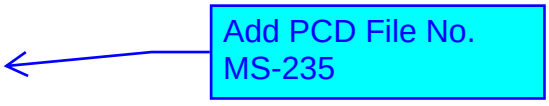
Final Drainage Report

Double Spur Ranch
Minor Subdivision
12420 Meridian Rd,
Colorado Springs, CO 80908

Prepared for (Owner):
Joan M Hathcock
12420 Meridian Rd,
Colorado Springs CO, 80908
(719) 466-1096

Prepared by:
Kimley-Horn and Associates, Inc.
2 North Nevada Avenue, Suite 300
Colorado Springs, Colorado 80903
Contact: Kevin Kofford, P.E.
(719) 453-0181

Project #: 196518000



Prepared: July 11th, 2022

Kimley»Horn

CERTIFICATION

ENGINEERS 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.

SIGNATURE (Affix Seal): _____

Kevin Kofford, Colorado P.E. No. 57234 Date

DEVELOPER'S STATEMENT

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

_____
Name of Developer

_____
Authorized Signature Date

_____
Printed Name

_____
Title

_____
Address:

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. Date
Interim County Engineer / ECM Administrator

Conditions:

TABLE OF CONTENTS

INTRODUCTION

PURPOSE AND SCOPE OF STUDY

The purpose of this Final Drainage Report (FDR) is to provide the hydrologic and hydraulic calculations and to document and finalize the drainage design methodology in support of the proposed Double Spur Ranch Minor Subdivision ("the Project") located at 12420 Meridian Road ("the Property") for Joan M. Hathcock. The Project is located within the jurisdictional limits of El Paso County ("the County"). Thus, the guidelines for the hydrologic and hydraulic design components were based on the criteria for the County and City of Colorado Springs, described below.

GENERAL PROJECT DESCRIPTION

The Project site is a part of the Double Spur Ranch Minor Subdivision and is located in a portion of the northeast quarter of the northeast quarter of Section 13, Township 12 south, Range 65 west in the 6th P.M., in El Paso County, Colorado (see Vicinity Map in Appendix A). More specifically, the site is located at 12420 N. Meridian Rd, Colorado Springs, CO 80908 ("Site"). The Site is bounded Meridian Road to the east and is surrounded by privately owned, unplatted properties in each direction. The Property is mostly vacant but contains one single family house, and five (5) auxiliary structures including buildings and sheds.

The Property is to be replatted as 3 individual lots. Lot 1 (northwest region of the property) being 6.835 acres, Lot 2 (central/northeast region of the property) being 27.345 acres, and Lot 3 (southern/southwestern region of the property) being 5.654 acres. Stormwater will ultimately outfall to Black Squirrel Creek.

The headwaters for Black Squirrel Creek are just west of the Site and Black Squirrel Creek passes through the Site. Snipe Creek also passes through the property to the north and converges with Black Squirrel Creek on the Site. East of the convergence point, Black Squirrel Creek passes under Meridian Road through a 96" corrugated metal pipe (CMP) culvert.

The Property is currently owned by Joan M. Hathcock. The Final Plat / Survey for the Double Spur Ranch Minor Subdivision was completed on January 17, 2022, by Land Development Consultants, Inc. This is the basis for design for the drainage map and report.

PROJECT CHARACTERISTICS

The Project Site is 40 acres in size. The Project involves the division of property into three single family lots ranging in size from 5.6 acres to 27.4 acres. The existing total impervious area of the site is approximately 2.36 acres, including the existing single-family home, five buildings / sheds, and gravel driveway providing access to and from Meridian Rd. The Site is heavily wooded with pine trees covering about 80% of the Site.

The existing Project Site generally slopes from west to east and towards Black Squirrel Creek, which meanders throughout the Property, centrally, from west to east. Slopes vary from 2% - 10% in grade, forming drainage basins A and B and conveying runoff towards Black Squirrel Creek eastwards. Black Squirrel Creek flows below Meridian road, east of the property, through a large, corrugated metal pipe (approximately 96") culvert. The drainageways leading up to the culvert are well vegetated and minimally eroded. See Appendix G for pictures of the existing drainageway and existing 96" CMP culvert. The existing culvert is in good condition and does not require cleaning of sediment of debris. There are no irrigation facilities located within the Site.

DRAINAGE BASIN PLANNING STUDY INFRASTRUCTURE AND ANALYSIS

The Property is located in the Upper Black Squirrel major drainage basin and is tributary to Black Squirrel Creek. There has been no Drainage Basin Planning Study performed for the watershed and there are no other existing drainage reports for the Site.

SOILS CONDITIONS

NRCS soil data is available for this Site and it has been noted that onsite soils are USCS Type B. The NRSC Soils map has been provided in Appendix B.

DRAINAGE DESIGN CRITERIA

DEVELOPMENT DESIGN CRITERIA REFERENCE AND CONSTRAINTS

The report is to be in compliance with the City of Colorado Springs and El Paso County "Drainage Criteria Manual (DCM)" dated October 2018 ("the MANUAL"), El Paso County "Engineering Criteria Manual" ("the Engineering Manual"), Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs Drainage Criteria Manual dated May 2014 ("the Colorado Springs MANUAL").

HYDROLOGIC CRITERIA

The 5-year and 100-year design storm events were used in determining rainfall and runoff for the proposed drainage scenario per Chapter 6 of the CRITERIA. Table 6-2 of the CRITERIA is the source for rainfall data for the 5-year and 100-year design storm events. Design runoff was calculated using the Rational Method for developed conditions as established in the CRITERIA and MANUAL. Runoff coefficients for the proposed development were determined using Table 6-6 of the CRITERIA by calculating weighted impervious values for each specific site sub-basin.

Included as a part of the hydrologic calculations is a StreamStats Streamflow Statistics Survey, located in Appendix C. Flow statistics were obtained to estimate the flows of Black Squirrel Creek and Snipe Creek at the western and northern entrance to the site. StreamStats information were obtained for Black Squirrel Creek as the drainage-way outfalls beneath Meridian Rd through the existing CMP culvert. Given there is no DBPS for the site, StreamStats flow data was obtained and utilized to better estimate the developed flows through the site during the minor and major storm events.

HYDRAULIC CRITERIA

Applicable design methods were utilized to verify culverts sizes, and drainage channels, which includes the use of the rational calculations spreadsheet and FlowMaster, V8i software.

Existing drainage features on-site have been analyzed for the following design storm events:

- Major Storm: 100-year Storm Event

Shown in Appendix E, the existing 96" CMP Culvert has capacity for the 100-year Storm.

Provide a proposed conditions narrative. Include proposed impervious amounts with the development and how much runoff increase will result.

VARIANCES FROM CRITERIA

There are no proposed variances from the El Paso County Criteria for the Project.

EXISTING DRAINAGE CONDITIONS

EXISTING DRAINAGE BASINS

Drainage Basin A is 110.4 acres with a weighted imperviousness of 1.4%. The basin encompasses most of the property, specifically the southern and central regions. Drainage Basin A also accounts for off-site drainage entering the site from the south. For the 5-year and 100-year storm scenarios, direct runoff values of 23.84 and 160.20 cubic feet per second (cfs) respectfully, are anticipated. All runoff conveyed within the basin will outfall to the Black Squirrel Creek at Design Point 1.

Drainage Basin B is 13.48 acres with a weighted imperviousness of 2.9%. The basin encompasses the northernmost region of the property, including the immediate off-site drainage entering the property from the north. For the 5-year and 100-year storm scenarios, direct runoff values of 4.29 and 26.46 cfs respectfully, are anticipated. All runoff conveyed within the basin will outfall at Design Point 2, to Black Squirrel Creek on property.

EMERGENCY OVERFLOW ROUTING

All overflow routing will be directed to the Black Squirrel Creek and Snipe Creek drainageways on the site. This flow path is consistent with the historical stormwater runoff path.

HYDRAULIC ANALYSIS METHODOLOGY

The proposed drainage facilities were designed in accordance with the CRITERIA and MANUAL. Floodplain identification was determined using a custom FIRMette map by FEMA and information provided in the CRITERIA. Culvert capacity calculations were computed using Flow master.

There is no stormwater infrastructure proposed with the Project.

Provide a summary of the StreamStats calculations included in Appendix C.

Four-Step Process

The Site was designed in accordance with the four-step process to minimize adverse impacts of urbanization, as outlined in Section I.7.2 BMP Selection of the CRITERIA. The four-step process per the CRITERIA provides guidance and requirements for the selection of siting of structural Best Management Practices (BMPs) for new development and significant redevelopment.

Step 1: Employ Runoff Reduction Practices

The purpose of this project is to replat the existing property, into three separate single-family lots. No infrastructure improvements are included with the Project. Should a single-family residence be developed at a later time on any of the lots, a BESQCP permit will be required by the County to prevent erosion and mitigate any runoff due to those activities.

Step 2: Stabilize Drainageways

Black Squirrel Creek and Snipe Creek drainageways flow through the Site and converge on the eastern portion of the Site. During a Site visit, it was found that the drainageway is currently well-stabilized and extremely vegetated. As the drainageway is currently stable the existing drainageway can be left as-is in its stable condition. As noted in Chapter 1, Section 1.4 of the CRITERIA, “Natural channel systems, primarily the designated Major Drainageways and Primary outfalls, serve to store flood waters, enhance water quality, provide for ground water

recharge and preserve riparian corridors. The use of historical channels to convey storm water runoff from developed and developing areas is acceptable. However, if historical storm water flows are increased, or if historical channels are unstable in their natural conditions, these channels must be adequately stabilized to prevent excessive erosion." Additionally, Chapter 2, Section 2.2 of the CRITERIA states, "A stable natural channel reaches 'equilibrium' over many years. Therefore, channel modifications should be minimal." Because the existing drainageway is properly stabilized, it is felt that attempts to change the natural channel may lead to destabilization of the drainageway and therefore, no changes to the unnamed drainageway, with the exception of stabilization at the location of the proposed ditches, are recommended.

Step 3: Provide Water Quality Capture Volume (WQCV)
Section I.7.1B of Appendix I of the ECM, detention and water-quality facilities are not required for the Project. The purpose of this project is to replat the existing property, into three separate single-family lots. No infrastructure improvements are included with the Project.

Step 4: Consider Need for Industrial and Commercial BMPs
The proposed Project consists of a single-family subdivision. No industrial and commercial uses or developments are anticipated as part of the proposed development.

Impervious areas for the proposed lot have to be accounted for now. See previous comment about including a proposed conditions narrative.

DETENTION AND WATER QUALITY REQUIREMENTS

As discussed in Section I.7.1B of Appendix I of the ECM, detention and w[illegible] not required for the Project as no improvements are to be made in the replatting process. Therefore, there is also no addition of impervious area with the project.

EROSION CONTROL PLAN

Erosion Control Plans with the Minor Subdivision are not required. A BESQCP permit will be required by the County to prevent erosion and mitigate any runoff due to those activities.

FLOODPLAIN STATEMENT

The areas within and just extending beyond the banks of Black Squirrel Creek are considered to be Special Flood Hazard Areas and Zone A. Areas located outside of Zone A are Zone X. This is represented on FEMA Map 08041C0340G, revised on December 7, 2018; also, FEMA Firmette Map exported on December 1, 2021. The El Paso County Requirements specify that the Base Flood Elevation be shown on the Final Plat per section RBC313.18.5.

However, coordination with the El Paso County Floodplain Administrator indicated that FEMA is restudying this area and it will be remapped by FEMA as park of the Statewide Risk Map Program. FEMA has set the precedence locally that they will not process LOMR requests if the area is already under a restudy. Due to this information from the Floodplain Administrator, the requirement to show the base flood elevations on the final plat are being waived. Please see the Appendix for the correspondence with the Floodplain Administrator.

Revise to add to the report that houses have to be 2 feet above the easement line and if the drainage easement wants to be adjusted in the future, applicant will have to come in a process an application to adjust easement to available FEMA BFEs.

The floodplain administrator recommends waiving BFE requirements. Coordinate with planner to process a waiver to not show BFEs on plat.

I therefor recommend that this subdivision proceed as per normal waiving the BFE and restudy requirements while showing the current effective floodplain limits and specifying those areas no build no storage of materials.

FEES DEVELOPMENT

APPLICABLE FEES

The Property is located in the Upper Black Squirrel major drainage basin and is tributary to Black Squirrel Creek. There has been no Drainage Basin Planning Study performed for the watershed, to this date and there are no drainage fees due at this time.

CONSTRUCTION COST OPINION

There are no public drainage ponds or permanent control measures proposed as part of the Project.

MAINTENANCE AND OPERATIONS

There are no public drainage ponds or permanent control measures proposed as part of the Project.

SUMMARY

COMPLIANCE WITH STANDARDS

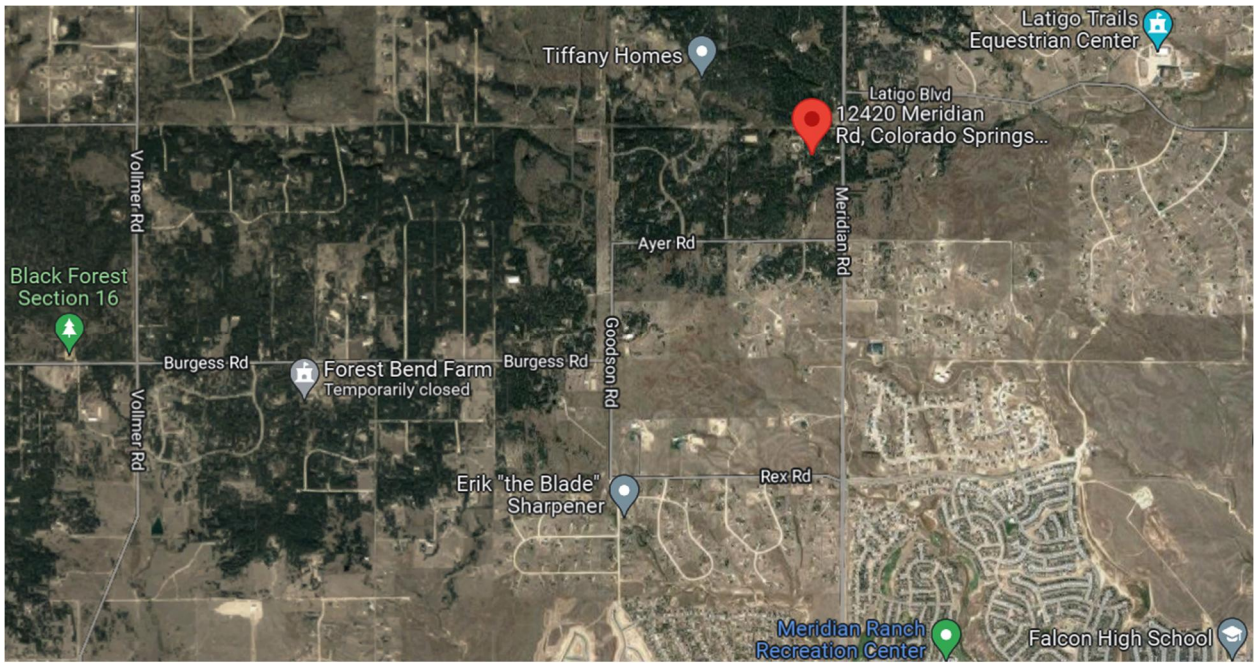
The drainage design presented within this report conforms to the City of Colorado Springs/El Paso County Storm Drainage Criteria and the Urban Drainage and Flood Control District Manual. Additionally, the minor subdivision plat will not adversely affect the downstream and surrounding developments or waterways.

REFERENCES

1. The City of Colorado Springs Drainage Criteria Manual, May 2014
2. El Paso County Drainage Criteria Manual, Vol. 1 and 2, October 1994
3. Urban Drainage and Flood Control District Drainage Criteria Manual (UDFCDCM), Vol. 1, prepared by Wright-McLaughlin Engineers, June 2001, with latest revisions.
4. Flood Insurance Rate Map, El Paso County, Colorado and Incorporated Areas, Map Number 08041C03040G, Effective Date December 7, 2018, prepared by the Federal Emergency Management Agency (FEMA).
5. U.S. Geological Survey, 2016, The StreamStats program, online July 12, 2022

APPENDIX

APPENDIX A - VICINITY MAP


Latigo Trails
Equestrian Center
Tiffany Homes
Latigo Blvd
12420 Meridian
Rd, Colorado Springs...
Vollmer Rd
Meridian Rd
Ayer Rd
Black Forest
Section 16
Burgess Rd
Forest Bend Farm
Temporarily closed
Burgess Rd
Goodson Rd
Vollmer Rd
Rex Rd
Erik "the Blade"
Sharpener
Meridian Ranch
Recreation Center
Falcon High School

APPENDIX B - FEMA FIRM PANEL MAPS and SOIL SURVEY

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, City of Fountain, Bureau of Land Management, National Oceanic and Atmospheric Administration, United States Geological Survey, and Anderson Consulting Engineers, Inc. These data are current as of 2006.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

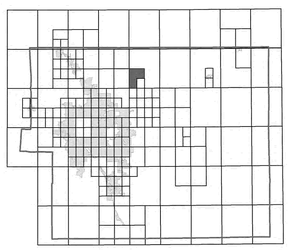
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

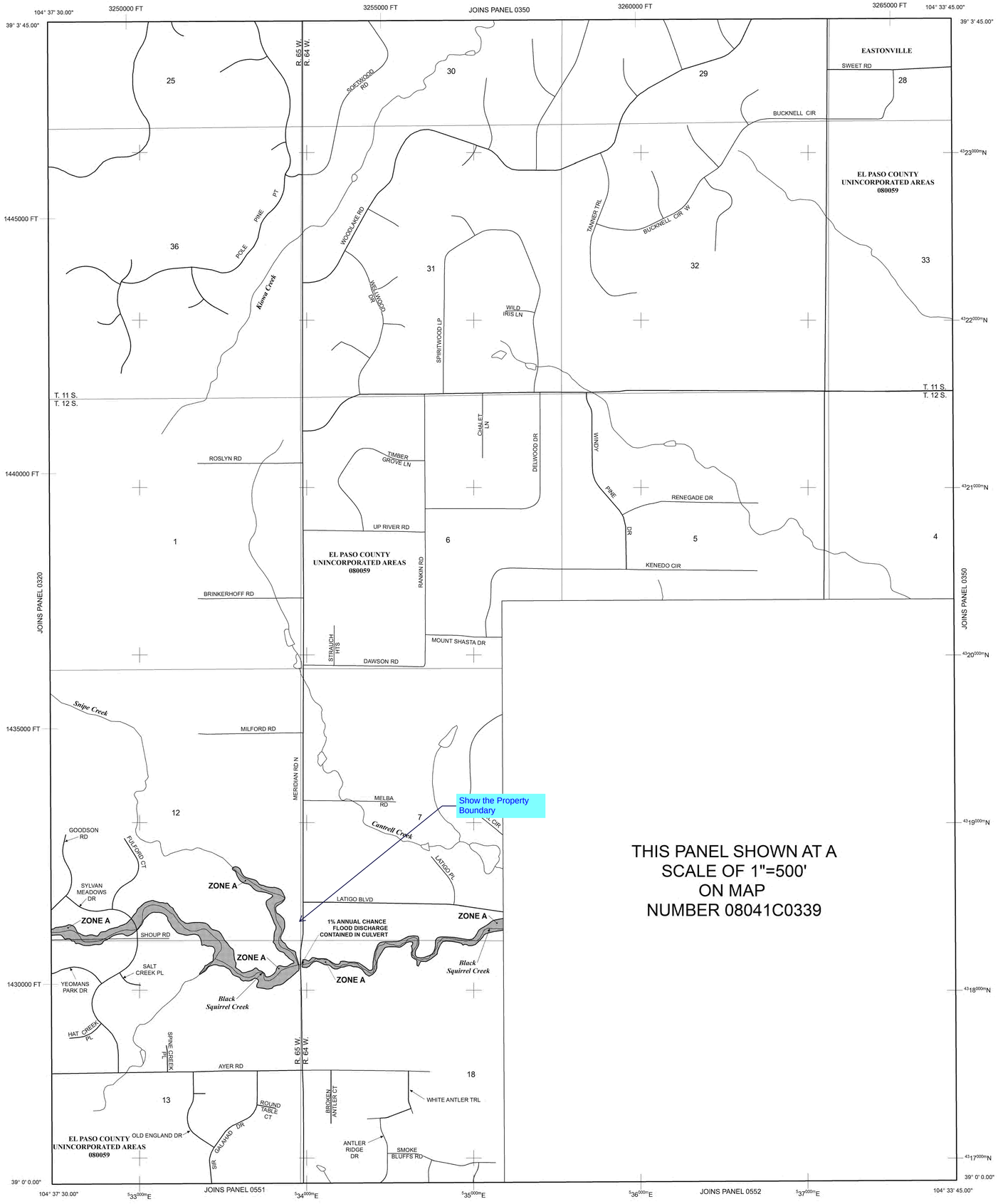
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- **ZONE A** No Base Flood Elevations determined.
- **ZONE AE** Base Flood Elevations determined.
- **ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- **ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE AR** Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- **ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- **ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- **ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D Boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97° 07' 30.00" / 32° 22' 30.00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 13
- 6000000 FT — 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

PANEL 0340G

MAP REVISED TO REFLECT LOMR(S) EFFECTIVE DECEMBER 7, 2018

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 340 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0340	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 08041C0340G

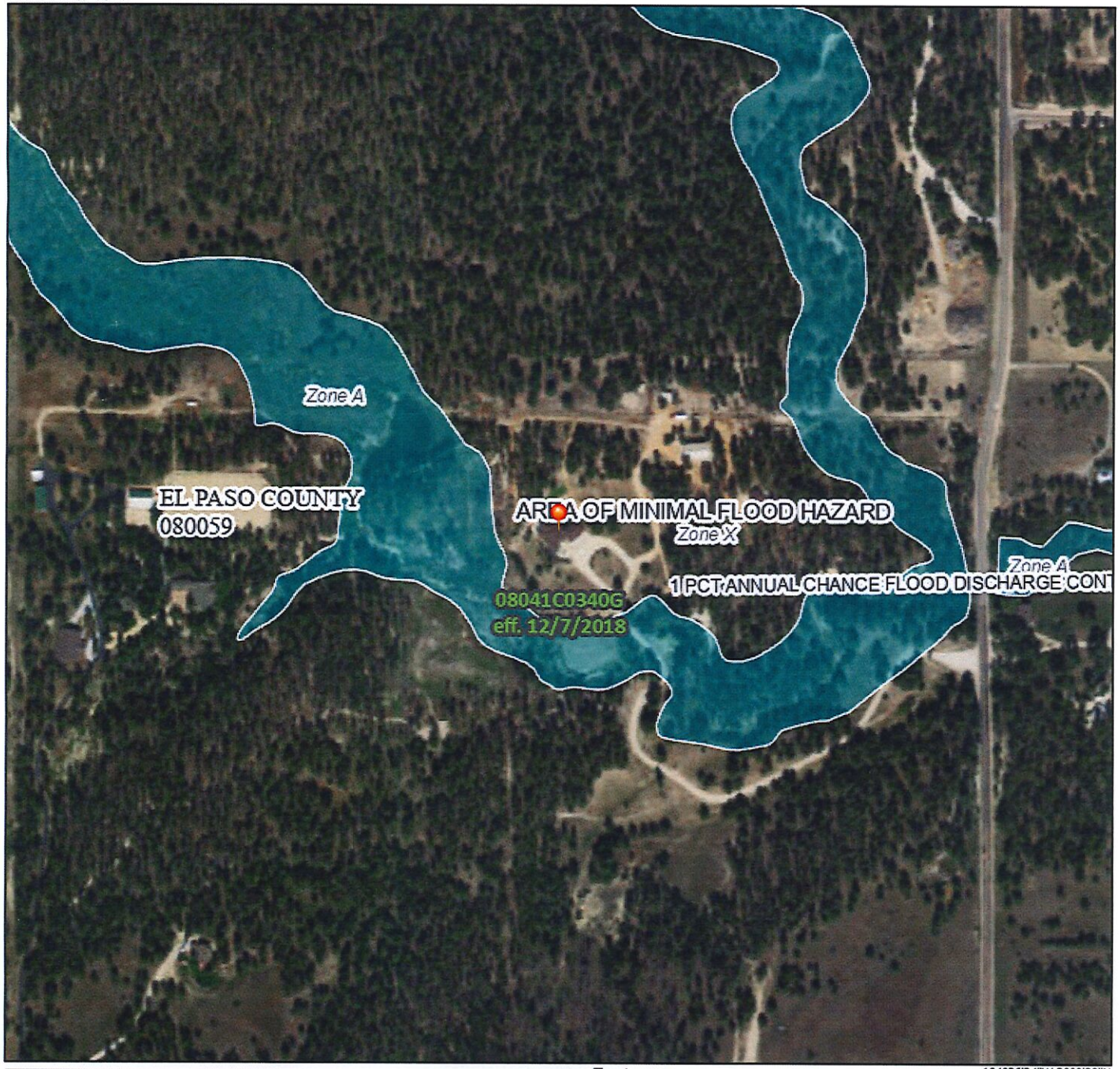
MAP REVISED DECEMBER 7, 2018

Federal Emergency Management Agency

National Flood Hazard Layer FIRMette

FEMA

104°37'1"W 39°0'57"N



0 250 500 1,000 1,500 2,000 Feet 1:6,000

104°36'24"W 39°0'29"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

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 / 17.5 — Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 — 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 12/1/2021 at 6:26 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.

United States Department of Agriculture

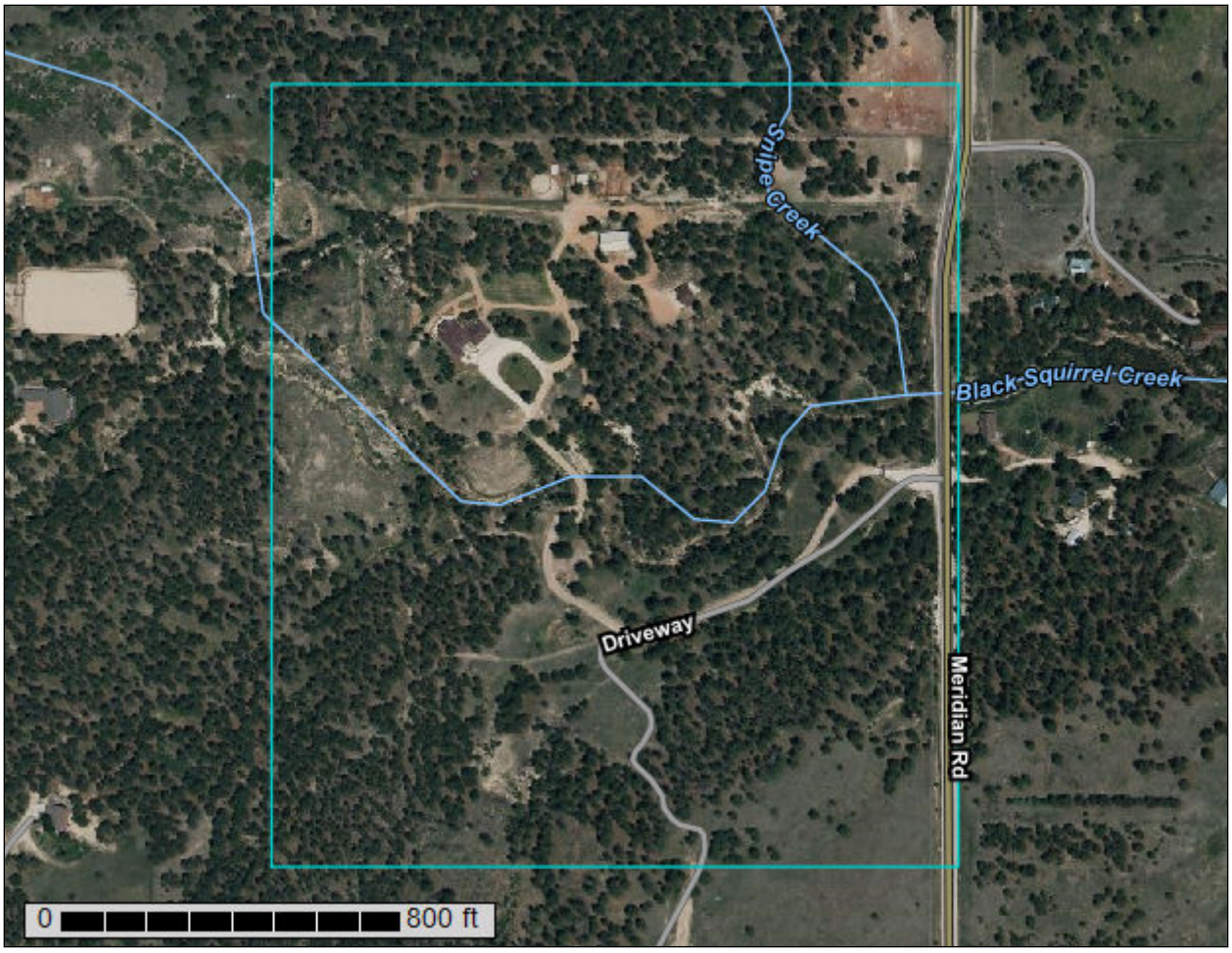
NRCS

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

12420 N. Meridian Rd



June 30, 2022

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: 1:3,820 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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 19, Aug 31, 2021

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

Date(s) aerial images were photographed: Jun 9, 2021—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
40	Kettle gravelly loamy sand, 3 to 8 percent slopes	2.3	3.4%
41	Kettle gravelly loamy sand, 8 to 40 percent slopes	64.8	94.7%
71	Pring coarse sandy loam, 3 to 8 percent slopes	1.3	1.9%
Totals for Area of Interest		**68.4**	**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
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 supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F048AY908CO - Mixed Conifer
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

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

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
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 supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F048AY908CO - Mixed Conifer
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

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
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 supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R048AY222CO - Loamy Park
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

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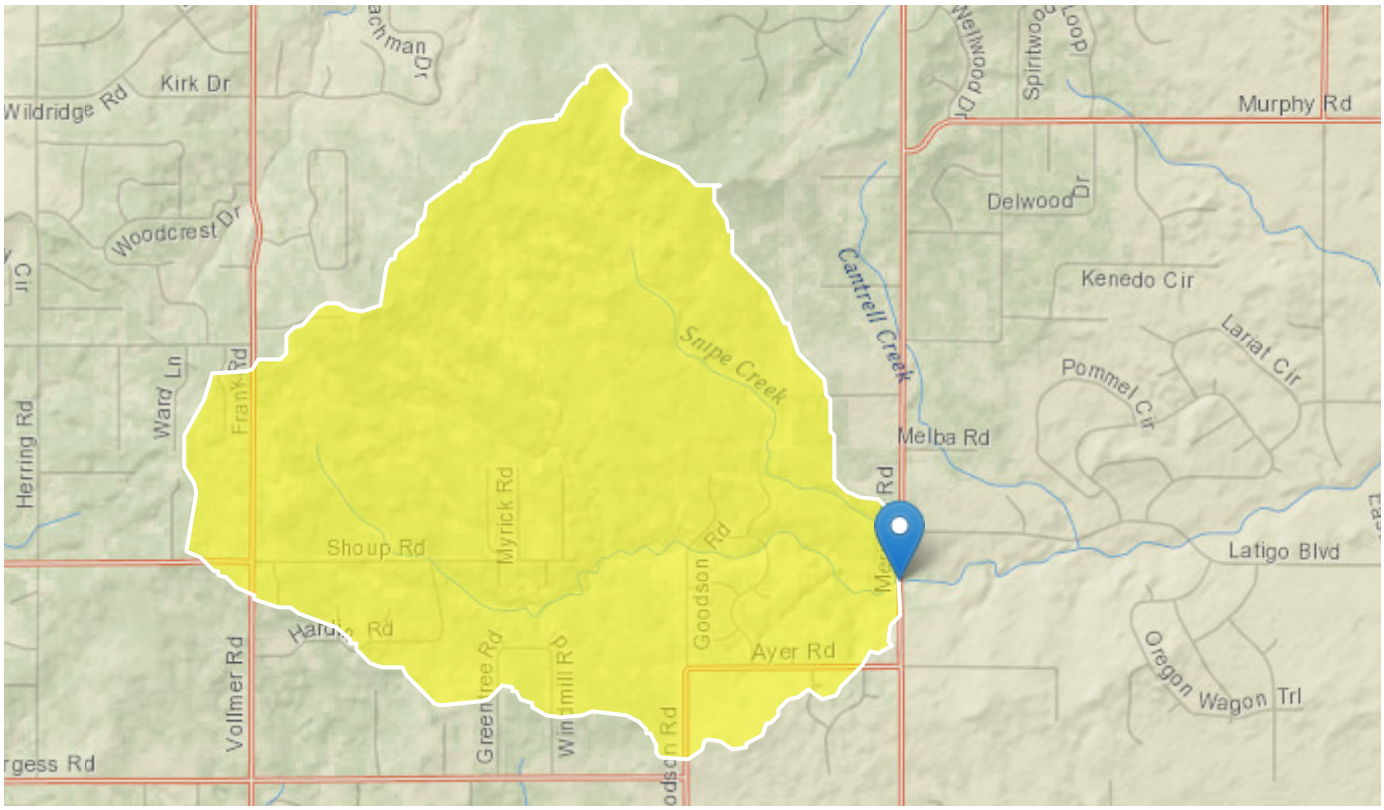
APPENDIX C – STREAMSTATS CALCULATIONS

12420 N. Meridian Rd - Upper Black Squirrel Drainage Basin Report

Region ID: CO
Workspace ID: CO20220630134843865000
Clicked Point (Latitude, Longitude): 39.01167, -104.60776
Time: 2022-06-30 07:49:04 -0600



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Uni
BSLDEM10M	Mean basin slope computed from 10 m DEM	5	per
CSL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	90.6	feet
DRNAREA	Area that drains to a point on a stream	6.29	squ
EL7500	Percent of area above 7500 ft	36	per
ELEV	Mean Basin Elevation	7463	feet

Statistic	Value	Unit	ASEp
20-percent AEP flood	105	ft^3/s	87
10-percent AEP flood	177	ft^3/s	80
4-percent AEP flood	307	ft^3/s	80
2-percent AEP flood	436	ft^3/s	83
1-percent AEP flood	605	ft^3/s	88
0.5-percent AEP flood	803	ft^3/s	94
0.2-percent AEP flood	1120	ft^3/s	104

Peak-Flow Statistics Citations

Kohn, M.S., Stevens, M.R., Harden, T.M., Godaire, J.E., Klinger, R.E., and Mommandi, A.,2016, Paleoflood investigations to improve peak-streamflow regional-regression equations for natural streamflow in eastern Colorado, 2015: U.S. Geological Survey Scientific Investigations Report 2016–5099, 58 p. (http://dx.doi.org/10.3133/sir20165099)

Bankfull Statistics

Bankfull Statistics Parameters [Interior Plains D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	6.29	square miles	0.19305	59927.7393

Bankfull Statistics Parameters [Great Plains P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	6.29	square miles	0.598455	30899.82624

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	6.29	square miles	0.07722	59927.7393

Bankfull Statistics Flow Report [Interior Plains D Bieger 2015]

Statistic	Value	Unit

StreamStats Report

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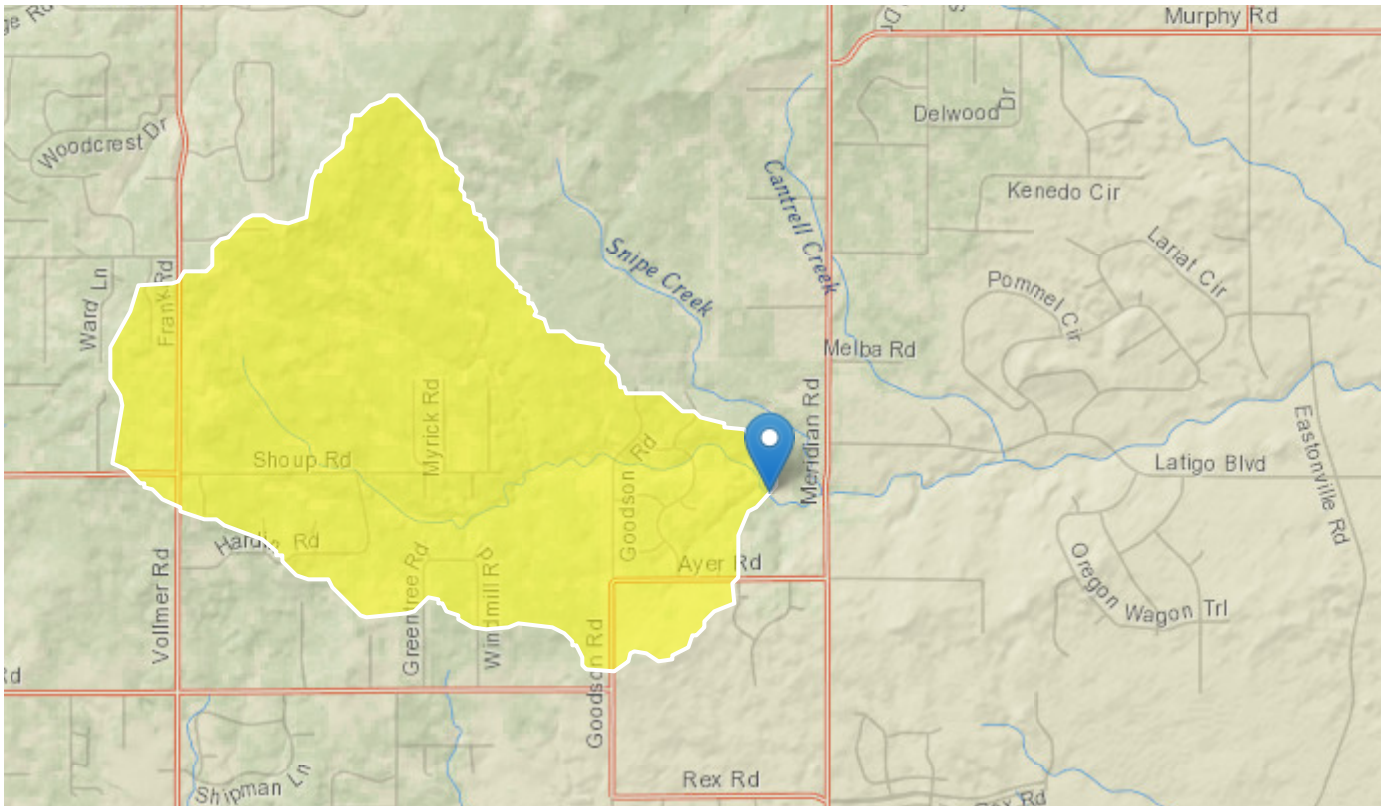

Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLDEM10M	Mean basin slope computed from 10 m DEM	5	perc
CSL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	94.2	feet
DRNAREA	Area that drains to a point on a stream	4.4	squa
EL7500	Percent of area above 7500 ft	40	perc
ELEV	Mean Basin Elevation	7476	feet

Peak-Flow Statistics Flow Report [Foothills Region Peak Flow 2016 5099]

PIl: Prediction Interval-Lower, PIu: Prediction Interval-Upper, ASEp: Average Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	ASEp
50-percent AEP flood	30.1	ft^3/s	117
20-percent AEP flood	84.3	ft^3/s	87
10-percent AEP flood	142	ft^3/s	80
4-percent AEP flood	247	ft^3/s	80
2-percent AEP flood	351	ft^3/s	83
1-percent AEP flood	488	ft^3/s	88
0.5-percent AEP flood	648	ft^3/s	94
0.2-percent AEP flood	904	ft^3/s	104

Peak-Flow Statistics Citations

Kohn, M.S., Stevens, M.R., Harden, T.M., Godaire, J.E., Klinger, R.E., and Mommandi, A.,2016, Paleoflood investigations to improve peak-streamflow regional-regression equations for natural streamflow in eastern Colorado, 2015: U.S. Geological Survey Scientific Investigations Report 2016–5099, 58 p. (http://dx.doi.org/10.3133/sir20165099)

Bankfull Statistics

Bankfull Statistics Parameters [Interior Plains D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.4	square miles	0.19305	59927.7393

Bankfull Statistics Parameters [Great Plains P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.4	square miles	0.598455	30899.82624

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	4.4	square miles	0.07722	59927.7393

StreamStats Report

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Workspace ID: CO20220630151421479000
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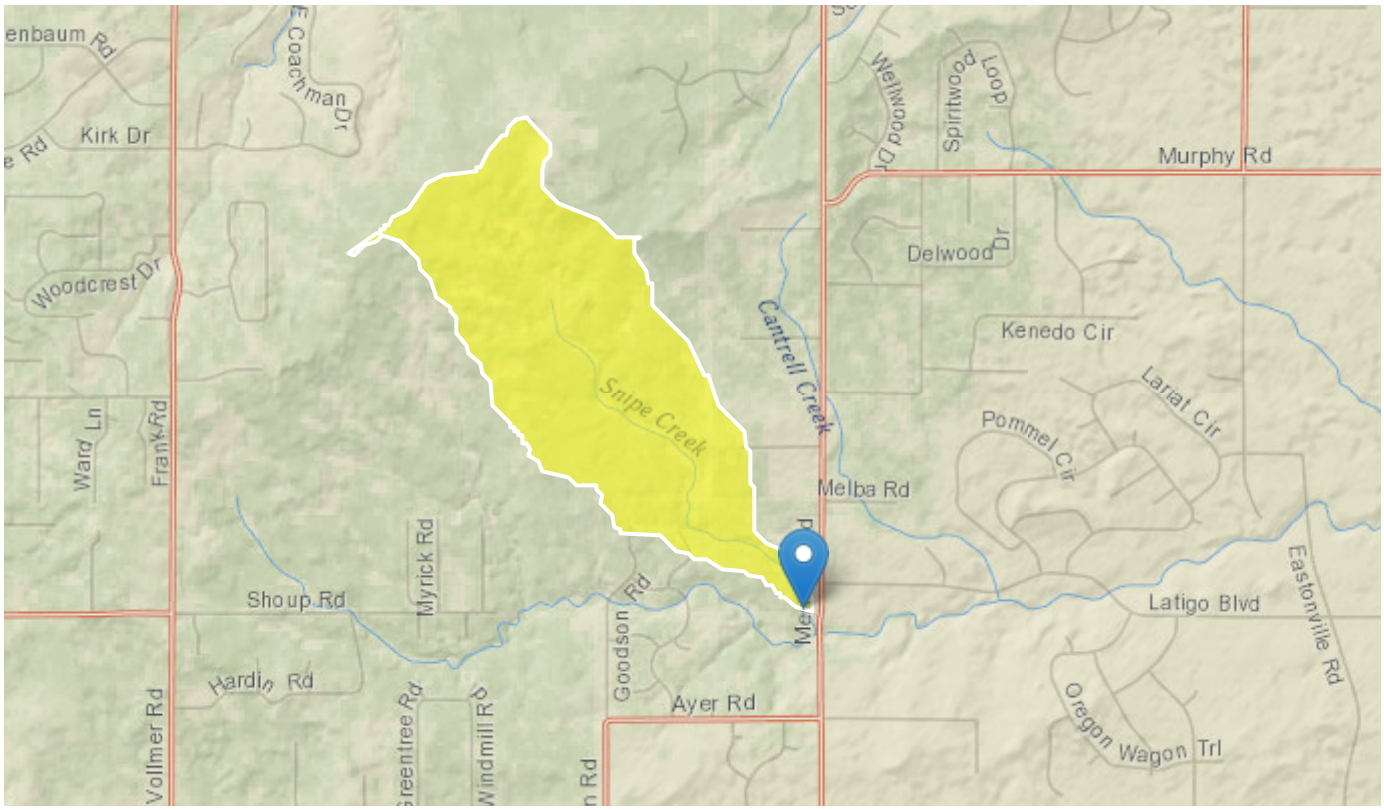
Time: 2022-06-30 09:14:43 -0600



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Uni
BSLDEM10M	Mean basin slope computed from 10 m DEM	5	per
CSL1085LFP	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid	113.2	feet
DRNAREA	Area that drains to a point on a stream	1.7	squ
EL7500	Percent of area above 7500 ft	28	per
ELEV	Mean Basin Elevation	7449	feet

Statistic	Value	Unit	ASEp
20-percent AEP flood	47.5	ft^3/s	87
10-percent AEP flood	80.8	ft^3/s	80
4-percent AEP flood	141	ft^3/s	80
2-percent AEP flood	201	ft^3/s	83
1-percent AEP flood	279	ft^3/s	88
0.5-percent AEP flood	371	ft^3/s	94
0.2-percent AEP flood	519	ft^3/s	104

Peak-Flow Statistics Citations

Kohn, M.S., Stevens, M.R., Harden, T.M., Godaire, J.E., Klinger, R.E., and Mommandi, A.,2016, Paleoflood investigations to improve peak-streamflow regional-regression equations for natural streamflow in eastern Colorado, 2015: U.S. Geological Survey Scientific Investigations Report 2016–5099, 58 p. (http://dx.doi.org/10.3133/sir20165099)

Bankfull Statistics

Bankfull Statistics Parameters [Interior Plains D Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.7	square miles	0.19305	59927.7393

Bankfull Statistics Parameters [Great Plains P Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.7	square miles	0.598455	30899.82624

Bankfull Statistics Parameters [USA Bieger 2015]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	1.7	square miles	0.07722	59927.7393

Bankfull Statistics Flow Report [Interior Plains D Bieger 2015]

Statistic	Value	Unit

APPENDIX D – HYDROLOGIC CALCULATIONS

Double Spur Ranch Minor Subdivision

Time of Concentration Existing Calculations

Watercourse Coefficient

Forest & Meadow	2.50	Short Grass Pasture & Lawns	7.00													Grassed Waterway	15.00
Fallow or Cultivation	5.00			Nearly Bare Ground	10.00											Paved Area & Shallow Gutter	20.00

	SUB-BASIN DATA				INITIAL / OVERLAND* TIME			TRAVEL TIME T(t)					T(c) CHECK (URBANIZED BASINS)			FINAL T©*
DESIGN POINT	DRAIN BASIN	AREA sq. ft.	AREA ac.	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	TOTAL LENGTH	L/180+10	min.
1	A	4,810,246	110.43	0.09	300	7.0%	16.8	3491	4.0%	2.50	0.5	116.4	133.2	3791	31.1	31.1
2	B	587,032	13.48	0.10	300	3.0%	22.0	1189	5.5%	2.50	0.6	33.8	55.8	1489	18.3	18.3
TOTAL	TOTAL	5,397,277	123.90					4680								

*Note: El Paso County Drainage Manual Chapter 6 indicates that the maximum overland flow length is 100ft for urbanized areas and 300ft for rural areas. The minimum time of concentration is 5 min for developed conditions, 10 min for undeveloped conditions.

Double Spur Ranch Minor Subdivision
Time of Concentration Existing Calculations *Design Storm* *5 Year Strom Event*
(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				CUMMULATIVE RUNOFF				NOTES
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	C x A	I in/hr	Q cfs	
1	A	110.43	0.09	31.1	9.82	2.43	23.84					0.00
2	B	13.48	0.10	18.3	1.33	3.22	4.29					0.00
TOTAL	TOTAL	123.90	0.09				28.13					

Double Spur Ranch Minor Subdivision
Time of Concentration Existing Calculations *Design Storm* *100 Year Storm Event*
(Rational Method Procedure)

BASIN INFORMATION				DIRECT RUNOFF				CUMMULATIVE RUNOFF				NOTES
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	C x A	I in/hr	Q cfs	
1	A	110.43	0.36	31.1	39.33	4.07	160.20					
2	B	13.48	0.36	18.3	4.89	5.41	26.46					
TOTAL	TOTAL	123.90	0.36				186.66					

SUMMARY - EXISTING RUNOFF TABLE				
DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	DIRECT 5-YR RUNOFF (CFS)	DIRECT 100-YR RUNOFF (CFS)
1	A	110.43	23.84	160.20
2	B	13.48	4.29	26.46
TOTAL		123.90	28.13	186.66

APPENDIX E – HYDRAULIC CALCULATIONS

Double Spur Ranch Minor Subdivision - 100-Year Storm Calculation

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.021	
Channel Slope	0.010	ft/ft
Diameter	96.0	in
Discharge	605.00	cfs

Results		
Normal Depth	86.5	in
Flow Area	47.7	ft²
Wetted Perimeter	20.0	ft
Hydraulic Radius	28.6	in
Top Width	4.78	ft
Critical Depth	75.1	in
Percent Full	90.1	%
Critical Slope	0.013	ft/ft
Velocity	12.69	ft/s
Velocity Head	2.50	ft
Specific Energy	9.71	ft
Froude Number	0.708	
Maximum Discharge	610.36	cfs
Discharge Full	567.40	cfs
Slope Full	0.011	ft/ft
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.0	%
Normal Depth Over Rise	77.2	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	86.5	in
Critical Depth	75.1	in
Channel Slope	0.010	ft/ft
Critical Slope	0.013	ft/ft

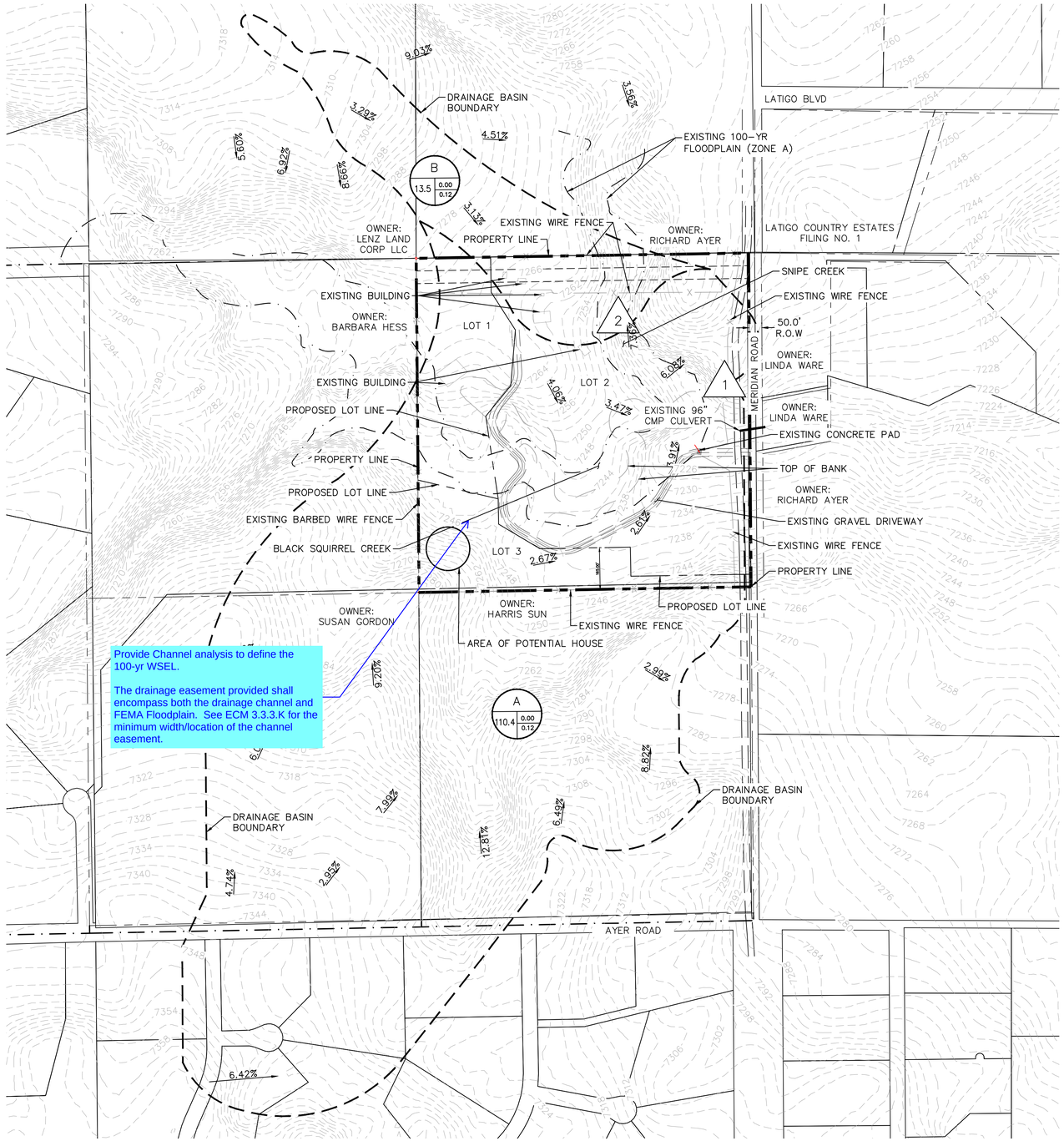
APPENDIX F – DRAINAGE EXHIBITS

DOUBLE SPUR RANCH MINOR SUBDIVISION

A PORTION OF THE NORTHEAST QUARTER OF THE
NORTHEAST QUARTER OF SECTION 13, TOWNSHIP 12 SOUTH,
RANGE 65 WEST IN THE 6TH P.M., IN EL PASO COUNTY,
COLORADO

SUMMARY - EXISTING RUNOFF TABLE				
DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	DIRECT 5-YR RUNOFF (CFS)	DIRECT 100-YR RUNOFF (CFS)
1	A	110.43	23.84	160.20
2	B	13.48	4.29	26.46
TOTAL		123.90	28.13	186.66

Provide proposed runoff values in a summary table.



LEGEND

- PROPERTY LINE
- EXISTING EASEMENT
- XXXX MAJOR CONTOUR
- XXXX MINOR CONTOUR
- DRAINAGE BASIN BOUNDARY
- 100-YR FLOODPLAIN (ZONE A)

A = BASIN DESIGNATION
B = AREA IN ACRES
C = 5-YR RUNOFF COEFFICIENT
D = 100-YR RUNOFF COEFFICIENT

= DESIGN POINT DESIGNATION

NORTH

GRAPHIC SCALE IN FEET
0 125 250 500

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

K:\COS_Civil\196518000_12420 N. Meridian Drive\CADD\PlanSheets\DRAINAGE\DrainagePlan_196518000.dwg Schnelbach, Ryan 7/12/2022 10:07 AM

NO.	REVISION	BY	DATE	APPR.

Kimley»Horn
2021 KIMLEY-HORN AND ASSOCIATES, INC.
2 North Nevada Avenue, Suite 300
Colorado Springs, Colorado 80903 (719) 453-0180

DESIGNED BY: KRK
DRAWN BY: RES
CHECKED BY: KRK
DATE: 07/12/2022

DOUBLE SPUR RANCH MINOR SUBDIVISION
12420 MERIDIAN ROAD
DRAINAGE MAP

PRELIMINARY
FOR REVIEW ONLY
NOT FOR CONSTRUCTION
Kimley»Horn
Kimley-Horn and Associates, Inc.

PROJECT NO.
196518000

SHEET
1

APPENDIX G – FIELD PHOTOS

SITE VISIT 07/08/2022

SITE VISIT 07/08/2022

SITE VISIT 07/08/2022

SITE VISIT 07/08/2022

SITE VISIT 07/08/2022

APPENDIX H – CORRESPONDENCE

Joan Hathcock

From: Keith Curtis <keith@pprbd.org>
Sent: Monday, December 6, 2021 11:22 AM
To: johngreen@elpasoco.com
Cc: Dennis Hathcock; Joan Hathcock
Subject: RE: MINOR SUBDIVISION file no is 21-131

John,
In reviewing the subject subdivision I find that it is exposed the A zone Floodplain.
Subdivision requirements specify that the A zone should be studied and BFE shown on the plat.
However this area is already being restudied and remapped by FEMA as part of the Statewide risk map program.
FEMA has set the precedence locally that they will not process LOMR requests if the area is already under restudy because of duplicative effort on their part.
I therefor recommend that this subdivision proceed as per normal waiving the BFE and restudy requirements while showing the current effective floodplain limits and specifying those areas no build no storage of materials.

Let me know if you have any questions.

Keith Curtis, PE, CFM
Floodplain Administrator
Pikes Peak Regional Building Department
2880 International Circle
Colorado Springs CO, 80910
O: 719-327-2898 **E:** keith@pprbd.org **W:** pprbd.org

From: Joan Hathcock <joan@djelectric.net>
Sent: Monday, November 8, 2021 4:41 PM
To: Keith Curtis <keith@pprbd.org>
Cc: Dennis Hathcock <dennis@djelectric.net>
Subject: MINOR SUBDIVISION

Good afternoon,

We met with John Green a few weeks ago to start the process for a minor subdivision, he said our first step was contacting you. The file no is 21-131-Hathcock
The parcel number is 5213000007. Please let me know what we need to do from here. Thank you for your time.

Sincerely,

Joan Hathcock
Cell 719-466-1096

Joan Hathcock

From: Keith Curtis <keith@pprbd.org>
Sent: Tuesday, November 9, 2021 8:27 AM
To: Joan Hathcock
Subject: RE: flood plain map

You are correct FEMA did update the A zones in 2018, but they are still just A zones "approximate" flood zones. Subdivision regulations require that these approximate areas be studied in more detail prior to platting to make sure any new lots are not at risk.
Here is and excerpt from the subdivision code as it relates to floodplain:

RBC313.18.5 Subdivision Proposals. All subdivision proposals shall be consistent with the need to minimize flood damage;
All subdivision proposals shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage;
All subdivision proposals shall have adequate drainage provided to reduce exposure to flood damage;
FEMA approved base flood elevation data and 100-year floodplain boundaries shall be provided and shown on plats for subdivision proposals and other proposed developments that contain at least fifty lots or five (5) acres, whichever is less; All buildable lots less than two and one half (2½) acres in size are required to be located entirely outside of the 100-year floodplain. Lands within the 100-year floodplain shall be established in a tract, and require that the owner maintain the tract. Buildable lots two and one half (2½) acres and larger, are required to have the 100-year floodplain contained in a drainage easement dedicated by plat in the name of the governing body with the restrictions of "No Build" and "No Storage of any Materials";.....

Keith Curtis, PE, CFM
Floodplain Administrator
Pikes Peak Regional Building Department
2880 International Circle
Colorado Springs CO, 80910
O: 719-327-2898 **E:** keith@pprbd.org **W:** pprbd.org

From: Joan Hathcock <joan@djelectric.net>
Sent: Tuesday, November 9, 2021 8:14 AM
To: Keith Curtis <keith@pprbd.org>
Subject: flood plain map

Good morning Keith,

I pulled this map from the FEMA flood plain map site and it says it was updated in 2018, so why do we need to start the process all over again?

Sincerely,