A and 4A

Evidence of shallow groundwater occurred at a depth of 28 inches in Profile Pit 1 and 16 inches in Profile Pit 2 both at the weathered bedrock/Bedrock interface. Geoquest specified that the site will require an Engineered Septic Design with a design based on an LTAR of 0.3, GPD/SF and including an above grade uniformly pressure dosed soil treatment (Geoquest-1 2017). The sample locations for the initial assessment are presented on Figure 3. The OWTS report is included as Attachment 3. The location of the test pits and the proposed and alternative OWTS locations is presented on **Figure 4.f**

PROFILE BORINGS

Two exploratory borings were drilled using a 4-in diameter auger to depths of 15 feet (Geoquest-2, 2017). Samples were collected using a 2-inch split spoon barrel sampler. A 140 pound drop-hammer, dropped 30 inches, was used to drive the sampler into the soil in accordance with ASTM D-1586. Samples were classified in the field and by laboratory analysis to evaluate physical and overlying sandstone (2-15 feet) with low to moderate clay content and moisture content ranging from 6.6 to 8 % (Attachment 4)

Missing. Include Figure 4.f



TABLE 1
Soil Profile Pit Summary Table
Colvin Heritage Farms Subdivision

Depth (in)	Sample Interval	Soil Data						
		USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	Cementation Class	Color
		Topsoil						
Lot 2	Pit 1	Sandy Loam	Granular	1	Yes at 28"	Type 2 (LTAR = 0.60) Treatment Level 1	Non-Cemented	Lt Brn 7.5YR 6/4
6" to 28"								
28" to 72"		Sandy Loam	none	Massive	Yes at 28 "	Type 2 (LTAR = 0.60) Treatment Level 1	Moderate	Pnk/Wt 7.5YR 8/2
Depth to groundwater (Permanent or Seasonal) at 28-inches								



**TABLE 1-cont-
Soil Profile Pit Summary Table
Colvin Heritage Farms Subdivision**

Depth (in)	Sample Interval							
		USDA Soil Texture	USDA Soil Structure - Shape	Soil Structure Grade	Redoximorphic Features Present? (Y/N)	Soil Type (from Table 9 in O-14)	Cementation Class	Color
Lot 2	Pit 2	Sandy Clay Loam	Blocky	1	Yes at 16"	Type 3 (LTAR = 0.35) Treatment Level 1	Non-Cemented	Dk Yel Brn 10YR 3/4
6" to 16"								
16" to 40"		Sandy Clay	none	Massive	Yes at 16 "	Type 4 (LTAR = 0.20) Treatment Level 1	Moderate	Lt Yel Brn 2.5YR 6/3
40" to 48"		Sandy Clay Loam	none	Massive	no	Type 3 (LTAR = 0.35) Treatment Level 1	Moderate	Pale Brn 2.5YR 7/4
Depth to groundwater (Permanent or Seasonal) at 16-inches								

HYDROGEOLOGY

The Property is located within the northern most portion of the Falcon Basin Drainage (Matrix 2015) within the Upper Black Squirrel Creek Designated Ground Water Basin. The ground surface elevation across the Project Site ranges from 7430 to 7484 feet above mean sea level (Figure 3). Surface drainage flows via existing natural drainage swales, draining to the southeast and south across the Project Site. Figure 4 shows the natural surface drainage pattern (JPS 2020). Surface water was visible on the southernmost area within the drainage depression near Burgess Road



during a site visit by GWI in the area labeled “Design Point 1” on Figure 4. As this visit was not following a recent precipitation event, persistent shallow water may occur in this area and should be considered in selecting a building location. There are areas greater than 1-acre within vacant lot 2 where there is relatively flat to gently sloping terrain suitable for building. The slope on the vacant lot is mild, ranging from 1 to 10 percent.

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 polluted water, landfills, fill areas, contamination; airports and major utility facilities, and landslides were evaluated and not identified on the Project Site.

Flooding

The National Flood Hazard map delineated the Property and surrounding area an “area of Minimal Flood Hazard” (FEMA 2018) (Figure 5). The drainage report completed by the applicant’s engineer emphasized the importance of maintaining drainage patterns and erosion control to avoid drainage problems (JPS 2020).

Erosion

The Project Site has mature ponderosa pines with a canopy covering a significant area of the northern portion of the Project Site. Lot 2 is mostly covered by native vegetation and to a lesser extent, ponderosa pine trees. The area does not appear to have been affected by the 2013 Black Forest Fire. Based on the Soil test pits and borings, The Project Site is underlain by Dawson Bedrock comprised of an arkosic sandstone. Building setbacks and other methods to reduce potential hazards associated with possible slope instabilities from erosion may be needed as arkoses are easily eroded on exposed weathered outcrops and disturbed areas due to excavation.



Expansive Soils

The soils were determined to have a “small amount of expansive potential” from the foundation borings as described in the Soils report directed at foundation design for the proposed home on Lot 2. As variability in the local soils within the Dawson Formation indicate there is a potential for expansive soils, thus borings will be to be re-evaluated upon completion of the foundation excavation and prior to the placement of any framework.

Shallow Groundwater

Groundwater was encountered in Soil Profile Pit #1 at 28 inches and Profile test pit #2 at 16 inches (Geoquest-1, 2017). The property is defined by highland areas and swales. As mentioned, a wide low lying flat drainage swale crosses the property from the northwest to the southeast. Due to elevation differences, water is drained towards this low-lying area and was visible at the southern portion of the property by Burgess road. Conditions at the Project Site indicate a potential for periodically high moisture conditions and/or frost heave.

MINERAL RESOURCES

Colorado Geological Mineral Resources Derivative Map indicates a low potential to contain economically viable mineral resources.

CONCLUSION

The site is not exposed to any geologic hazards or geotechnical constraints that would preclude the proposed two-lot residential subdivision. The OWTS for the vacant lot was determined to require an engineered system.

Provide recommendations/mitigation for the shallow groundwater. Coordinate with the surveyor to for an appropriate plat note



REFERENCES

Coloradogeologicalsurvey.org. /geologic-hazards/abandoned-mine-lands/maps
US Forest Service Abandoned Mine Lands Inventory
Debris Flows-Fans/Mudslides

Federal Emergency Management Agency (FEMA). December 12, 2018.

<https://www.fema.gov/national-flood-hazard-layer-nfhl>; nfhl Viewer.

Geoquest-1 2017. Profile Pit Evaluation for Seger Homes Job #17-0660.

Geoquest-2 2017. Soils Report for Seger Homes Job #17-0660.

JPS Engineering 2020. Final Drainage Report For Colvin Heritage Subdivision, May 8, 2020.

Matrix Design Group. Falcon Drainage Planning Study Selected Plan Report Final-September 2015.

Mineral Resources. <https://cologeosurvey.maps> Mineral Resource Potential Derivative Mapping
JR Engineering LLC, May 5, 2015 Drainage Basin Planning Study for Kettle Creek Basin prepared
for High Valley Land Company Inc. <http://Coloradosprings.gov/dbps>

Natural Resource Conservation Service (NRCS), August 21, 2017. Web Soil Survey. United States
Department of Agriculture: <https://websoilsurvey.nrcs.usda.gov>

NRCS: <https://websoilsurvey.nrcs.usda.gov>

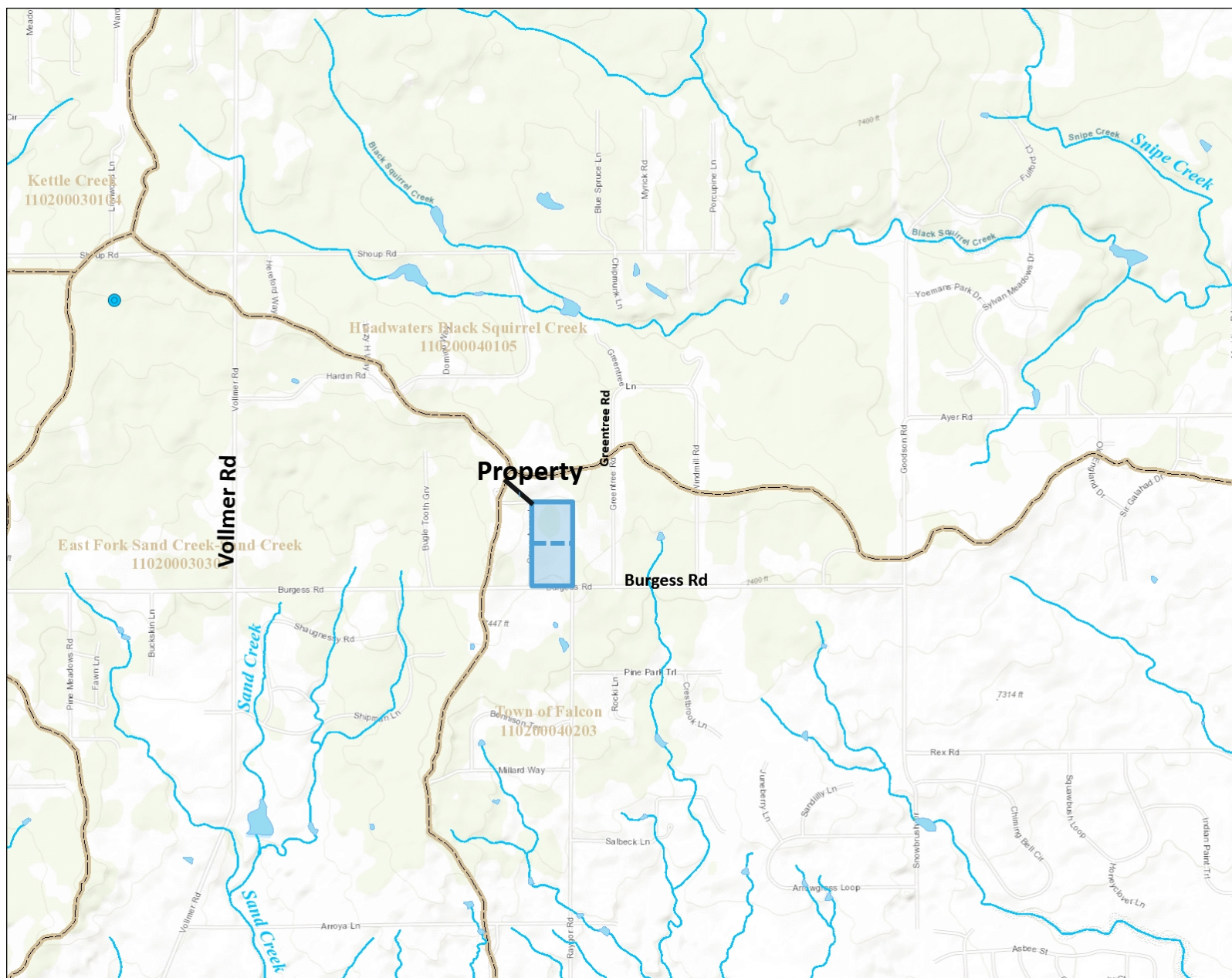
Watts, Oliver Consulting Engineer inc., January 16, 2019. Preliminary and Final Drainage Plan and
Report Poenitsch Subdivision, El Paso County.

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



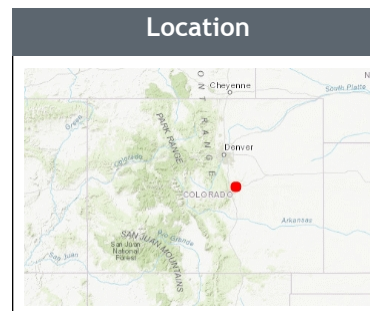
CDSS

Colorado's Decision Support Systems



Legend

- NHDPoint
- NHDArea
 - CanalDitch
 - StreamRiver
- NHDWaterbody
 - LakePond
 - Reservoir
 - SwampMarsh
- NHDFlowline
 - ArtificialPath
 - CanalDitch
 - Connector
 - Pipeline
 - StreamRiver
 - Underground Conduit
- WBD_HU12
- County



Notes

PROPERTY LOCATION
Colvin 19.8 Acres

SE S15 T12S R65W

FIGURE 1

4,677 0 2,339 4,677 Feet

1: 28,064



This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Date Prepared: 7/23/2018 7:56:13 PM

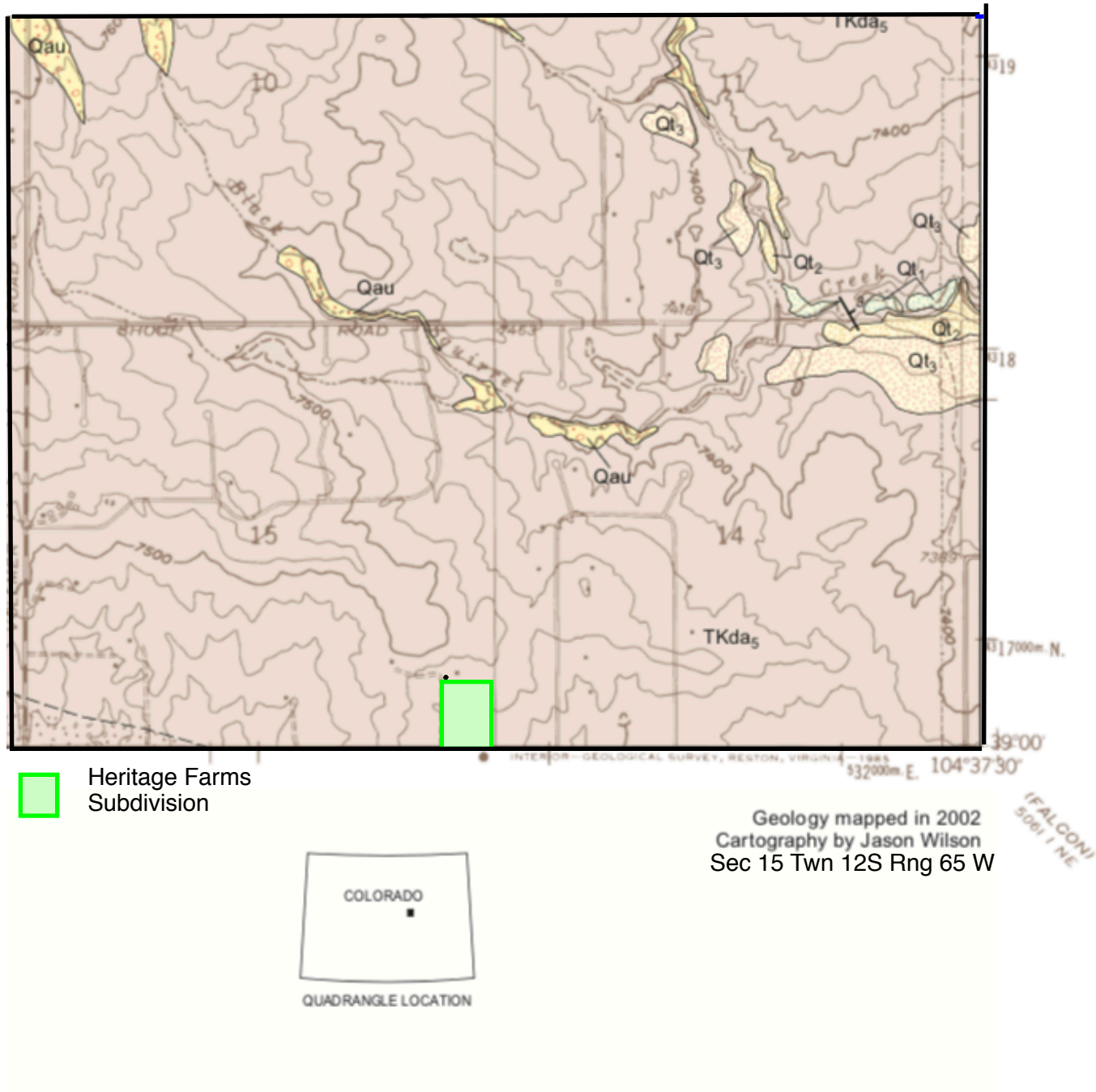


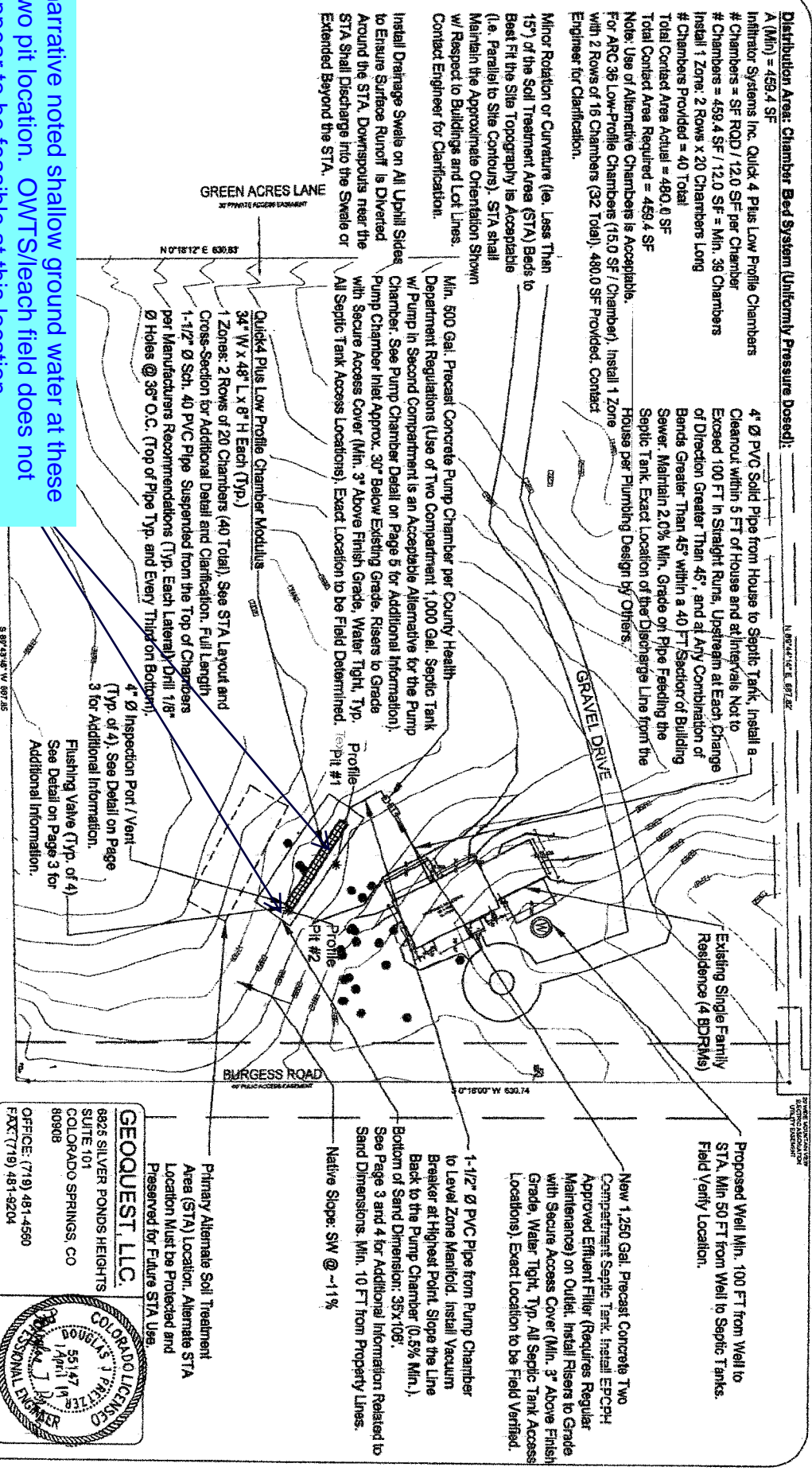
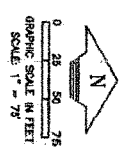
FIGURE 2

Geology
 Herigage Farms Subdivision
 Black Forest Quandrangle

narrative noted shallow ground water at these two pit location. OWTs/leach field does not appear to be feasible at this location

Location from Profile Pit #1 to Profile Pit #2: S. 44° E. - 54°
GPS Coordinates Profile Pit #1: N. 38° 59' 57.81" W. 104° 38' 42.62"
GPS Coordinates Profile Pit #2: N. 38° 58' 57.58" W. 104° 39' 42.13"

Site Plan



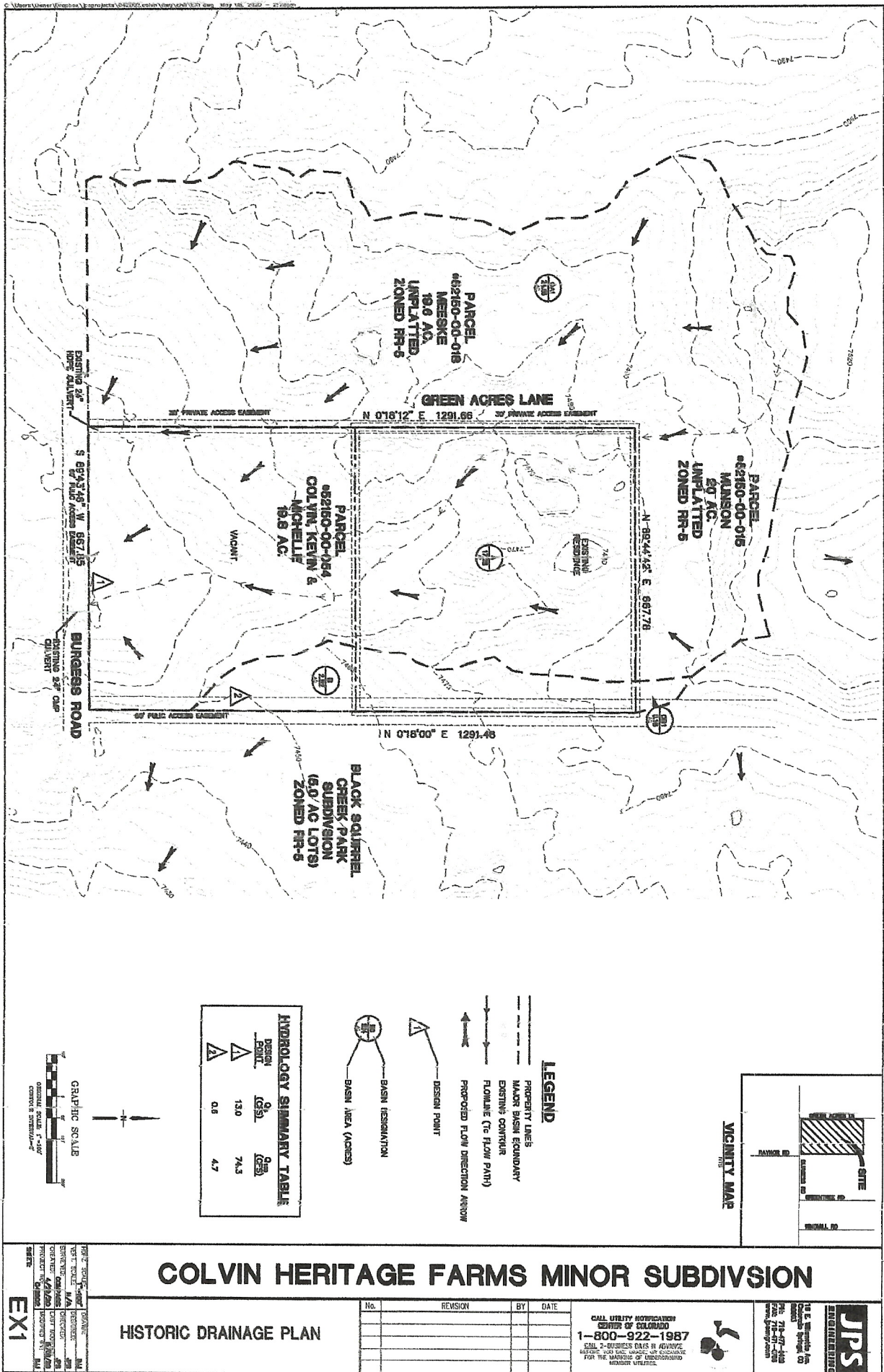


FIGURE 4

National Flood Hazard Layer FIRMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/7/2020 at 2:16:02 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



ATTACHMENT 1

PLATT MAP
COLVIN HERITAGE FARMS SUBDIVISION

COLVIN HERITAGE FARMS MINOR SUBDIVISION

A SUBDIVISION OF A PORTION OF THE SOUTHEAST QUARTER OF SECTION 15,
TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6TH P.M.,
EL PASO COUNTY, COLORADO

KNOW ALL MEN BY THESE PRESENTS:

That Kevin Colvin and Michelle Colvin, being the owners of the following described tract of land to wit:

The Northeast Quarter of the Southeast Quarter of the Southeast Quarter od Section 15, Township 12 South, Range 65 West of the 6th Principal Meridian, El Paso County, Colorado.

AND

The Southeast Quarter of the Southeast Quarter of the Southeast Quarter od Section 15, Township 12 South, Range 65 West of the 6th Principal Meridian, El Paso County, Colorado, except the South 30 feet for road purposes.

Containing a calculated area of 862,493 square feet (19.8001 acres), more or less.

OWNERS CERTIFICATION:

The undersigned, being all the owners, mortgages, beneficiaries of deeds of trust and holders of other interests in the land described herein, have laid out, subdivided, and platted said lands into lots and easements as shown hereon under the name and subdivision of COLVIN HERITAGE FARMS MINOR SUBDIVISION. The utility easements shown hereon are hereby dedicated for public utilities and communication systems and other purposes as shown hereon. The entities responsible for providing the services for which the easements are established are hereby granted the perpetual right of ingress and egress from and to adjacent properties for installation, maintenance, and replacement of utility lines and related facilities.

Kevin Colvin Date

Michelle Colvin Date

STATE OF COLORADO }
COUNTY OF EL PASO } SS

Acknowledged before me this ____ day of _____, 2020 by Kevin Colvin and Michelle Colvin.

My commission expires _____

Witness my hand and official seal _____
Notary Public

BOARD OF COUNTY COMMISSIONERS CERTIFICATE:

This plat for COLVIN HERITAGE FARMS MINOR SUBDIVISION was approved for filing by the El Paso County, Colorado Board of County Commissioners on the _____ day of _____, 2020, subject to any notes specified hereon and any conditions included in the resolution of approval. The dedications of land to the public (Public Utility Easements) are accepted, but public improvements thereon will not become the maintenance responsibility of El Paso County until preliminary acceptance of the public improvements in accordance with the requirements of the Land Development Code and Engineering Criteria Manual, and the Subdivision Improvements Agreement.

Chair, Board of County Commissioners Date

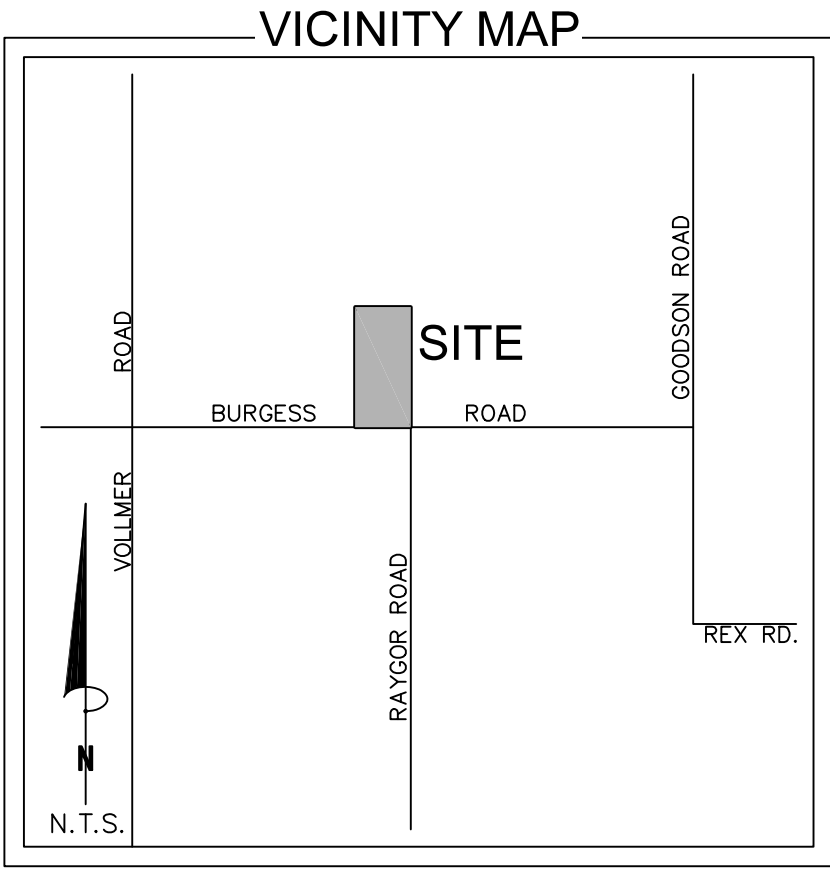
COUNTY APPROVAL:

Approval is granted for this plat of COLVIN HERITAGE FARMS MINOR SUBDIVISION this ____ day of

_____, 2020, A.D.

El Paso County Director of Planning and Community Development

El Paso County Assessor



NOTES (continued):

- 17) Wastewater: Wastewater service for this subdivision is provided by individual septic systems. Sewage treatment is the responsibility of each individual property owner. The El Paso County Department of Health and Environment must approve each system and, in some cases the Department may require an engineer designed system prior to permit approval. These systems may cost more to design, install, and maintain.
- 18) Utility providers are: Black Hills Energy, Colorado Springs Utilities, Century Link Communications, Falcon Broadband.
- 19) This property has been incorporated into the Black Forest Fire/Rescue Protection District.
- 20) Sediment control is to be provided on each lot and the minimal developed conditions runoff shall be maintained per the El Paso County Drainage Criteria Manual.

SURVEYOR’S CERTIFICATION:

I, Mark S. Johannes, a duly registered Professional Land Surveyor in the State of Colorado, do hereby certify that this plat truly and correctly represents the results of a survey made on the date of survey shown hereon, by me or under my direct supervision and that all monuments exist as shown hereon; that mathematical closure errors are less than 1:10,000; and that said plat has been prepared in full compliance with all applicable laws of the State of Colorado dealing with monuments, subdivision, or surveying of land and all applicable provisions of the El Paso County Land Development Code.

This certification is neither a warranty nor guarantee, either expressed or implied.

Mark S. Johannes
Colorado Professional Land Surveyor No. 32439
For and on behalf of Compass Surveying and Mapping, LLC

FEES:

Drainage Fee: _____ School Fee: _____

Bridge Fee: _____ Park Fee: _____

RECORDING:

STATE OF COLORADO }
COUNTY OF EL PASO } SS

I hereby certify that this instrument was filed for record in my office at ____ o'clock

____M., this____ day of _____, 2020, A.D., and is duly recorded

under Reception No. _____ of the records of El Paso County, Colorado.

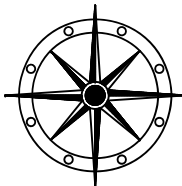
CHUCK BROERMAN, RECORDER

BY: _____
Deputy

SURCHARGE: _____

FEE: _____

DSD FILE NO: MS _____

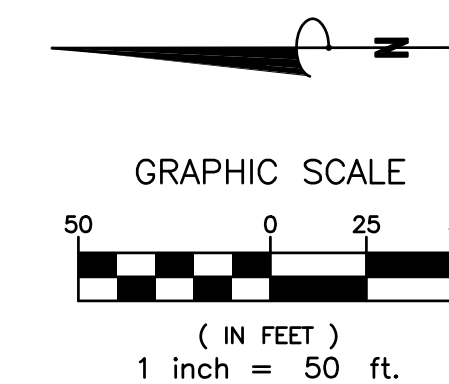


COMPASS SURVEYING & MAPPING, LLC
3249 WEST CAREFREE CIRCLE
COLORADO SPRINGS, CO 80917
719-354-4120
WWW.CSAMLLC.COM

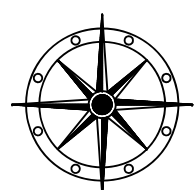
REVISIONS:	

PROJECT No. 19227
APRIL 30, 2020
SHEET 1 OF 2

A SUBDIVISION OF A PORTION OF THE SOUTHEAST QUARTER OF SECTION 15,
TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6TH P.M.,
EL PASO COUNTY, COLORADO

[illegible]

PROJECT No. 19227
APRIL 30, 2020
SHEET 2 OF 2



COMPASS SURVEYING & MAPPING, LLC
3249 WEST CAREFREE CIRCLE
COLORADO SPRINGS, CO 80917
719-354-4120
WWW.CSAMLLC.COM

ATTACHMENT 2

SOILS RESOURCES REPORT
COLVIN HERITAGE FARMS SUBDIVISION



United States
Department of
Agriculture

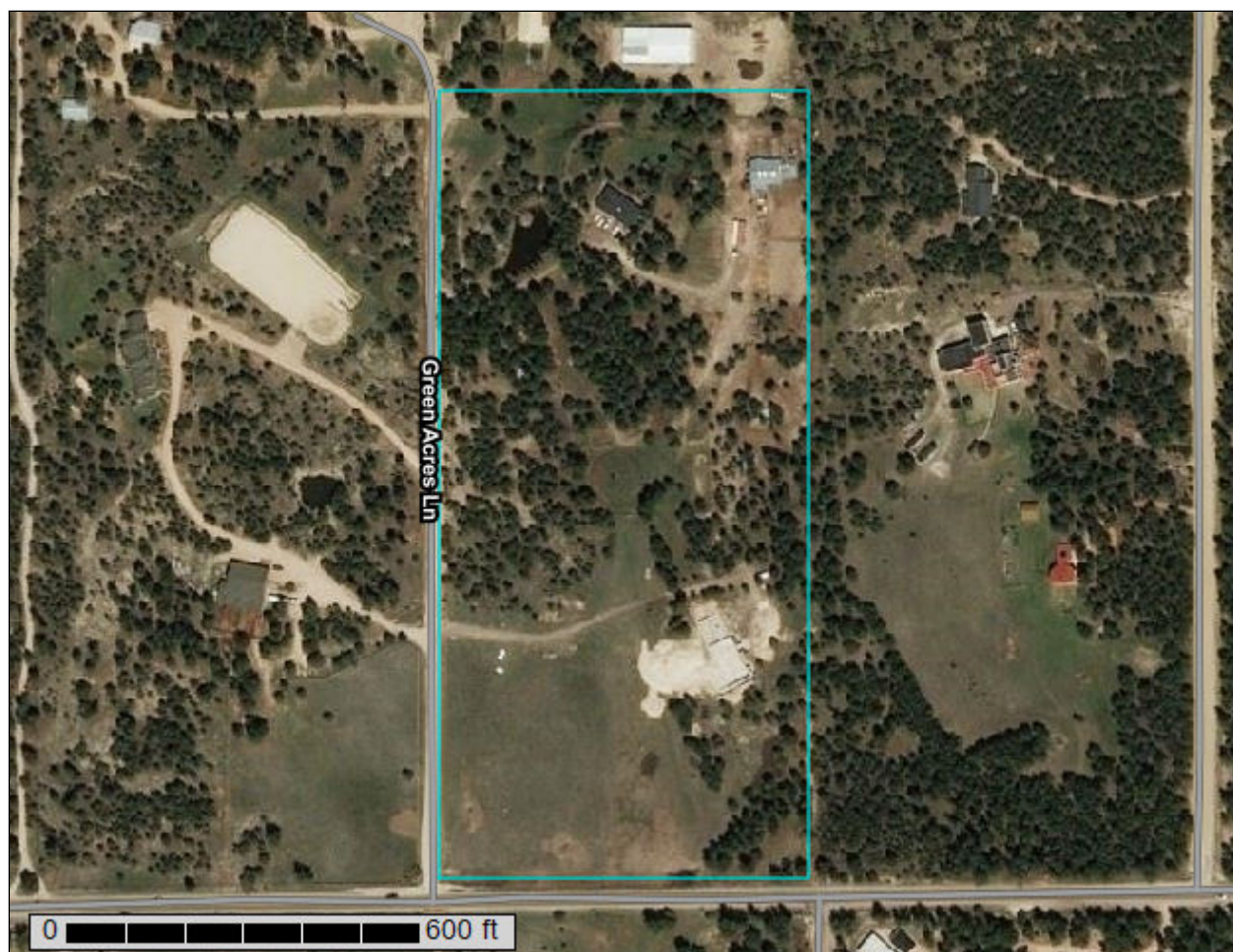
NRCS

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 El Paso County Area, Colorado

Colvin Heritage Farms



March 6, 2020

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Preface	2
How Soil Surveys Are Made	5
Soil Map	8
Soil Map.....	9
Legend.....	10
Map Unit Legend.....	11
Map Unit Descriptions.....	11
El Paso County Area, Colorado.....	13
40—Kettle gravelly loamy sand, 3 to 8 percent slopes.....	13
41—Kettle gravelly loamy sand, 8 to 40 percent slopes.....	14
71—Pring coarse sandy loam, 3 to 8 percent slopes.....	15
References	17

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

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



Custom Soil Resource Report

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
40	Kettle gravelly loamy sand, 3 to 8 percent slopes	10.8	55.8%
41	Kettle gravelly loamy sand, 8 to 40 percent slopes	4.8	24.8%
71	Pring coarse sandy loam, 3 to 8 percent slopes	3.7	19.4%
Totals for Area of Interest		19.3	100.0%

Map Unit Descriptions

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.

El Paso County Area, Colorado

40—Kettle gravelly loamy sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 368g

Elevation: 7,000 to 7,700 feet

Farmland classification: Not prime farmland

Map Unit Composition

Kettle and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kettle

Setting

Landform: Hills

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Sandy alluvium derived from arkose

Typical profile

E - 0 to 16 inches: gravelly loamy sand

Bt - 16 to 40 inches: gravelly sandy loam

C - 40 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat excessively drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High (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 storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: B

Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit:

Landform: Depressions

Hydric soil rating: Yes

Other soils

Percent of map unit:

Hydric soil rating: No

41—Kettle gravelly loamy sand, 8 to 40 percent slopes

Map Unit Setting

National map unit symbol: 368h

Elevation: 7,000 to 7,700 feet

Farmland classification: Not prime farmland

Map Unit Composition

Kettle and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kettle

Setting

Landform: Hills

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Sandy alluvium derived from arkose

Typical profile

E - 0 to 16 inches: gravelly loamy sand

Bt - 16 to 40 inches: gravelly sandy loam

C - 40 to 60 inches: extremely gravelly loamy sand

Properties and qualities

Slope: 8 to 40 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat excessively drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): High (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 storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: B

Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:

Hydric soil rating: No

Pleasant

Percent of map unit:

Custom Soil Resource Report

Landform: Depressions
Hydric soil rating: Yes

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

Map Unit Setting

National map unit symbol: 369k
Elevation: 6,800 to 7,600 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
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (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 storage in profile: Low (about 6.0 inches)

Interpretive groups

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

Minor Components

Pleasant

Percent of map unit:
Landform: Depressions

Custom Soil Resource Report

Hydric soil rating: Yes

Other soils

Percent of map unit:

Hydric soil rating: No

References

- American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
- American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- 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.
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262
- 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. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577
- Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374
- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelpdb1043084>

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

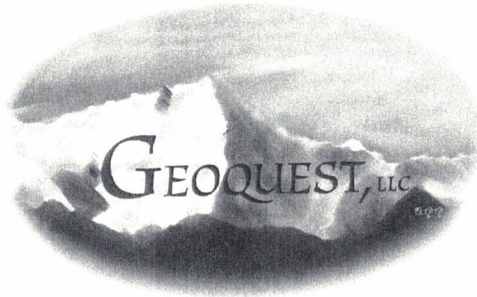
United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

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

ATTACHMENT 3

OWTS PROFILE PIT EVALUATION
COLVIN HERITAGE FARMS SUBDIVISION

Septic



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

PROFILE PIT EVALUATION

FOR

SEEGER HOMES

JOB #17-0660

11545 Green Acres Lane,
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 **11545 Green Acres Lane, El Paso County, Colorado**. The location of the test pit was determined by Seeger Homes. 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 south-southwest 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 July 21, 2017, in accordance with Table 10-1 of the **E.P.C.P.H. OWTS Regulations**.

Soil Profile #1:

- 0 to 6" - Topsoil- loam, organic composition.
- 6" to 28" - USDA soil texture sandy loam, soil type 2A, structure shape granular, structure grade 1, non-cemented, LTAR 0.50, light brown in color, 7.5YR 6/4.
- 28" to 6' - USDA soil texture sandy loam, soil type 2A, structure shape none, structure grade massive, moderately cemented, LTAR 0.50, pinkish white in color, 7.5YR 8/2, Dawson sandstone, redoximorphic features at 28 inches.

Soil Profile #2:

- 0 to 6" - Topsoil- loam, organic composition.
- 6" to 16" - USDA soil texture sandy clay loam, soil type 3A, structure shape blocky, structure grade 1, non-cemented, LTAR 0.30, dark yellowish in color, 10YR 3/4.
- 16" to 40" - USDA soil texture sandy clay, soil type 4A, structure shape none, structure grade massive, moderately cemented, LTAR 0.15, light yellowish brown in color, 2.5YR 6/3, Dawson sandstone, redoximorphic features at 16 inches.
- 40" to 4' - USDA soil texture sandy clay loam, soil type 3A, structure shape none, structure grade massive, moderately cemented, LTAR 0.30, pale brown in color, 2.5Y 7/4, Dawson sandstone.

Groundwater evidence was encountered at the depth of 28 inches in Profile Pit #1 and at 16 inches in Profile Pit #2 during the inspection. Bedrock was encountered at the depth of 28 inches in Profile Pit #1 and at 16 inches and 40 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 USDA soil type 3A, 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 0.30, GPD/SF (USDA 3A, 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 partly cloudy skies with hot temperatures.

PROFILE PIT LOG - Profile Pit #1

JOB#: 17-0660
DATE EVALUATED: 21 Jul 2017
EQUIPMENT USED: MINI-EXCAVATOR

0"-6" TOPSOIL

Loam
Organic Composition

6"- 28" Sand

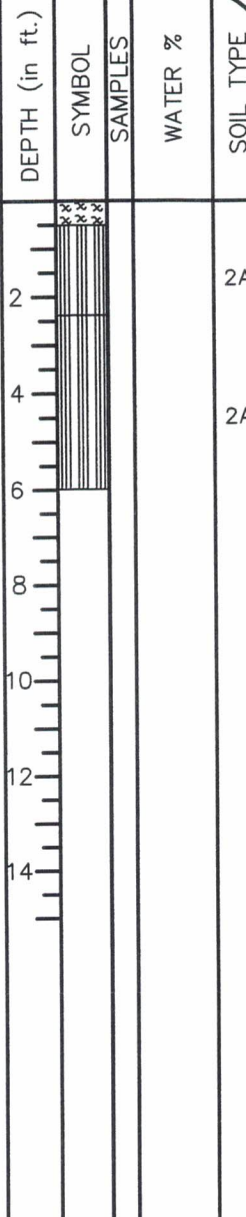
Fine-coarse Grained
Low-moderate Density
Moderate Moisture Content
Low-moderate Clay Content
Low-moderate Cohesion
Low-moderate Plasticity
Light Brown Color
7.5YR 6/4

USDA Soil Texture: Sandy Loam
USDA Soil Type: 2A
USDA Structure Shape: Granular
USDA Structure Grade: 1
Cementation Class: Non-Cemented
Long Term Acceptance Rate (LTAR, Treatment Level 1): 0.50

28"- 6' Dawson Sandstone

Fine-coarse Grained
Moderate-high Density
Low-moderate Moisture Content
Low-moderate Clay Content
Low Cohesion
Low Plasticity
Pinkish White Color
7.5YR 8/2

USDA Soil Texture: Sandy Loam
USDA Soil Type: 2A
USDA Structure Shape: None
USDA Structure Grade: Massive
Cementation Class: Moderately
Long Term Acceptance Rate (LTAR, Treatment Level 1): 0.50
Redox @ 28"



LTAR to be Used for OWTS Sizing: **0.30GPD/SF (USDA Type 3A, Treatment soil, Treatment Level 1)**

Depth to Groundwater (Permanent or Seasonal): Seasonal @ 28"

Depth to Bedrock and Type: Dawson Sandstone @ 28"

Depth to Proposed Infiltrative Surface from Ground Surface: Above Grade (Uniformly pressure dosed STA)

Soil Treatment Area Slope and Direction: SSW @ 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: 17-0660

Sheet: 1 of 2

Date: 04 Aug 2017

Scale: 1/4" = 1'

Drawn by: mtj

Checked by: cem

Project Name and Address

Seeger Homes

11545 Green Acres Ln
Sch. No. 5215000053
El Paso County, Colorado

GEOQUEST, LLC.

6825 SILVER PONDS HEIGHTS
SUITE 101
COLORADO SPRINGS, CO
80908

OFFICE: (719) 481-4560
FAX: (719) 481-9204

JOB#: 17-0660
 DATE EVALUATED: 21 Jul 2017
 EQUIPMENT USED: MINI-EXCAVATOR

Loam
 Organic Composition

Fine-coarse Grained
 Moderate Density
 Moderate Moisture Content
 Moderate Clay Content
 Moderate Cohesion
 Moderate Plasticity
 Dark Yellowish Brown Color
 10YR 3/4

USDA Soil Texture: Sandy Clay Loam
 USDA Soil Type: 3A
 USDA Structure Shape: Blocky
 USDA Structure Grade: 1
 Cementation Class: Non-Cemented
 Long Term Acceptance Rate (LTAR, Treatment Level 1): 0.30

Fine-medium Grained
 High Density
 Moderate Moisture Content
 Moderate-high Clay Content
 Moderate-high Cohesion
 Moderate-high Plasticity
 Light Yellowish Brown Color
 2.5YR 6/3

USDA Soil Texture: Sandy Clay
 USDA Soil Type: 4A
 USDA Structure Shape: None
 USDA Structure Grade: Massive
 Cementation Class: Moderately
 Long Term Acceptance Rate (LTAR, Treatment Level 1): 0.15
 Redox @ 16"

Fine-coarse Grained
 Moderate-high Density
 Low-moderate Moisture Content
 Moderate Clay Content
 Moderate Cohesion
 Moderate Plasticity
 Pale Brown Color
 2.5Y 7/4

USDA Soil Texture: Sandy Clay Loam
 USDA Soil Type: 3A
 USDA Structure Shape: None
 USDA Structure Grade: Massive
 Cementation Class: Moderately
 Long Term Acceptance Rate (LTAR, Treatment Level 1): 0.30

DEPTH (in ft.)	SYMBOL	SAMPLES	WATER %	SOIL TYPE
0				3A
2				4A
4				3A
6				
8				
10				
12				
14				

LTAR to be Used for OWTS Sizing: 0.30GPD/SF (USDA Type 3A, Treatment soil, Treatment Level 1)

Depth to Groundwater (Permanent or Seasonal): Seasonal @ 16"

Depth to Bedrock and Type: Dawson Sandstone @ 16"

Depth to Proposed Infiltrative Surface from Ground Surface: Above Grade (Uniformly pressure dosed STA)

Soil Treatment Area Slope and Direction: SSW @ 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: 17-0660

Sheet: 2 of 2

Date: 04 Aug 2017

Scale: 1/4" = 1'

Drawn by: mtj

Checked by: cem

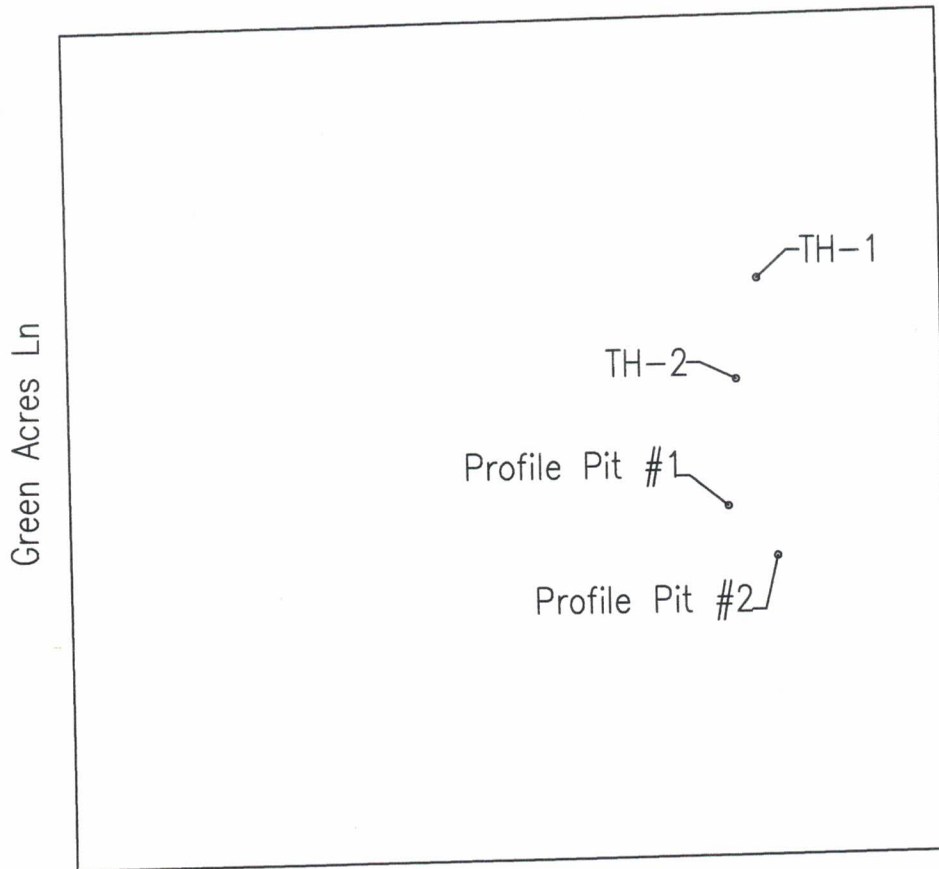
11545 Green Acres Ln
 Sch. No. 5215000053
 El Paso County, Colorado

6825 SILVER PONDS HEIGHTS
 SUITE 101
 COLORADO SPRINGS, CO
 80908

OFFICE: (719) 481-4560
 FAX: (719) 481-9204

GEOQUEST LLC
SITE MAP

11545 Green Acres Ln
El Paso County,
Colorado,
Job #17-0660



Location from Southwest Lot Corner to Profile Pit #1:

N. 61° E. - 577'

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

S. 44° E. - 54'

GPS Coordinates:

Pit 1; N. 38° 59' 57.81" W. 104° 38' 42.62"

Pit 2; N. 38° 59' 57.56" W. 104° 39' 42.13"



0 50 100 150
GRAPHIC SCALE IN FEET
SCALE: 1" = 150'

ATTACHMENT 4

SOILS REPORT
FOUNDATION DESIGN
COLVIN HERITAGE FARMS SUBDIVISION

Home
Foundation



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

SOILS REPORT

FOR

SEEGER HOMES

JOB #17-0660

11545 Green Acres Lane,
El Paso County,
Colorado

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "CE Milligan".

Charles E. Milligan, P.E.
Civil Engineer



TABLE OF CONTENTS

INTRODUCTION	1
CONCLUSIONS	1
GENERAL	1
FIELD AND LABORATORY INVESTIGATION	1
TOPOGRAPHY	2
WEATHER	2
DESIGN AND CONSTRUCTION CONSIDERATIONS	2 - 3
RECOMMENDATION REMARKS	3
COLD TEMPERATURE CONSIDERATIONS	3
SURFACE DRAINAGE	4
SUBSURFACE DRAINAGE	4
REINFORCING	4
FOOTING DESIGN	4
CONSTRUCTION DETAILS	4
MINIMUM MATERIALS SPECIFICATIONS	5
OPEN HOLE OBSERVATION	5
LOGS	6
SITE MAP	7
SIEVE ANALYSIS RESULTS	8
PERIMETER DRAIN SKETCH	9
LIMITATIONS	10

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 **Seeger Homes, builder on 11545 Green Acres Lane, 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 materials shall be designed for a loading of not greater than **5,000 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 (U.S.C. Classification Symbol SM). The unit weight of equivalent fluid soil pressure of this material is 40 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 July 21, 2017, at the location shown on the enclosed site map. The location of these test holes were determined by Seeger Homes. The test holes was 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 south-southwest at 6%.

WEATHER

The weather at the time of the soil examination consisted of partly cloudy skies with hot 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 this 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 site 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.**



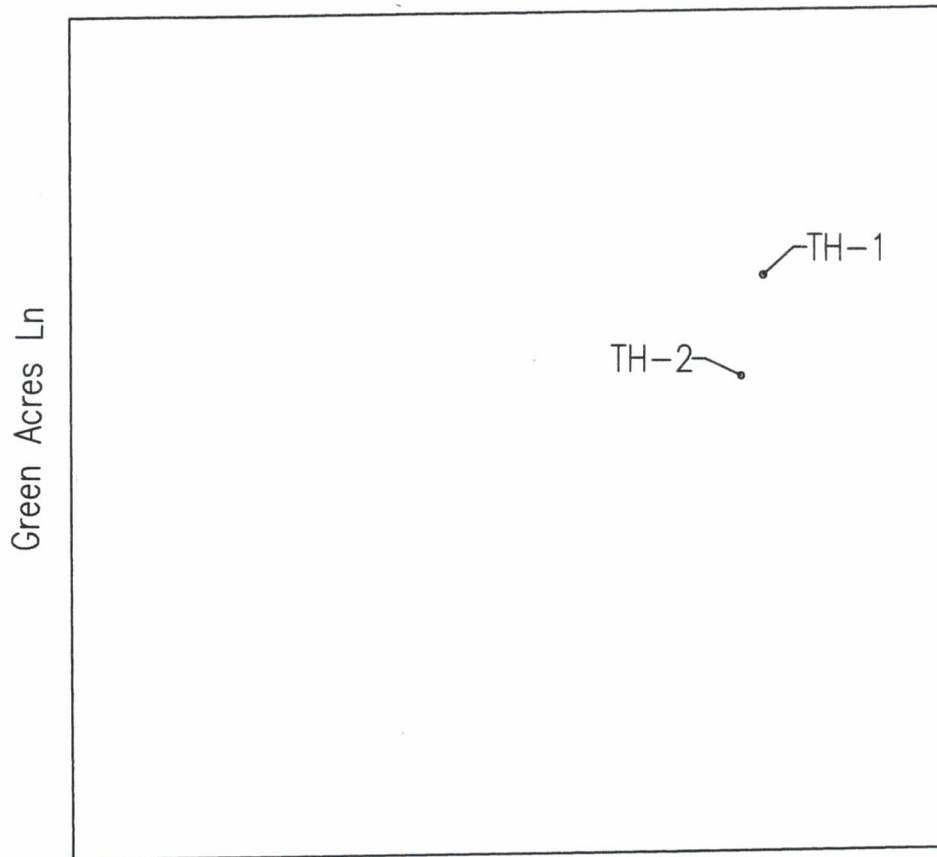
DRILL LOGS

JOB #: 17-0660	DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
TEST BORING NO.: TH-1						
DATE: 7/21/2017						
<u>0"-6" Topsoil</u>						
<u>6"-2' Sand</u>						
Fine-coarse grained Moderate density Moderate moisture content Low-moderate clay content Low plasticity Light Brown color	2					
	4			20 3"	6.6	SM
	6					
	8					
<u>2'- 15' Sandstone (SM)</u>	10					
Fine-coarse grained High density Moderate moisture content Low-moderate clay content Low plasticity Brown color	12			22 2"	7.1	
	14					
	16					
	18					
	20					

JOB #: 17-0660	DEPTH (in ft.)	SYMBOL	SAMPLES	BLOW COUNT	WATER %	SOIL TYPE
TEST BORING NO.: TH-2						
DATE: 7/21/2017						
<u>0"-6" Topsoil</u>						
<u>6"-2' Sand</u>						
Fine-coarse grained Moderate density Moderate moisture content Low-moderate clay content Low plasticity Light Brown color	2					
	4			20 3"	6.7	
	6					
	8					
<u>2'- 15' Sandstone (SM)</u>	10					
Fine-coarse grained High density Moderate moisture content Low-moderate clay content Low plasticity Brown color	12					
	14			Bag 12"	8.0	SM
	16					
	18					
	20					

GEOQUEST LLC
SITE MAP

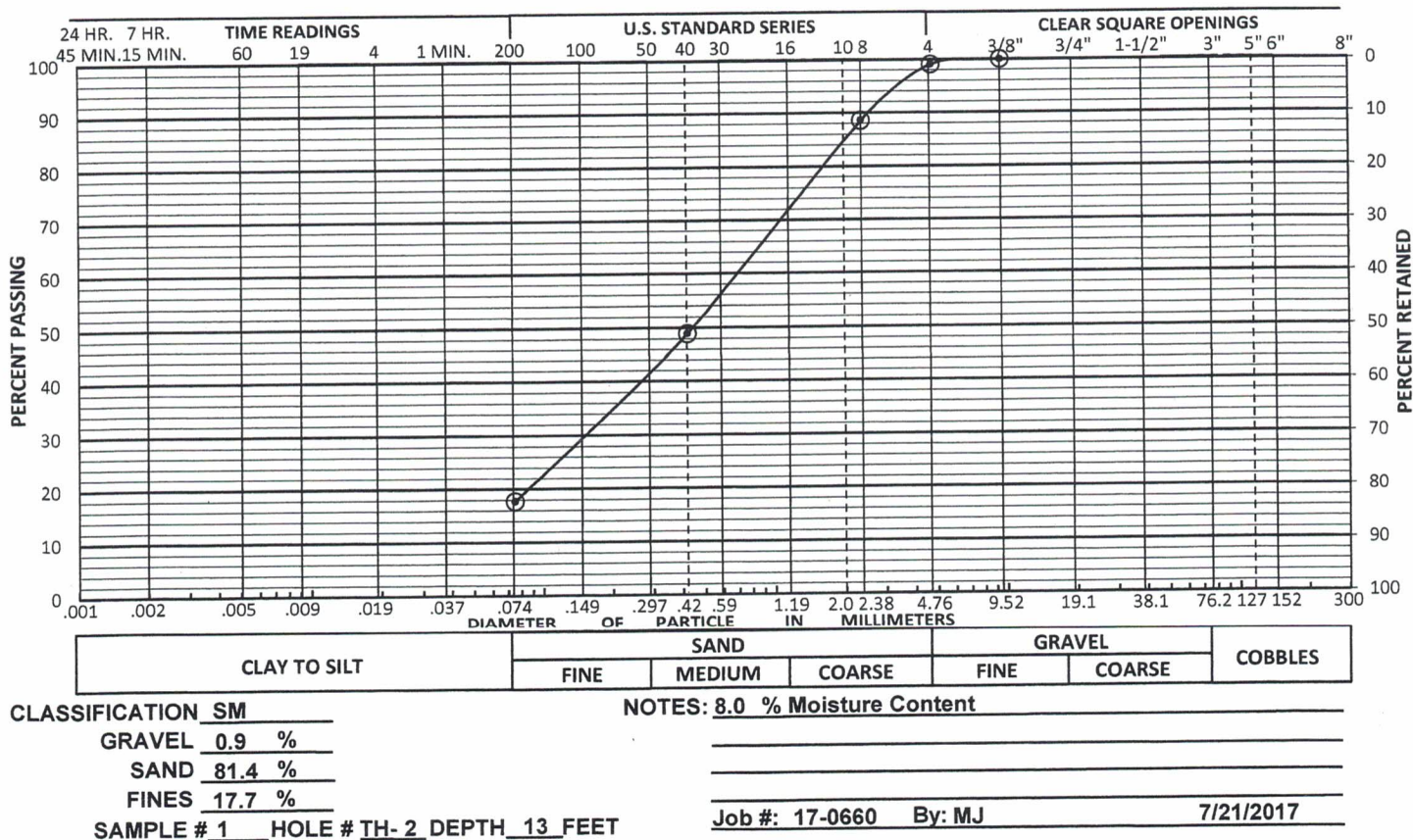
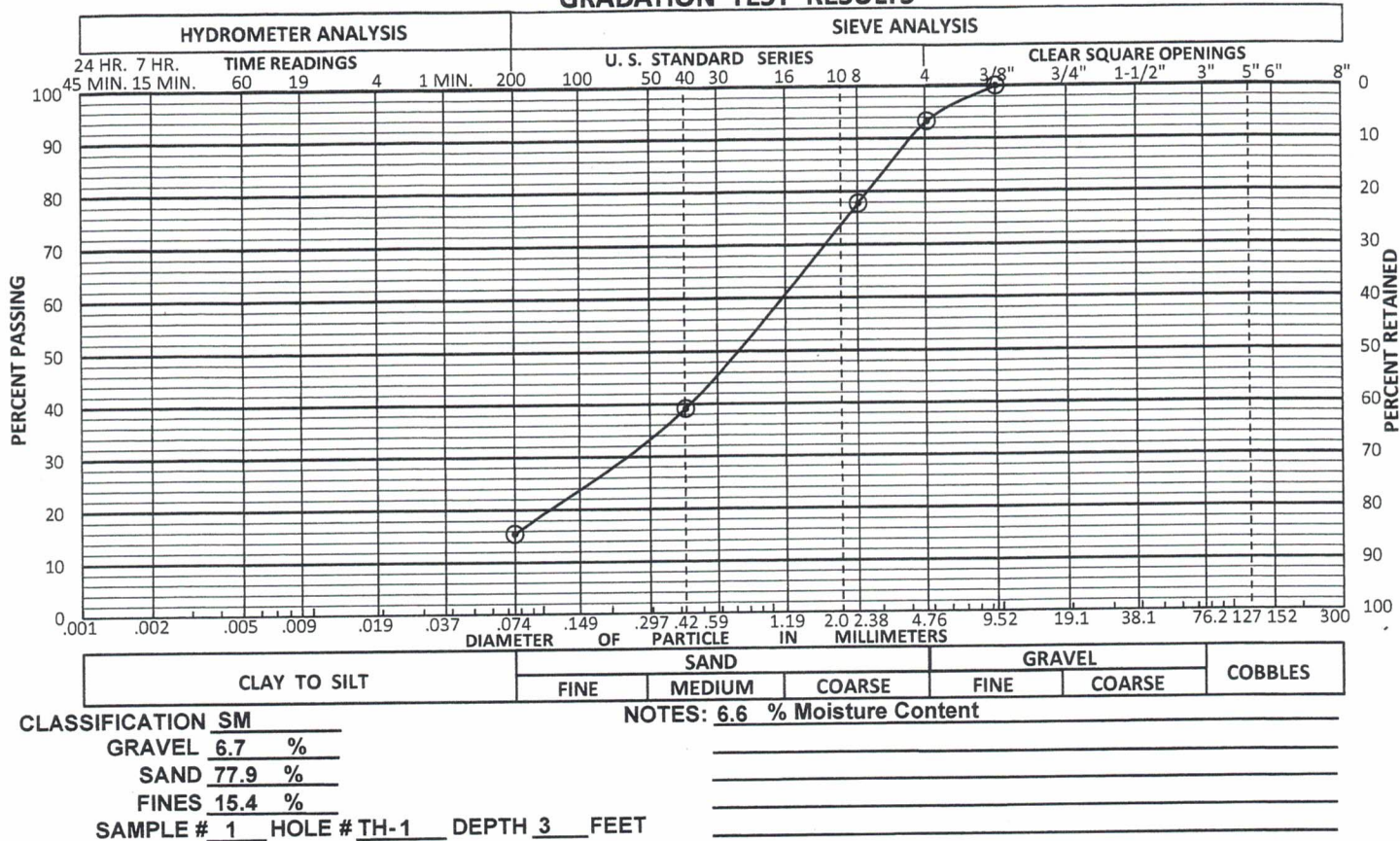
11545 Green Acres Ln
El Paso County,
Colorado,
Job #17-0660



0 50 100 150
GRAPHIC SCALE IN FEET
SCALE: 1" = 150'

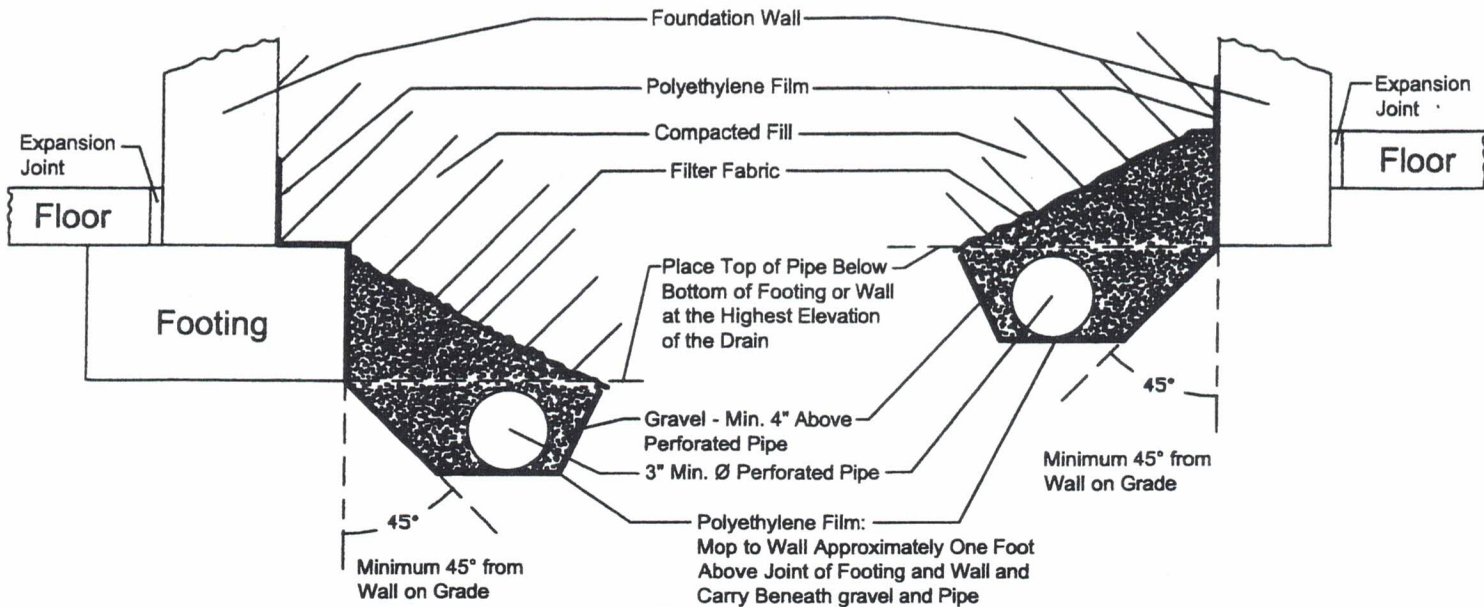
GEOQUEST LLC

GRADATION TEST RESULTS



SPREAD FOOTING TYPE

WALL ON GRADE TYPE



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"Ø and 4"Ø 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.