



Grandview Reserve Water Treatment Site Development Stormwater Management Plan (SWMP)

August 12, 2024

HR Green Project No: 201662.06

El Paso County No. XXX-XX

Prepared For (Applicant/Owner):

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Engineer's Statement

The Stormwater Management Plan was prepared under my direction and supervision and is correct to the best of my knowledge and belief. Said Plan has been prepared according to the criteria established by the County and State for Stormwater Management Plans.

Name: Greg Panza, P.E. Date: 08/12/2024

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I. Site Location & Description

Location

The Grandview Water Treatment site is located in unincorporated El Paso County, Colorado. The Grandview Reserve water treatment plant (referred to as the Project herein) is located downstream of the Grandview Reserve Filings 1-4. The Project resides near Falcon High School, approximately 2,500 feet northeast of the corner of Eastonville Rd and Londonderry Dr. The water treatment plant will service the potable water requirements of the future development, the Grandview Reserve, sponsored by Melody Homes, INC. This plant will receive extract water from two proposed nearby wells—Laramie Fox Hills well and Arapahoe well.

The site lies within a tract of land within Section 28 Township 12 South, Range 64 West of the 6th Principal Meridian, in El Paso County, State of Colorado. A Vicinity Map is included in **Appendix A**.

The site is bound by Eastonville Rd on the west and future road Kate Meadow Ln, its accessible side, on the east. The north project area is bounded by the future road, Brixham Dr, which the plant will eventually reside along. The south boundary reaches approximately 200 ft perpendicular to Brixham Dr in the southward direction.

A stream does not pass through the Project site; however, the closest stream is approximately 1,200 feet west of the water treatment plant project limits. The stream is Unnamed Tributary to Ellicott Consolidated, tributary to Black Squirrel Creek. The stream confluences with Black Squirrel Creek approximately 15 miles southeast of the Project site.

Description of Project

The Project is located on the southwest corner of the future intersection of Brixham Dr and Kate Meadow Ln. The Project consists of grading and building a water treatment plant that will serve the water requirements of a section of the future Grandview Reserve development. Additionally, the Project will involve the installation of water lines from the two onsite wells to the treatment plant. The existing groundcover is soil and vegetation which will be replaced by mulching and permanent erosion control for the majority of areas not covered by the proposed structure or future roadways.

There are no known irrigation facilities in the area. Temporary ground irrigation will be required to water designated area until vegetation is established. Once established, temporary irrigation will be disconnected at the valve box.

Construction Activity

The proposed project will be to build a water treatment plant along with the necessary piping from two nearby wells. The water lines from the wells will be implemented by trench excavation. The above ground area will be graded, and a foundation will be placed for the proposed water treatment facility. There will be some fill on the water treatment plant site to ensure adequate coverage of pipes and proper drainage of the site. None of the disturbed ground resides within a FEMA identified 100-year floodplain.

Construction will begin with setting up perimeter erosion control measures and construction fencing. Temporary erosion control measures such as silt fence, inlet protection, and vehicle tracking control will be installed prior to construction. A stabilized staging area will be located on site approximately 40 ft northwest of the proposed structure. A stockpile management area will be established with the stabilized staging area. A concrete washout area will be utilized to ensure proper disposal of all concrete. Once construction activities have been completed,

all areas not within limits of disturbance will receive seeding and mulching. Upon stabilization, permanent erosion control measures will be left in place such as erosion control blankets on the south and north edges of the water treatment plant site due to steeper slopes.

No off-site disturbance is anticipated. A temporary sediment basin will be located outside the Project site and limits of disturbance. The temporary sediment is part of the overall Grandview Reserve development. Refer to the Grandview Reserve development Grading and Erosion Control Plans and SWMP for more details.

Project area does not include any stream crossings. The closest stream to the Project is an Unnamed Tributary to Ellicott Consolidated. Best management practice (BMP) measures will minimize discharge flows into the Unnamed Tributary to Ellicott Consolidated.

II. Construction Phasing

Phasing and Sequence Schedule

The proposed sequence of major construction activities and Construction Control Measures for the Project are as follows:

1. Install VTC, SSA, SF and other perimeter erosion and stormwater control measures (i.e. construction fence, etc.) (Spring 2025/Summer 2025) All vehicles exiting the construction site must drive over the VTC to ensure on-site soil is not tracked off-site.
2. Clear grub and grade site for improvements. Install the initial phase control measures for perimeter control and temporary conditions stormwater diversion including silt fence. (Spring 2025/Summer 2025)
3. Landscaping, restoration and final stabilization. Ensuring final stabilization is achieved prior to site closure is to take place as part of a future full construction phasing SWMP and is not within the scope of this report.
4. Dispose of any waste in the location by means approved by the CDPHE.

Construction Documentation

Construction drawings are provided with this document showing the Erosion Control Plan for this project and are intended to be a “living” document used by the SWMP Manager to document construction activities. The location of the SWMP plans will be located on the SWMP map. See Appendix E for record log. There will be no dedicated batch plants used on this project.

III. Pre-Development Conditions and Soils

Existing Land-Use

The existing land cover is 100 percent vegetative cover, natural conditions, as evidenced by aerial imagery with a potential fraction of the area being dirt road. The existing vegetation includes native grasses, weeds, and shrubs.

Soils

According to the US Department of Agriculture Natural Resources Conservation Service Soil Survey of El Paso County, Colorado, the primary soil throughout the site is Type A Columbine gravely sandy loam. A report summary is provided in Appendix A.

The existing soil type has a slight potential for erosion which can be mitigated by employing appropriate downstream construction BMPs before/during/after construction to limit potential impacts to stormwater discharges. The potential impacts are sediment discharge into the existing Unnamed Tributary downstream of the Project site.

IV. Description of Potential Pollutants

Potential sources of sediment to stormwater runoff include earth moving and concrete activities associated with grading, implementing piping, and landscaping.

Potential pollutants and sources other than sediment to stormwater runoff include trash, debris, fueling and equipment failure. Materials of significance stored on the Project site include cement, trash & debris, fuels and oils.

Construction activities can produce a variety of pollutants that can potentially cause stormwater contamination. Grading activities remove rocks, vegetation and other erosion prohibiting surfaces and can result in the exposure of underlying soil to the elements, which can then be displaced into water sources.

Wind, erosion and vehicular transport can produce sediment debris. No control measures from other entities are to be employed by this construction project. Use of batch plants is not anticipated for this project.

Potential Sources of Pollution:

1. Potential sources of pollution from construction activities include:
 - a. Disturbed or stored soils
 - b. Vehicle tracking of sediment
 - c. Loading & unloading operations
 - d. Outdoor Storage activities
 - e. Vehicle and Equipment Maintenance/Fueling
 - f. Dust or Particulate Generating Processes
 - g. Routine maintenance activities involving fertilizers, pesticides, detergents, fuels, solvents etc.
 - h. On-site waste management (waste piles, liquid wastes, dumpsters)
 - i. Concrete truck/equipment washing (washing truck chute and associated fixtures)
 - j. Non-industrial waste (worker trash and portable toilets)
2. Non-stormwater discharges – no discharge from springs or landscape irrigation return flows are anticipated for this project.
 - a. Contractor must apply to the Colorado Department of Public Health and Environment for a Dewatering General Permit for any construction dewatering that will occur during the construction phase.
 - b. Any other non-stormwater discharges that the contractor determines are necessary during the construction phase shall be submitted to the Engineer of Record for approval prior to commencement.

- c. Temporary irrigation will be required to water designated area until vegetation is established. Once established, temporary irrigation will be disconnected at the valve box.
 - i. If temporary irrigation discharges from Project site, flow will drain onto the Grandview Reserve development. Therefore, the Grandview Reserve development SWMP will be adhered.

V. Areas and Volumes

The total site area is 1.4 acres, and the expected disturbed area is 1.4 acres. Portable toilets will be located a minimum of 10 feet from stormwater inlets and 50 feet from state waters. They will be secured at all four corners to prevent overturning and cleaned on a weekly basis. Portable toilets are to be inspected for spills daily.

VI. Self-Inspections

Self-inspections of the Construction Control Measures must be completed by the certified GEC Administrator. An erosion control inspection log with a signature sheet is to be kept onsite for the entirety of the construction process. The GEC Administrator is to affirm inspection by signing this log every time the Construction Control Measures are inspected. The below provides the minimum to satisfy the El Paso County self-inspection requirements. A more frequent self-inspection schedule may be required to ensure Control Measures are operating in compliance with the approved GEC plan.

1. Inspection Schedules:

- a. The GEC Administrator shall make a thorough inspection of the Control Measures:
 - i. At least once every fourteen (14) calendar days.
 - ii. Within 24 hours following any precipitation event (i.e. rain, snow, hail etc.) that causes surface erosion.
 - Alternatively, the GEC Administrator can perform a thorough inspection of the Control Measures once every seven (7) days and forego post-precipitation inspections.
- b. For sites where construction activities have completed and final stabilization measures installed but final stabilization has not yet been achieved, the GEC Administrator shall make a thorough inspection of the Control Measures:
 - i. At least once every month
 - ii. Within 72 hours following any precipitation event that causes surface erosion

2. Inspection Procedures:

- a. Site Inspection & Observation Items:
 - i. Limits of disturbance perimeter and stormwater discharge points
 - ii. All disturbed areas to ensure necessary Construction Control Measures are in place to control potential stormwater runoff.
 - iii. Areas used for material/waste storage.
 - iv. Any areas having a significant potential for storm water pollution (i.e., site entrances, concrete washout areas etc.)
 - v. All Construction Control Measures identified on the GEC plans.
- b. Inspection Requirements:
 - i. Determine any locations, or potential locations, where pollutants and stormwater may be exiting the site/entering the receiving waters.

- ii. Evaluate Construction Control measures and determine if they are constructed in accordance with the latest revision of the approved GEC plan and operate effectively.
 - iii. Provide recommendations for the need of additional Construction Control measures and the maintenance of existing measures in disrepair to ensure compliance with the El Paso County Stormwater Construction Manual.
 - c. Construction Control Measure Maintenance/Replacement:
 - i. The GEC administrator shall ensure sediment has been removed from perimeter controls and relocated to an area without the potential for sediment to discharge from the site.
 - ii. The GEC administrator shall ensure that failed Control Measures are repaired/reinstalled within three (3) calendar days, according to the El Paso County Stormwater Control Measure details, to ensure pollutants and/or sediment do not discharge from the site. GEC details are provided in Appendix B.
 - d. Documentation:
 - i. Update the GEC plan to document the installation/revision of Control Measures.
 - ii. Identify Control Measure deficiencies and that noncompliance is resolved within three (3) calendar days.
 - iii. Identify Self-Inspection schedule in most recent inspection form.
 - iv. Complete and submit Self-Inspection forms to the El Paso County within five (5) business days of the completed inspection.
 - v. Ensure Self-Inspections are available, either physically or electronically, throughout the duration of the Project
 - vi. Self-Inspection Report shall contain at least the following:
 - Inspection Date
 - Name, signature and title of the GEC Administrator performing inspection
 - Location(s) of illicit discharges of stormwater, sediment or pollutants from the site
 - Location(s) of Construction Control Measures in need of maintenance/repair
 - Location(s) of Construction Control Measures that failed to operate as designed or proved inadequate.
 - Location(s) of additional Construction Control Measures not shown in the latest, approved revision of the GEC plan.
 - Any deviations from the minimum inspection schedule

VII. Materials Handling

1. General Materials Handling Practices:
 - a. Potential pollutants shall be stored and used in a manner consistent with the manufacturer's instructions in a secure location. To the extent practical, material storage areas should be located away from storm drain inlets and should be equipped with covers, roofs or secondary containment as required to prevent stormwater from contacting stored materials. Chemicals that are not compatible shall be stored in segregated areas so that spill materials cannot combine and react.
 - b. Disposal of materials shall be in accordance with the manufacturer's instructions and applicable local, state, and federal regulations.
 - c. Materials no longer required for construction shall be removed from the site as soon as possible.

- d. Adequate garbage, construction waste, and sanitary waste handling and disposal facilities shall be provided as necessary to keep the site clear of obstruction and Control Measures clear and functional. All storage methods, including bins and containers shall be checked on a daily basis to ensure no possibility of leakage is occurring or overflow will occur. Bins and containers shall be emptied prior to fill reaching 80% of capacity.
2. Specific Materials Handling Practices:
 - a. All pollutants, including waste materials and demolition debris, that occur onsite during construction shall be handled in a way that does not contaminate stormwater.
 - b. All chemicals including liquid products, petroleum products, water treatment chemicals, and wastes stored onsite shall be covered and protected from vandalism.
 - c. Maintenance, fueling, and repair of all equipment and vehicles involving oil changes, hydraulic system drain down, degreasing operation, fuel tank drain down and removal, and other activities which may result in the accidental release of contaminants, shall be conducted under cover during wet weather and on an impervious surface to prevent release of contaminants onto the ground. Materials spilled during maintenance operations should be cleaned up immediately and properly disposed of.
 - d. Wheel wash water shall be settled and discharged onsite by infiltration.
 - e. Application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Follow manufacturer's recommendations for application rates and procedures.
 - f. pH-modifying sources shall be managed to prevent contamination of runoff and stormwater collected onsite. The most common sources of pH-modifying materials are bulk cement, cement kiln dust (CKD), fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, and concrete pumping and mixer washout waters.

VIII. Spill Prevention & Response Plan

1. The primary objective in responding to a spill is to quickly contain the material and prevent or minimize their mitigation into stormwater runoff and conveyance systems. If the release has impacted onsite stormwater, it is critical to contain the released materials onsite and prevent their release into receiving waters.
2. Spill Response Procedures:
 - a. Notify site superintendent immediately when a spill, or the threat of a spill, is observed. The superintendent shall assess the situation and determine the appropriate response.
 - b. If spills represent an imminent threat of escaping onsite facilities and entering the receiving waters, site personnel shall respond immediately to contain the release and notify the superintendent once the situation has stabilized.
 - c. The site superintendent shall be responsible for completing a spill reporting form and for reporting the spill to the appropriate agency.
 - d. Spill response equipment shall be inspected and maintained as necessary to replace any materials used in spill response activities.
3. Spill kits shall be on-hand at all fueling sites. Spill kit locations shall be reported to the GEC administrator.
4. Absorbent materials shall be on-hand at all fueling areas for use in containing advertent spills. Containers shall be on-hand at all fueling sites for disposal of used absorbents.

5. Recommended components of spill kits include the following:
 - a. Oil absorbent pads
 - b. Oil absorbent booms
 - c. 55-gallon drums
 - d. 9-mil plastic bags
 - e. Personal protective equipment including gloves and goggles
6. Concrete wash water: unless confined in a pre-defined, bermed containment area, the cleaning of concrete truck delivery chutes is prohibited at the job site.
7. Notification procedures:
 - a. In the event of an accident or spill, the GEC administrator shall be notified.
 - b. Depending on the nature of the spill and material involved, the Colorado Department of Public Health and Environment, downstream water users, or other agencies may also need to be notified.
 - c. Any spill of oil which 1) violates water quality standards, 2) produces a “sheen” on a surface water, or 3) causes a sludge or emulsion, or any hazardous substance release, or hazardous waste release which exceeds the reportable quantity, must be reported immediately by telephone to the National Response Center Hotline at (800) 424-8802.

IX. Implementation of Control Measures

Stormwater control measures must be installed according to El Paso County design specifications, presented in Appendix D, and the approved Grading and Erosion Control plan this report supports. Within the context of this SWMP’s construction activities the following control measures, at a minimum, are required:

- Perimeter Silt Fence
- Vehicle Tracking Control
- Stabilized Staging Area
- Concrete Washout
- Stockpile Management
- Rock Socks
- Erosion Control Blanket

Additional control measures may be required at the discretion of the County Stormwater Inspector.

The control measures used on this Project site will not rely on another entity. All control measures used will be owned and operated by the Project permittee and GEC administrator.

Additional control measures will be located outside the Project site, such as sediment basins and additional silt fences. These control measures will be owned and operated by the Grandview Reserve development (entity), refer to Grandview Reserve development erosion control plans for more details. The Project is accountable for abiding to the Grandview Reserve development SWMP.

X. Final Stabilization & Long-Term Stormwater Management Plan

1. Final stabilization for the Project site will be achieved at the time of final stabilization of the Grandview Reserve Filing No. 1. Refer to the Grandview Reserve development SWMP, final erosion control plans, and landscaping plans for more detail.
2. See approved landscaping plans for final stabilization details. Final stabilization is met when 70% of pre disturbance levels, not including noxious weeds, are stabilized. Final stabilization must be achieved prior to removal of temporary stormwater control measures. The anticipated date of final stabilization is Summer 2025; however, this is subject to change. See below for seeding and mulching details:
 - a. Prior to seeding, fill any eroded rills and gullies with topsoil.
 - b. Ensure all areas are seeded and mulched per the County Stormwater Construction Manual.
 - c. Continue monthly self-inspections of final stabilization methods and the stormwater management system to ensure proper function. If repairs are needed, reseed and re-mulch as needed.
 - d. Control noxious weeds in a manner acceptable to the GEC inspector.
 - e. Seed Mix: See Landscape Architecture Construction Documents for approved seed mixes.
 - f. Seeding Requirements:
 - i. Drill seed whenever possible, seed depth must be 1/3 to 1/2 inch when drill-seeding. Cross drilling should be used whenever possible with the seed divided between the two operations. The second drilling should be perpendicular to the first.
 - ii. When drill seeding is not possible or on slopes greater than 3:1, hydro-seeding with tackifier may be substituted at the discretion of the GEC inspector. Hydro-seeding must be lightly raked into soil. Seeding rates are presented in Appendix D.
 - iii. All seeded areas must be mulched.
 - g. Mulching Requirements:
 - i. Mulching shall be completed as soon as practical after seeding but no more than fourteen (14) days after planting. Erosion control blankets can be used in place of the below mulching methods.
 - ii. Hay or straw mulch:
 1. Only certified weed-free and certified-seed free mulch may be used. Must be applied at 2 tons/acre and adequately secured.
 2. Crimping shall not be used on slopes greater than 3:1, tackifier must be used in place.
 - iii. Hydraulic mulching:
 1. Allowable on steep slopes or areas with limited access
 2. If hydro-seeding is used, mulching must be applied secondarily.
 3. Wood cellulose fibers mixed with water must be applied at a rate of 2,000-2,500 lbs/acre, and tackifier applied at a rate of 100 lbs/acre.
3. Prior to the entire Grandview Reserve site closure, final grading and erosion control stabilization should be achieved. Final stabilization for the Grandview Reserve development is not within the scope of this report. For final stabilization of the Grandview Reserve development refer to the SWMP and construction documents for the Grandview Reserve development.



4. Long-term stormwater management will be mitigated and managed by the permanent stormwater detention ponds located on the Grandview Reserve development. For more details, review the construction documents for the stormwater structures on the Grandview Reserve development.

XI. References

El Paso County – Drainage Criteria Manual, latest revision October 31, 2018

El Paso County – Engineering Criteria Manual, latest revision October 14, 2020

Mile High Flood District Urban Storm Drainage Criteria Manual Volumes 1, 2, and 3; latest revisions



Grandview Reserve
Water Treatment Plant Development
Stormwater Management Plan
Project No.: 201662.06
El Paso County, Colorado

APPENDIX A – VICINITY MAP & NRCS SOIL SURVEY & FEMA MAP

Legend

FEMA Flood Hazard
Areas

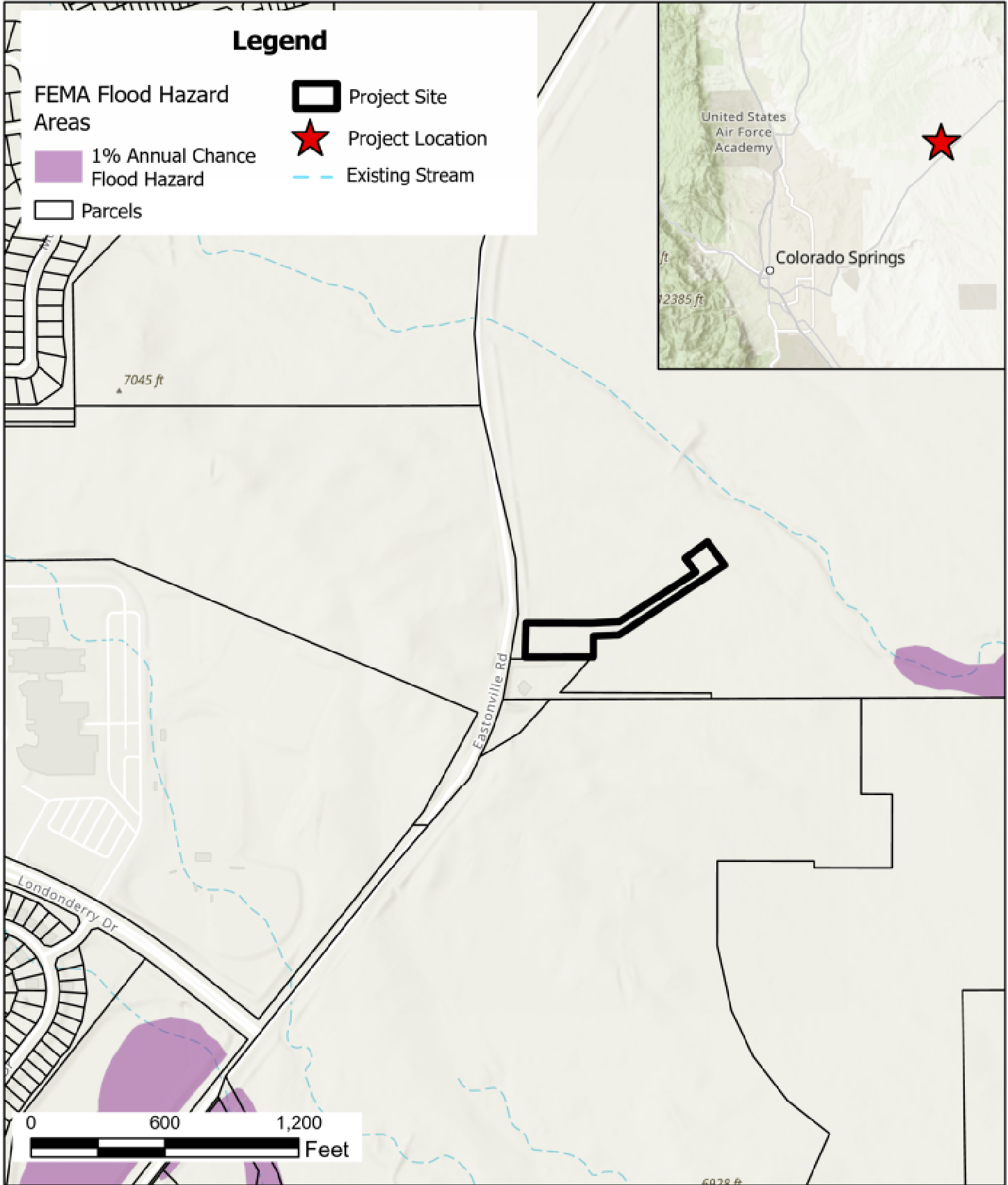
1% Annual Chance
Flood Hazard

Parcels

Project Site

Project Location

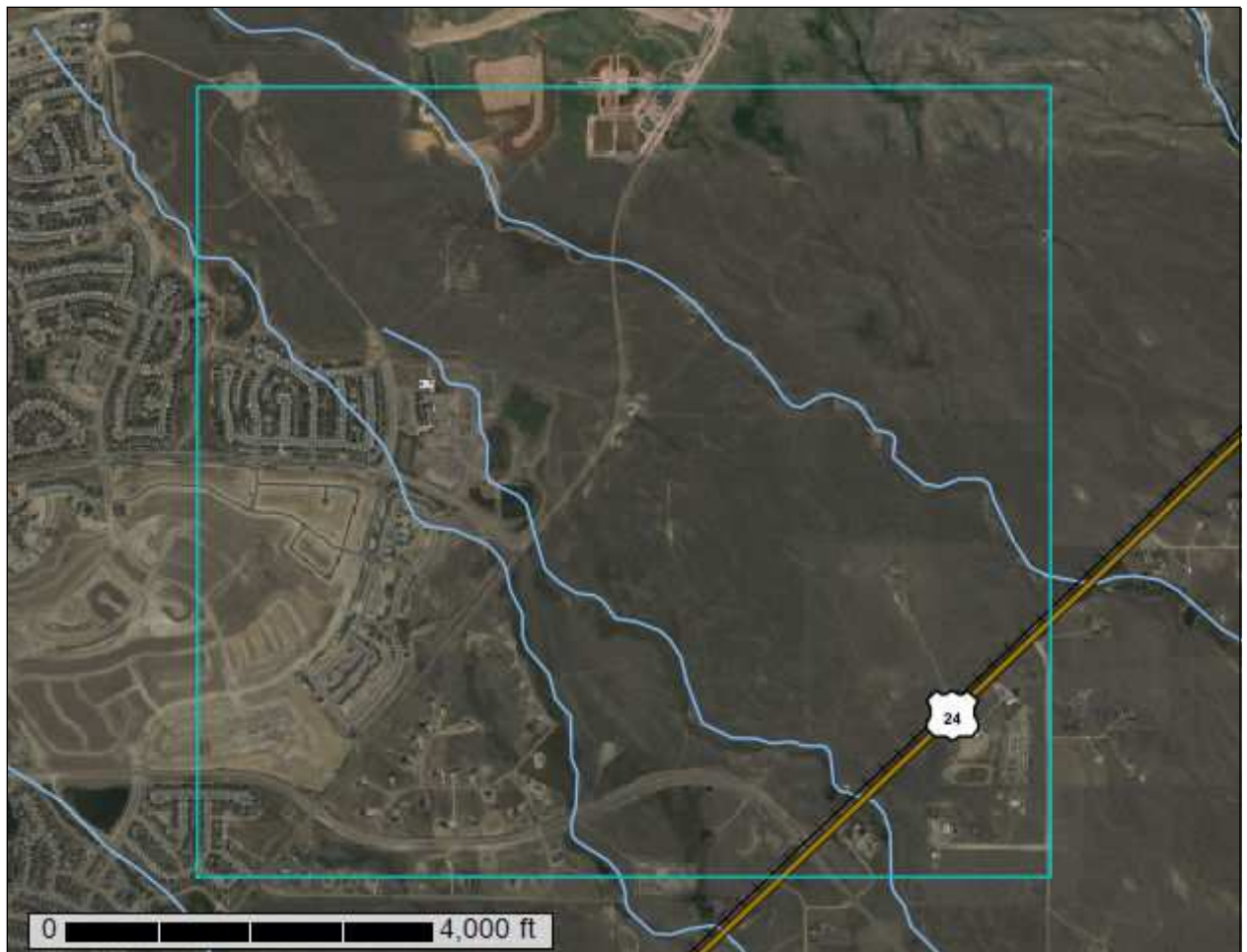
Existing Stream



SWMP Plan Grandview Water Treatment Plant
Vicinity and FEMA Map



Custom Soil Resource Report for El Paso County Area, Colorado



Preface

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

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

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

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

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

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

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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

Custom Soil Resource Report

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

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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.

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MAP LEGEND

	Area of Interest (AOI)		Spoil Area
	Area of Interest (AOI)		Stony Spot
	Soil Map Unit Polygons		Very Stony Spot
	Soil Map Unit Lines		Wet Spot
	Soil Map Unit Points		Other
	Special Point Features		Special Line Features
	Blowout		Water Features
	Borrow Pit		Streams and Canals
	Clay Spot		Transportation
	Closed Depression		Rails
	Gravel Pit		Interstate Highways
	Gravelly Spot		US Routes
	Landfill		Major Roads
	Lava Flow		Local Roads
	Marsh or swamp		Background
	Mine or Quarry		Aerial Photography
	Miscellaneous Water		
	Perennial Water		
	Rock Outcrop		
	Saline Spot		
	Sandy Spot		
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slip		
	Sodic Spot		

MAP INFORMATION

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

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 21, Aug 24, 2023

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—Jun 12, 2021

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
8	Blakeland loamy sand, 1 to 9 percent slopes	25.7	1.4%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	983.3	53.8%
83	Stapleton sandy loam, 3 to 8 percent slopes	819.0	44.8%
Totals for Area of Interest		1,828.0	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

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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

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369v
Elevation: 4,600 to 5,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Hills, flats
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: 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
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 1 percent

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Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

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: Flood plains, fan terraces, fans

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

83—Stapleton sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 369z

Elevation: 6,500 to 7,300 feet

Mean annual precipitation: 14 to 16 inches

Mean annual air temperature: 46 to 48 degrees F

Frost-free period: 125 to 145 days

Farmland classification: Not prime farmland

Map Unit Composition

Stapleton and similar soils: 97 percent

Minor components: 3 percent

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

Description of Stapleton

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

A - 0 to 11 inches: sandy loam

Bw - 11 to 17 inches: gravelly sandy loam

C - 17 to 60 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

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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 supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B

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

Soil Information for All Uses

Soil Properties and Qualities

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

Soil Qualities and Features

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

Hydrologic Soil Group

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

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

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

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

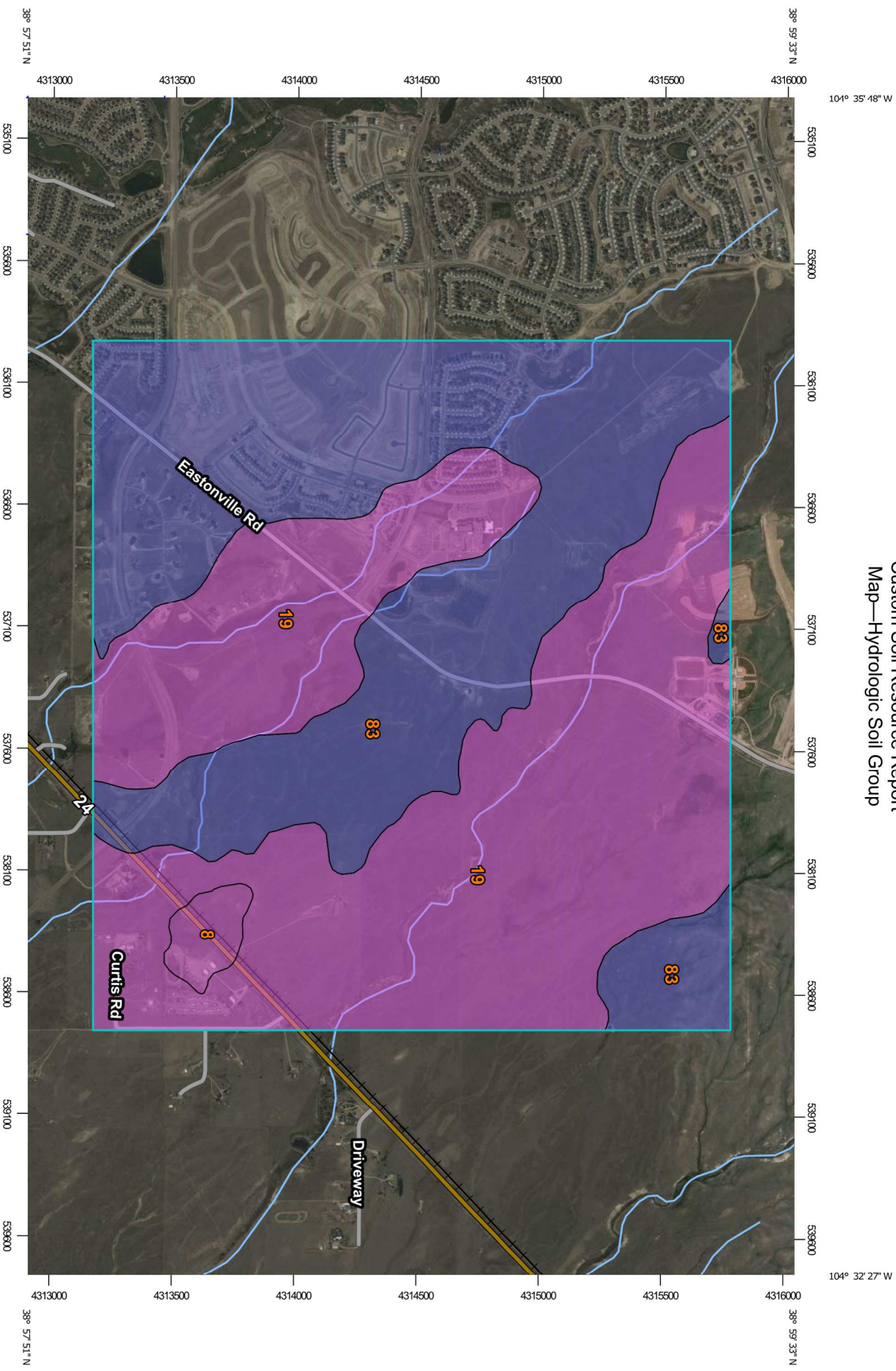
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Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water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

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

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

Custom Soil Resource Report Map—Hydrologic Soil Group



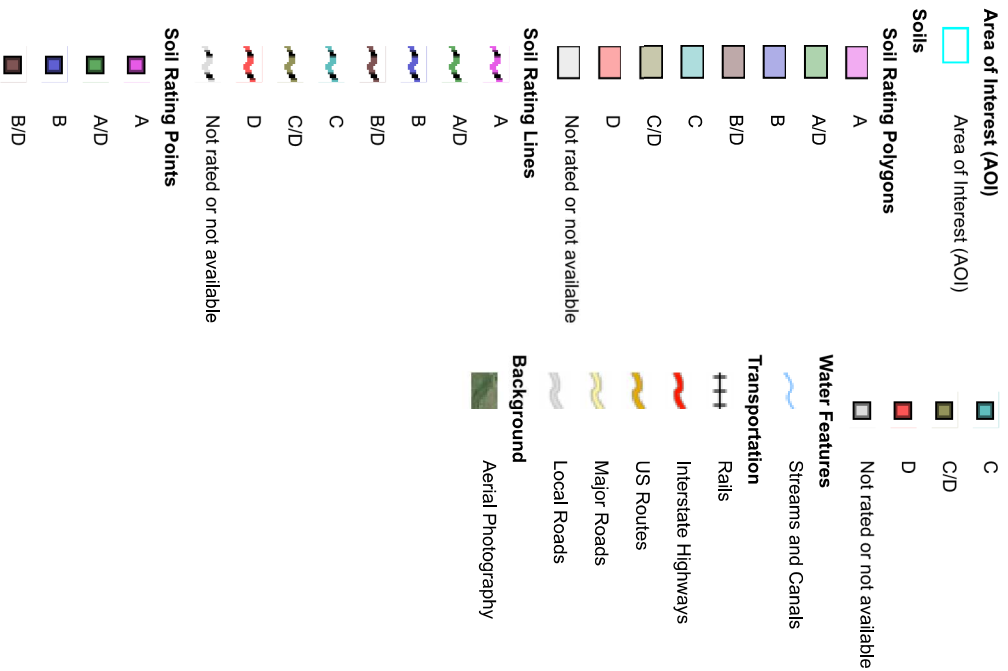
Map Scale: 1:22,100 if printed on A landscape (11" x 8.5") sheet.

0 300 600 1200 1800 6000
Meters

0 1000 2000 4000 6000
Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND



MAP INFORMATION

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

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

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

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Soil Survey Area: El Paso County Area, Colorado
 Survey Area Data: Version 21, Aug 24, 2023

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—Jun 12, 2021

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	25.7	1.4%
19	Columbine gravelly sandy loam, 0 to 3 percent slopes	A	983.3	53.8%
83	Stapleton sandy loam, 3 to 8 percent slopes	B	819.0	44.8%
Totals for Area of Interest			1,828.0	100.0%

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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=stelprdb1043084>

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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



APPENDIX B – GEC PLANS



APPENDIX C – EL PASO COUNTY CONSTRUCTION CONTROL MEASURES



APPENDIX D – SPILL PREVENTION PLAN



APPENDIX E – SWMP REPORT REVISION LOG

