DRAINAGE LETTER

WOODMEN HILLS WASTEWATER FACILITY STORAGE

TRACT K MERIDIAN RANCH FIL NO. 1
9503 MERIDIAN RANCH BLVD
CITY OF COLORADO SPRINGS,
EL PASO COUNTY,
COLORADO

February 2025

Prepared for:
City of Colorado Springs, Colorado
Stormwater Enterprise
30 S. Nevada Avenue,
Colorado Springs, CO 80903

PCD File # xxx

Woodmen Hills Metropolitan District
8046 Easton Rd.
Peyton, CO 80831

Prepared by:

Matrix
2435 Research Parkway, Suite 300
Colorado Springs, CO 80920
(719) 575-0100
fax (719) 572-0208

Matrix Project No. 24.1462.001

Engineer's Statement:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____ _____

Jesse Sullivan Date
Registered Professional Engineer
State of Colorado
No. 55600

Owner/Developer's Statement:

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

Wally Eaves
Woodmen Hills Metropolitan District

By: _____ _____
Date

Title: Wastewater Enterprise Director

Address: 8046 Eastonville Rd
Peyton, CO 80831

El Paso County:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

_____ _____

Joshua Palmer, P.E.
County Engineer / ECM Administrator Date
Conditions:

I. Body of Report

a. General Property Description

The property is located at SEC30 T12S R64W, county of El Paso, State of Colorado at 9503 Meridian Ranch Blvd. It is currently a wastewater treatment facility with two lagoons and two existing buildings. To the west is Meridian Ranch Blvd., to the south is Stapleton Dr. to the north is a private access road, and to the east is a private access road. See the attached vicinity map for additional details. The drainage letter format is used because this site was previously analyzed in the Meridian Ranch Filing No. 1 FDR, the anticipated area of disturbance, and the proposed improvements are not part of a larger overall plan of development.

b. General Existing Drainage Characteristics (on and off site)

The proposed improvements are located within a parcel owned by the Woodmen Hill Metropolitan District. The parcel contains district wastewater treatment facilities. The subject area of improvement within this tract is currently undeveloped and sparsely vegetated. Under the existing conditions, sub-basin EX-1/DP3 (1.54 acres), which contains the proposed improvement area (0.47 acres), is estimated to generate 5 year flows of 0.3 cfs and 100 year flows of 2.3 cfs. The basin is bordered on the west and south by berms of 5-6 feet in height with 4:1 side slopes. Runoff is generally conveyed to the east at slopes ranging from 2-4 percent. The site is located in zone X, an area of minimal flood hazard, FIRM number 08041C0551G, dated 12/7/2018. Please see FIRMette with can be found in attachments.

Source: NRCS Soil Survey

Map Unit Symbol	Soil Unit Description	Hydrologic Classification	Percent of AOI
19	Columbine gravelly sandy loam	A	±100%

c. General Proposed Drainage Characteristics (on and off site)

The proposed improvements to the site include a building and gravel driveway and will disturb 0.46 acres. The proposed grading will divert flow around the building in both north and south directions in proposed swales. The northernly flowing swale will curve around the building at a 6.7% slope then flow southeast toward design point 1 (DP1).

The southernly flowing swale will curve around the building at a 6.5% slope then flow east towards DP1. DP1 is calculated based on basin A-1 as shown in proposed drainage map located in the attachments of this report. Basin A-1 with an area of 0.84 acres has 5 year storm flow of 0.6 cfs, and 100 year storm flow of 2.1 cfs. DP1 is a collection of the proposed grading area with building and driveway and contributing existing area. DP1 storm flows have been calculated using the rational method using an area of 0.84 acres. Those flows are 0.6 cfs for 5 year storm and 2.1 cfs for 100 year storm.

Basin A-2 is all undeveloped area and has average slopes between 2-4% with a defined low point where design point 2 is established. Basin A-2 is 0.69 acre area located on the proposed drainage map in attachments. Flows were calculated using the rational method 0.2 cfs for 5 year storm and 1.2 cfs for the 100 year storm.

Design point 2 (DP2) is found at the low point of the area being scrutinized and includes both basin A-1 and basin A-2. DP2 is an area of 1.54 acres and flows were calculated to be 0.6 cfs for 5 year

storm and 2.5 cfs for 100 year storm. Drainage calculations for pre and post development conditions can be found in the attachments.

d. **Drainage Fees**
Fees were paid at the time of original platting. No drainage fees are due at this time.

e. **Conclusions**
Comparing DP3 and DP2 there are increases of 0.3 cfs for the 5 year storm and 0.2 cfs for the 100 year storm. These amounts are negligible and confirm that the proposed building and gravel driveway will not negatively affect downstream infrastructure or developments.

Attachments:

1. Vicinity Map
2. Existing Drainage Map
3. Proposed Drainage Map
4. Hydraulic Calculations
5. FIRMette Map
6. Soils Report

References

City of Colorado Springs, Drainage Criteria Manual Volume 1 (DCM), (2014, Revised January 2021)

City of Colorado Springs, Drainage Criteria Manual Volume 2 (DCM), (2014, Revised December 2020)

Soil Survey of El Paso County Area, Colorado by USDA, NRCS

City of Colorado Springs, Subdivision Policy Manual – Part 1 (July 2010)

Mile High Flood Control District, Urban Storm Drainage Criteria Manual, Volume 1-3 (August 2018)

VICINITY MAP

VICINITY MAP

GRAPHIC SCALE

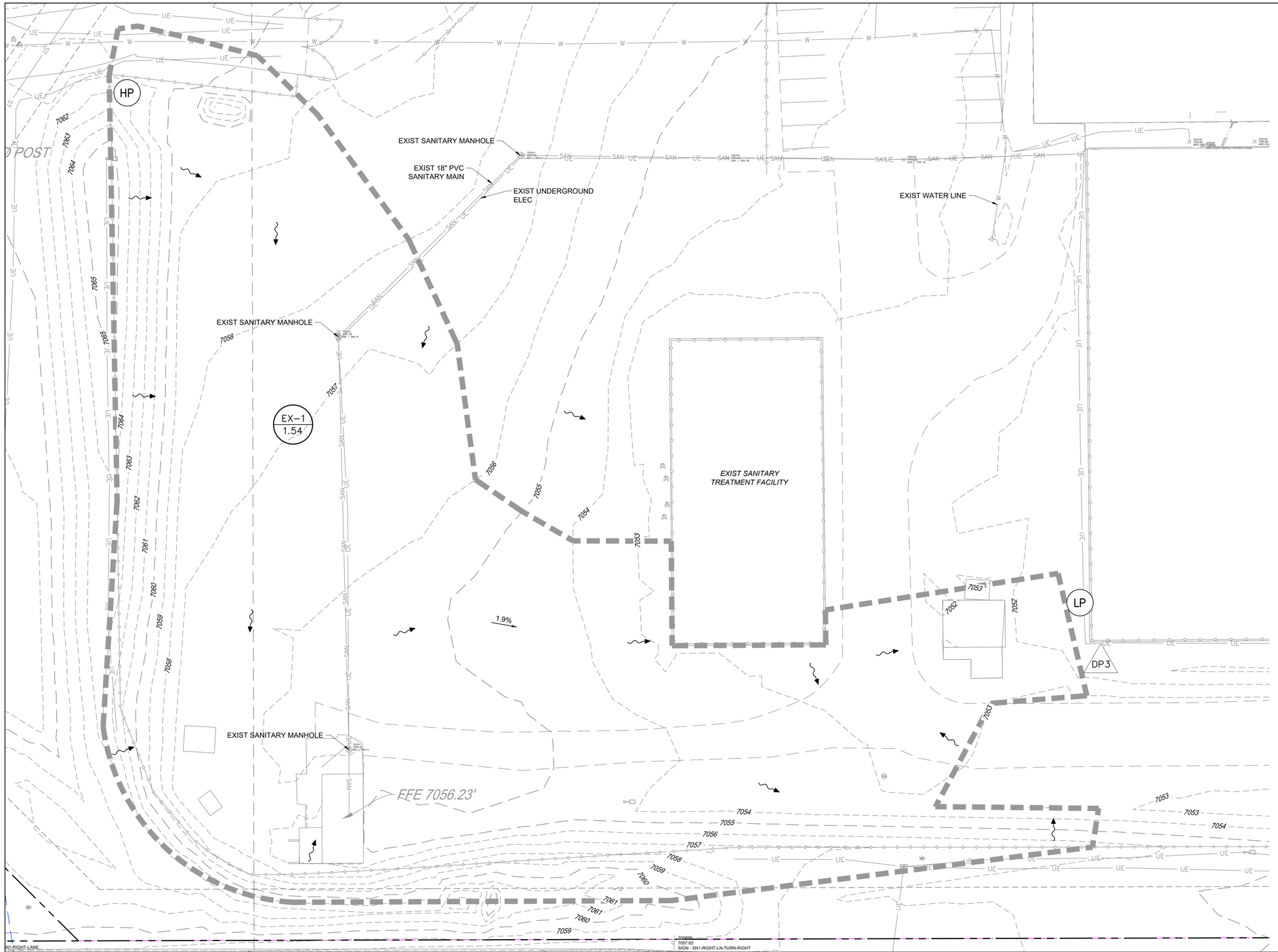
500' 0' 500' 1000'

(IN FEET)

1 inch = 500 ft.

N

EXISTING DRAINAGE MAP



Know what's **below.** **Call** before you dig.

GRADING LEGEND

- PROPERTY BOUNDARY LINE
- ADJACENT PROPERTY LINE
- PROPOSED EASEMENT LINE
- EXISTING EASEMENT LINE
- EXISTING CONCRETE CURB
- EXISTING CONTOURS (4000 / 4001)
- 1.8% SLOPE ARROW
- HP / LP HIGH POINT / LOW POINT
- EXISTING DRAINAGE BASIN BOUNDARY LINE
- EXISTING STORM PIPE
- x.x / x.x BASIN IDENTIFIER AND SIZE (AC)
- XXX PROPOSED DESIGN POINT

Basin and DP Summary Table			
Shiloh Take 5			
Area ID	Area (Acres)	Q5 (cfs)	Q100 (cfs)
EX-1	1.54	0.3	2.3
DP3	1.54	0.3	2.3

N

GRAPHIC SCALE

20' 0' 20' 40'

(IN FEET)
1 inch = 20 ft.

REFERENCE DRAWINGS

X-1462-EX-UTIL
X-1462-PR-SITE
X-1462-EX-MAP
X-1462-EX-BASE
X-MDG22x34

No.	DATE	DESCRIPTION	BY
##	##	##	##
##	##	##	##
##	##	##	##
##	##	##	##
##	##	##	##

REVISIONS

COMPUTER FILE MANAGEMENT

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CTB FILE: Matrix(black).ctb
PLOT DATE: February 18, 2025 9:58:38 AM
THIS DRAWING IS CURRENT AS OF PLOT DATE AND MAY BE SUBJECT TO CHANGE.

SHEET KEY

PREPARED BY:
Matrix
Excellence by Design

SEAL

PRELIMINARY
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FOR AND ON BEHALF OF MATRIX DESIGN GROUP, INC.
PROJECT No. 24.1462.001

WOODMEN HILLS WASTEWATER FACILITY STORAGE

EL PASO COUNTY
COLORADO SPRINGS, COLORADO

EXISTING DRAINAGE MAP

DESIGNED BY:	MDF	SCALE	DATE ISSUED:	FEBRUARY 2025	DRAWING No.
DRAWN BY:	KGI	HORIZ. 1" = 20'			
CHECKED BY:	JTS	VERT. N/A	SHEET	1 OF 2	1

PROPOSED DRAINAGE MAP

GRADING LEGEND

- PROPERTY BOUNDARY LINE
- ADJACENT PROPERTY LINE
- PROPOSED EASEMENT LINE
- EXISTING EASEMENT LINE
- PROPOSED CONTOURS (4000 / 4001)
- EXISTING CONTOURS (4000 / 4001)
- GRADING LIMITS
- SLOPE ARROW (1.8%)
- HIGH POINT / LOW POINT (HP / LP)
- PROPOSED DRAINAGE BASIN BOUNDARY LINE

- SUB BASIN DESIGNATION (x.x)
- BASIN IDENTIFIER AND SIZE (AC) (x.x)
- SUB BASIN AREA (AC.)
- PROPOSED DESIGN POINT (XXX)

Basin Summary Table
8th Street Take 5

Area ID	Area (Acres)	Q5 (cfs)	Q100 (cfs)
A-1	0.84	0.6	2.1
A-2	0.69	0.2	1.2
DP1	0.84	0.6	2.1
DP2	1.54	0.6	2.9

N

GRAPHIC SCALE
20' 0' 20' 40'
(IN FEET)
1 inch = 20 ft.

Know what's below. Call before you dig.

REFERENCE DRAWINGS
X-1462-PR-SITE
X-1462-EX-UTIL
X-1462-EX-MAP
X-MDG22x34
X-1462-EX-BASE

No.	DATE	DESCRIPTION	BY
##	##	##	##
##	##	##	##
##	##	##	##
##	##	##	##
##	##	##	##

REVISIONS

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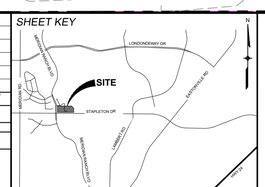

PREPARED BY:
Matrix
Excellence by Design

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PROJECT No. 24.1462.001

WOODMEN HILLS WASTEWATER FACILITY STORAGE

EL PASO COUNTY
COLORADO SPRINGS, COLORADO

PROPOSED DRAINAGE MAP

DESIGNED BY:	MDF	SCALE	DATE ISSUED:	FEBRUARY 2025	DRAWING No.
DRAWN BY:	KGI	HORIZ. 1" = 20'			
CHECKED BY:	JTS	VERT. N/A	SHEET	2 OF 2	2

HYDRAULIC CALCULATIONS

Rational Method - Existing Conditions

Project Name:	WOODMAN HILLS
Project Location:	STAPLETON DR N & MERIDIAN RD
Designer	JTS
Notes:	EXISTING AND PROPOSED CONDITIONS

Average Channel Velocity 4.00 ft/s (If specific channel vel is used, this will be ignored)
Average Slope for Initial Flow 0.04 ft/ft (If Elevations are used, this will be ignored)

Channel Flow Type Key
Heavy Meadow 2
Tillage/Field 3
Short Pasture and Lawns 4
Nearly Bare Ground 5
Grassed Waterway 6
Paved Areas 7

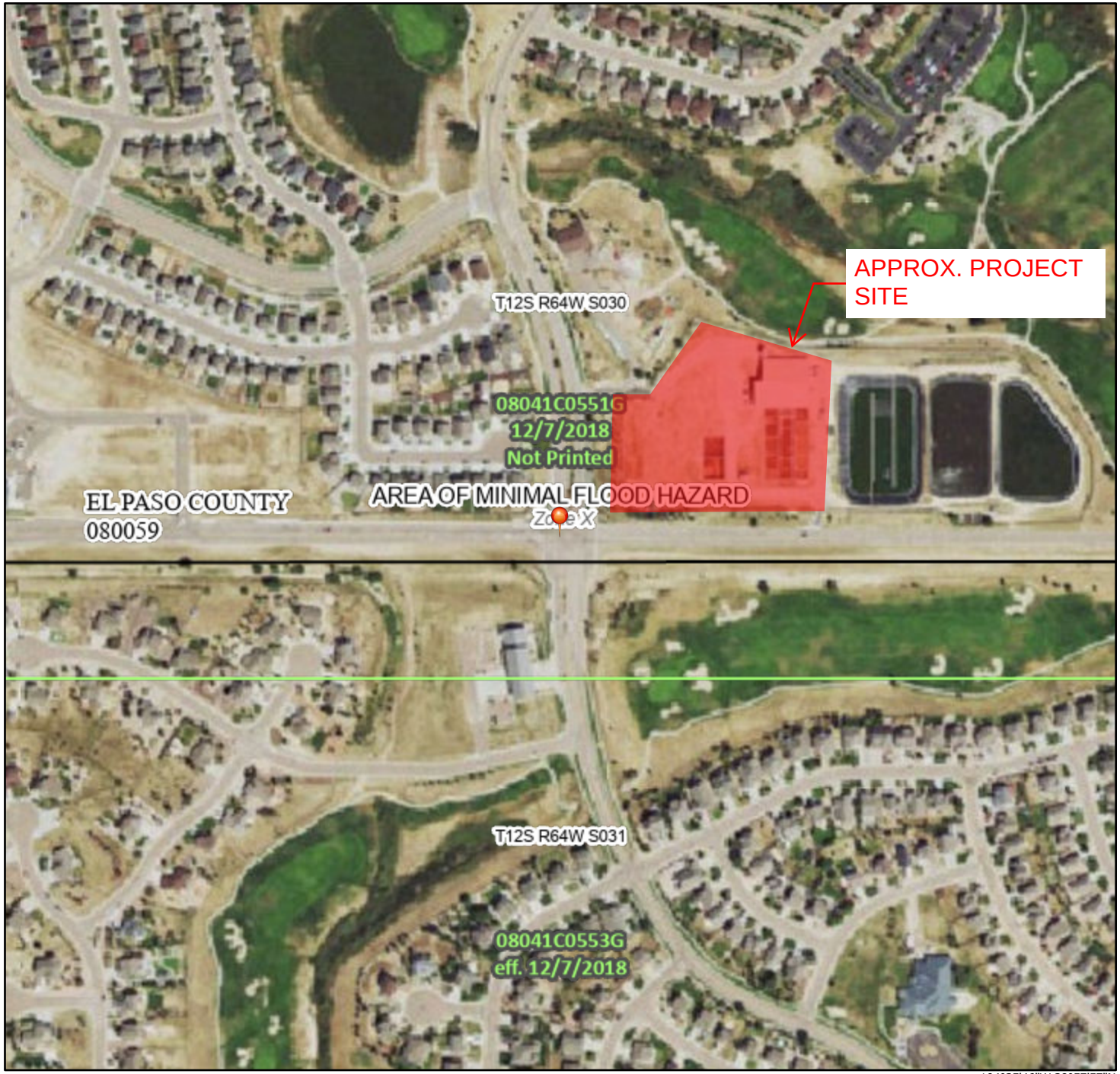
		Area				2%	90%	40%								Flow Lengths								Tc	Rainfall Intensity & Rational Flow Rate											
						Rational 'C' Values																														
Sub-basin	**Comments**				Soil Group	Undeveloped (2% Impervious)			Roof (90% Impervious)			Gravel (40% Impervious)			Composite		Percent Impervious	Initial	True Initial	Channel	True Channel	Average (decimal)	Initial	Average (%)	Channel Flow Type (See Key above)	Velocity	Channel	Total	i2	Q2	i5	Q5	i10	Q10	i25	Q25	i50	Q50	i100	Q100	**Sub-basin**
		sf	acres	Sq. Mi.		C5	C100		C5	C100	Area (SF)	C5	C100	Area (SF)	C5	C100		ft	Length ft	ft	Length ft	Slope	Tc (min)	Slope	Ground Type	(ft/s)	Tc (min)	(min)	in/hr	cfs	in/hr	cfs	in/hr	cfs	in/hr	cfs	in/hr	cfs	in/hr	cfs	
EX-1	***EXISTING CONDITIONS***	66880	1.54	0.0024	A	0.09	0.36	66880	0.73	0.81		0.30	0.50		0.09	0.36	2.0%	159	100	417	417	0.03	15.89	4.0	2	0.50	13.90	29.79	2.00	**0.28**	2.49	**0.3**	2.91	**0.40**	3.32	**1.85**	3.74	**2.08**	4.18	**2.3**	***EX-1***
DP1	***EXISTING DRAINAGE POINT***	66880	1.54	0.0024	A	0.09	0.36	66880	0.73	0.81		0.30	0.50		0.09	0.36	2.0%	159	100	417	417	0.03	15.89	4.0	2	0.50	13.90	29.79	2.00	**0.28**	2.49	**0.3**	2.91	**0.40**	3.32	**1.85**	3.74	**2.08**	4.18	**2.3**	***DP1***
A-1	***PROPOSED BASIN***	36642	0.84	0.0013	A	0.09	0.36	27376	0.73	0.81	4804	0.30	0.50	4462	0.20	0.44	18.2%	67	67	260	260	0.05	7.76	4.7	2	0.54	8.00	15.75	2.75	**0.47**	3.45	**0.6**	4.02	**0.68**	4.60	**1.70**	5.17	**1.91**	5.79	**2.1**	***A-1***
A-2	***PROPOSED BASIN***	30192	0.69	0.0011	A	0.09	0.36	30192	0.73	0.81		0.30	0.50		0.09	0.36	2.0%	128	100	192	192	0.03	14.26	2.5	2	0.40	8.10	22.35	2.34	**0.15**	2.92	**0.2**	3.41	**0.21**	3.90	**0.98**	4.38	**1.10**	4.91	**1.2**	***A-2***
DP1	***PROPOSED DRAINAGE POINT***	36642	0.84	0.0013	A	0.09	0.36	27376	0.73	0.81	4804	0.30	0.50	4462	0.20	0.44	18.2%	67	67	260	260	0.05	7.76	4.7	2	0.54	8.00	15.75	2.75	**0.47**	3.45	**0.6**	4.02	**0.68**	4.60	**1.70**	5.17	**1.91**	5.79	**2.1**	***DP1***
DP2	***PROPOSED DRAINAGE POINT***	66880	1.54	0.0024	A	0.09	0.36	57614	0.73	0.81	4804	0.30	0.50	4462	0.15	0.40	10.9%	159	100	417	476	0.03	14.95	4.0	2	0.50	15.87	30.81	1.96	**0.45**	2.44	**0.6**	2.85	**0.66**	3.26	**2.02**	3.66	**2.28**	4.10	**2.5**	***DP2***

FIRMette MAP

National Flood Hazard Layer FIRMette

FEMA

104°36'23"W 38°58'25"N



104°35'46"W 38°57'57"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

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
- NO SCREEN 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
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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 10/30/2024 at 7:14 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.

SOILS REPORT

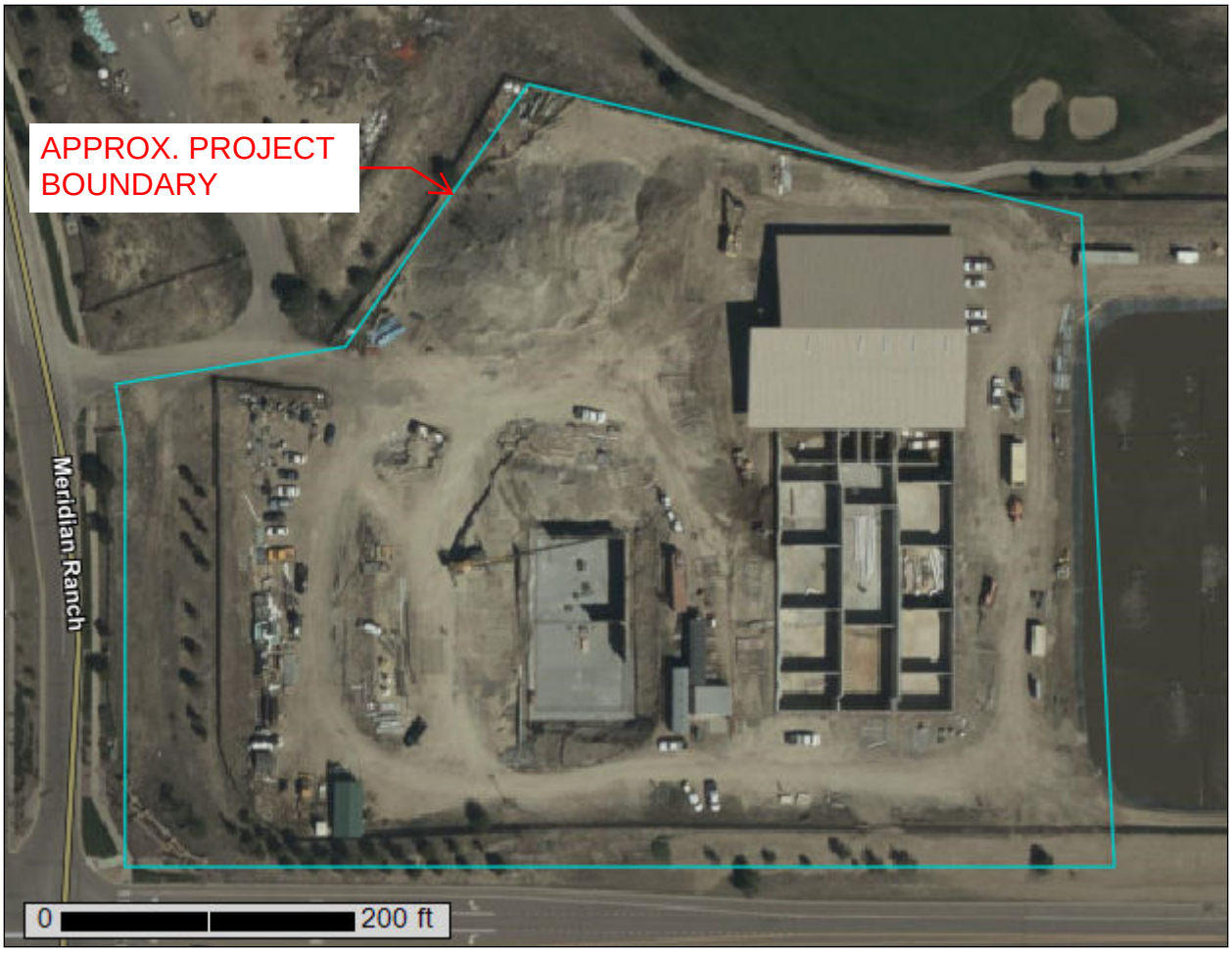
United States Department of Agriculture

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



October 30, 2024

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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Contents

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

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

Map Scale: 1:1,370 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 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 22, Sep 3, 2024

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

Date(s) aerial images were photographed: Sep 11, 2018—Oct 20, 2018

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
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	6.7	100.0%
Totals for Area of Interest		**6.7**	**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

19—Columbine gravelly sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 367p
Elevation: 6,500 to 7,300 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Columbine and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Columbine

Setting

Landform: Fans, fan terraces, flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 14 inches: gravelly sandy loam
C - 14 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquolls

Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

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