FINAL DRAINAGE REPORT

ORTON PIT
17710 CO115
El Paso County, Colorado 80926

Prepared For:

Castle Rock Construction Co. of Colorado LLC
6374 South Racine Circle
Centennial, Colorado 80111

Prepared By:

Baseline Engineering Corporation
1046 Elkton Drive
Colorado Springs, Colorado 80907

Steven Baggs, PE

Date: July 12, 2022
Revised: August 19, 2022

PCD File No.: CDR2211

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El Paso County
Planning and Community Development
2880 International Circle, Suite 110
Colorado Springs, Colorado 80910

August 19, 2022

Re: Final Drainage Report
For Orton Borrow Pit
Located on 17710 CO115
El Paso County, CO 80926

To Whom It May Concern:

Transmitted herewith is the Final Drainage Report for the Orton Borrow Pit, located on an unplatted parcel addressed 17710 CO115 Colorado Springs, El Paso County, Colorado 80926. The Orton Borrow Pit is approximately 10 acres and located on the property's southeastern corner. The site is currently zoned RR-5 with an existing residence, and a historic borrow pit. The purpose of the proposed borrow pit on the southern edge of El Paso County is to provide earthen fill for CDOT Project 22903 on SH115. The proposed pit would expand a historic pit from the original construction of SH115 and only be permitted/used for this one Project (less than 2 years). We would therefore like to submit for a special use permit through El Paso County in accordance with section 5.2.34(C) of the Counties land development code.

This drainage analysis was prepared in accordance with the most current El Paso County Drainage Criteria Manual. If there are any comments or questions regarding any part of this drainage analysis, please contact the undersigned.

Very truly yours,

BASELINE ENGINEERING CORP.

Sean P Callahan, E.I.

Reviewed by:
Steven G. Baggs, P.E.

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Certification Statements

Engineer's Statement

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

COLORADO REGISTERED
STEVEN G. BAGGS
26020
8/19/22
PROFESSIONAL ENGINEER

Steven G Baggs, P.E. Colorado 26020

Developer's Statement

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

Name of Developer: Castle Rock Construction Company of Colorado, LLC

Authorized Signature/Date: Amy Brooks 8/18/22

Printed Name: Amy Brooks

Title: COO

Address: 6374 S. Racine Circle
Centennial, CO 80111

El Paso County Certification

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.

APPROVED
Engineering Department
09/15/2022 3:25:18 PM
dsdnijkamp
EPC Planning & Community Development Department

Joshua Palmer, P.E. County Engineer / ECM Administrator

1) General Location and Description

a) Location

This Final Drainage Report has been prepared for Orton Borrow Pit, located on an unplatted parcel addressed 17710 CO115 Colorado Springs, El Paso County, Colorado 80926. The property is bound to the North by two rural residential properties (RR-5), the East by CO115 Right-of-Way, the South by vacant land, and the West by vacant land on the West limits of El Paso County.

The site is located within the NW ¼ of the NW ¼ of Section 18, Township 17 S, Range 67 West of the 6th Principal Meridian.

There is a historic borrow pit from the original construction of SH115 and an existing residential building on the property. There are no major drainageways adjacent to the site.

There are no existing platted developments adjacent to the site.

b) Description of Property

For the purposes of this report "the site" will refer to the Orton Borrow Pit site, which is approximately 10 acres of disturbed area. The entirety of the property which the Orton Borrow Pit site is located on encompasses 93.75 acres.

The proposed Orton Borrow Pit portion of the site consists of a historic borrow pit and undeveloped land covered by native grasses, trees, and weeds.

The existing site drains from the Northwest to the Southeast primarily at slopes between 0-3% into an existing depression on the Northeast side of CO-115.

The soil type at the site was identified as Satanta Loam, with slopes ranging from 0-3%, and a hydrologic soil grouping of "B". Soils associated with hydrologic soil group B have a moderate infiltration rate when thoroughly wet. These are moderately deep, well-draining soils with a moderate rate of water transmission.

There are no major drainageways adjacent to the site. There is a FEMA floodplain (Zone A) on the northeast portion of the parcel, northeast of the disturbed area for this project. The floodplain will not be disturbed with this project, refer to the appendix for the FIRM Map.

There are no known existing irrigation facilities located on the site.

There is an existing overhead transmission line on the eastern boundary of the site. The transmission line will not be disturbed with this project. There are no other known utilities or encumbrances on the borrow pit portion of the site.

2) Drainage Basins and Sub-Basins

a) Major Basin Descriptions

This project is within the Red Creek Drainage Basin. Stormwater from this site drains from the Northwest to the Southeast into an existing depression on the Northeast side of CO-115. The immediate receiving water for the site is Red Creek, with the ultimate receiving water being the Arkansas River (COARUA14d_C).

According to the FEMA Flood Insurance Rate Map (FIRM) Panel No. 08041C1125G, effective 12/07/2018, the disturbed area of the site is located within an area of minimal flood hazard (Zone X). Refer to the appendix for FIRM Map.

The Red Creek Drainage Basin generally drains south, until its confluence with the Arkansas River approximately 14 miles south of the borrow pit site.

There are no known irrigation facilities or other obstructions which could influence or be influenced by the local drainage patterns.

b) Sub-basin Description

An Existing Conditions Drainage Plan has been included in the Appendix of this report. A description of the existing subbasins is as follows:

Subbasin E1 (16.43 acres) consists of the entirety of the disturbed area for the borrow pit site and the historic borrow pit area. This subbasin drains from the Northwest to the Southeast generally at slopes between 0-4% into an existing depression from a historic borrow pit on the Northeast side of CO-115 at DP1. Stormwater infiltrates into soils at the existing depression in existing conditions. The determined existing runoff quantities from subbasin E1 draining to DP1 are Q_5=3.18 cfs and Q_{100}=21.37 cfs in the minor and major storms. The total accumulative flows from subbasins E1 & E2 draining to DP1 are Q_5=7.30 cfs and Q_{100}=48.97 cfs in the minor and major storms

Subbasin E2 (26.40 acres) consists of an undeveloped offsite area tributary to the existing borrow pit. This subbasin drains from the Northwest to the Southeast generally at slopes between 3-4% into the west edge of basins E1/P1. Ultimately draining to the existing depression from a historic borrow pit on the Northeast side of CO-115 at DP1. Stormwater infiltrates into soils at the existing depression in existing conditions. The determined existing runoff quantities from subbasin E2 draining to DP2 are Q_5=4.11 cfs and Q_{100}=27.60 cfs in the minor and major storms.

A Proposed Conditions Drainage Plan has been included in the Appendix of this report. A description of the proposed subbasins is as follows:

Subbasin P1 (16.43 acres) consists of the entirety of the disturbed area for the borrow pit site and the historic borrow pit area. This subbasin will maintain existing drainage patterns. The proposed subbasin drains from the Northwest to the Southeast generally at slopes between 0-3.7% into an existing depression from a historic borrow pit on the Northeast side of CO-115 at DP1. Stormwater infiltrates

into soils at the existing depression in existing conditions. The determined proposed runoff quantities from subbasin P1 draining to DP1 are Q_5=3.17 cfs and Q_{100}=21.26 cfs in the minor and major storms. The total accumulative flows from subbasins P1 & E2 draining to DP1 are Q_5=7.28 cfs and Q_{100}=48.85 cfs in the minor and major storms

Other than Subbasin E2, there are no known off-site drainage flow patterns that will impact this project.

3) Drainage Design Criteria

a) Development Criteria Reference

This drainage analysis has been prepared in accordance with the current El Paso County Drainage Criteria Manual Volumes 1 & 2, as well as applicable portions of the City of Colorado Springs Drainage Criteria Manual Volumes 1 & 2.

This site is located within the Red Creek Drainage Basin (BEBE0200). There are no previous drainage studies completed for this project site. There are no associated drainage fees for this basin.

b) Hydrologic Criteria

The design rainfall depths for the site were determined from the NOAA Atlas 14, Volume 8, Version 2. Design rainfall depths have been included in the appendix of this report.

The Rational Method was used to determine developed flow volumes for historic and developed conditions. The Rational Formula is Q = CiA, where Q, the maximum rate of runoff is equal to the runoff coefficient C, times the rainfall intensity (I), times the area (A).

The minor and major design storms were analyzed as the 5-yr and 100-yr storm events in this report. A summary of calculated direct runoff flows has been provided below, refer to the Appendix for additional rational calculations.

There were no detention discharge calculation methods required for this report. The existing historic borrow pit storage volume and tributary area runoff quantities were analyzed using the MHFD Detention Workbook v4.06

4) Drainage Facility Design

a) General Concept

The proposed drainage patterns of the site will maintain the existing drainage patterns. The site drains from Northwest to the Southeast into a historic borrow pit from the original construction of SH115 at DP1. Stormwater infiltrates into soils at the existing depression in existing conditions and will continue to after operation of the proposed borrow pit is completed. This project will expand the historic pit from its original construction to provide earthen fill for CDOT Project 22903 on SH115 and only be

permitted/used for this one Project (less than 2 years). This project will not have a negative impact on downstream drainageways.

Subbasin E2 contributes off-site runoff to the proposed borrow pit disturbed area. The borrow pit will be expanded and runoff will continue to flow in its historic patterns. Runoff that currently enters the historic borrow pit will continue to flow to the exiting borrow pit depression as the pit is expanded. There will be no change to the amount of runoff captured at the existing borrow pit depression.

The existing borrow pit storage volume was analyzed, and it was determined that the 100-year storm volume will be contained within the historic borrow pit without overtopping into the CDOT roadside ditch adjacent to the site. The 100-year storm will pond to an elevation of 6379.99. The infiltration of storm events stored in the historic borrow pit was not analyzed. However, a permeability test was completed for soils on site and the permeation trial data has been provided in the appendix of this report.

Four Step Process: The four-step process for minimizing adverse impacts of urbanization must be applied to all new or redevelopment projects for which construction activities disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale. The four steps have been applied to this site as follows:

Step 1: Reduce runoff by disconnecting impervious area, eliminating "unnecessary" impervious area and encouraging infiltration into soils that are suitable.
The stormwater management for the Orton Borrow Pit does employ runoff reduction practices. No impervious area will be added during operations of the borrow pit. The UD-BMP IRF spreadsheet was prepared for this project and is included in the Hydrologic Calculations section of the Appendix.

Step 2: Treat and slowly release the WQCV.
This site is exempt from water quality treatment per the exclusion in ECM Appendix I.E.4.a.i.G. Also, per the post construction stormwater management applicability evaluation from, no permanent post construction stormwater management is required since the undeveloped land will remain undeveloped following the borrow pit activity.

Step 3: Stabilize stream channels.
All new and re-development projects are required to construct or participate in the funding of channel stabilization measures. There are no associated drainage fees for the Red Creek Drainage Basin. There are no major drainage ways that are adjacent to the site. Negative impacts on downstream drainageways will not occur as no impervious area will be added to the site and runoff is contained on-site. Runoff from the site is conveyed via sheet flow to a historic depression from the original construction of SH115. Stormwater infiltrates into soils at the existing depression.

Step 4: Implement source controls.

This development will implement a Stormwater Management Plan utilizing construction control measures, proper housekeeping practices, and spill containment procedures. There is no outdoor storage of contaminants or outside pollutant sources anticipated at this site.

b) Specific Details

Below is a summary of the existing and proposed direct runoff summaries for the disturbed area of the borrow pit. Rational calculations have been provided in the appendix of this report.

Table 1. Subbasin Direct Runoff Summary

DIRECT RUNOFF SUMMARY										
BASIN LABEL	DESIGN POINT	AREA	Imp.	C5	C100	LOCAL (CFS)		ACCUMULATIVE (CFS)		Notes
						Q5	Q100	Q5	Q100	
E2	2	26.40	2%	0.09	0.36	4.11	27.60			
E1	1	16.43	2%	0.09	0.36	3.18	21.37	7.30	48.97	
P1	1	16.43	2%	0.09	0.36	3.17	21.26	7.28	48.85	

There are no negative drainage impacts on downstream facilities as no impervious area will be added and runoff is contained on-site. Runoff from the site is conveyed via sheet flow to a historic depression from the original construction of SH115. Stormwater will continue to infiltrate into soils at the existing depression as in historic conditions.

The purpose of the proposed borrow pit is to provide earthen fill for CDOT Project 22903 on SH115. The proposed pit would expand a historic pit from the original construction of SH115 and only be permitted/used for this one Project (less than 2 years).

The existing borrow pit creates a depression on the east edge of the site and the west side of SH115. There is no known outfall for this low point and stormwater will infiltrate into soils on site.

There are no known environmental or drainage issues existing on site.

Maintenance for the site will be provided off of the proposed haul road for the operation of the borrow pit. The haul road will not be developed with an impervious surface material.

There is no permanent detention structure proposed with this project. Temporary erosion control CM's will be in place prior to final stabilization of the site. Grading and Erosion Control Plans for the site will be submitted separately.

There are no public or private drainage facilities proposed for this project. Applicable portions of the 2022 Financial Assurance Estimate From has been completed and provided to the County.

There are no associated drainage fees for the Red Creek Drainage Basin.

c) Other Government Agency Requirements

Federal Emergency Management Agency (FEMA)

According to the FEMA Flood Insurance Rate Map (FIRM) Panel No. 08041C1125G, effective 12/07/2018, this site is located within an area of minimal flood hazard (Zone X). A copy of a portion of the appropriate FIRM panel is included in the Appendix.

Army Corps of Engineers (COE)

N/A

Colorado State Engineer

Following conversation between Travis Bell with Castle Rock Construction Company (CRCC) and Dan Henrichs the Division 2, District 12 Water commissioner for the Colorado Division of Water Resources, it was confirmed that no water rights are required for the proposed borrow pit. Included in the appendix of this report is an email from Mr. Henrichs confirming this.

Colorado Water Conservation Board (CWCB)

N/A

CDOT

The existing borrow pit storage volume was analyzed, and it was determined that up to the 100-year storm volume will be contained within the historic borrow pit without overtopping into the CDOT roadside ditch adjacent to the site. The infiltration of the storm events stored in the historic borrow pit was not analyzed. A permeability test was completed for soils on site and the permeation trial data has been provided in the appendix of this report.

Drawings/Appendix

A. General Location (Vicinity) Map

B. Hydrologic Calculations

C. Drainage Plans

D. Coordination Documents

APPENDIX A

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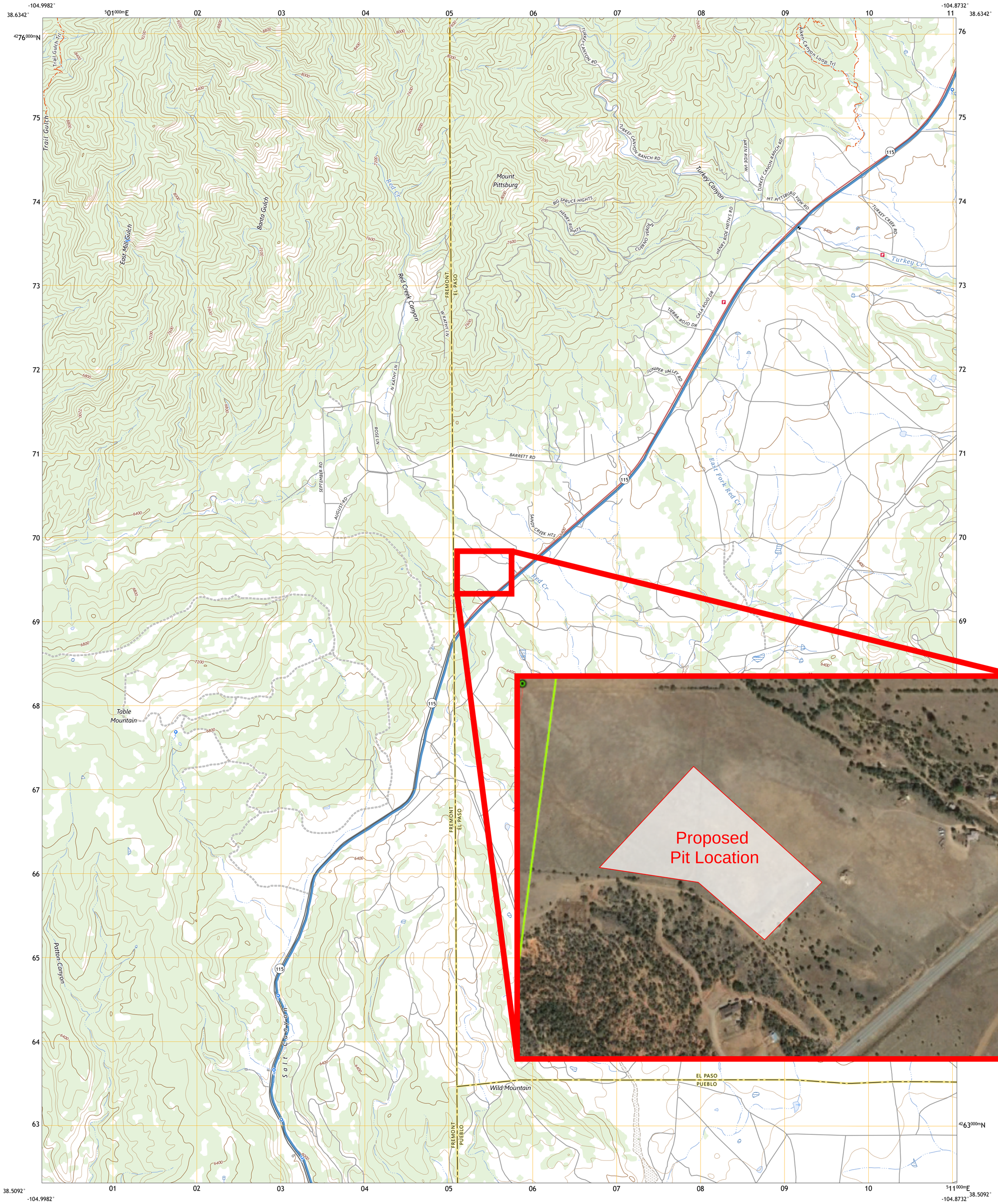
Orton Pit Vicinity Map

7.5-MINUTE TOPO 2 QUADRANGLE
Custom Extent
7.5-MINUTE TOPO

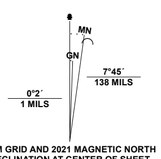


Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 13S

Data is provided by The National Map (TNM), is the best available at the time of map generation, and includes data content from supporting themes of Elevation, Hydrography, Geographic Names, Boundaries, Transportation, Structures, Land Cover, and Orthoimagery. Refer to associated Federal Geographic Data Committee (FGDC) Metadata for additional source data information.

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands. Temporal changes may have occurred since these data were collected and some data may no longer represent actual surface conditions.

Learn About The National Map: https://nationalmap.gov



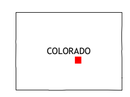
UTM GRID AND 2021 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000 - m Square ID
EC
Grid Zone Designation
13S

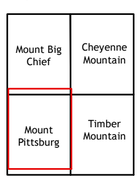
SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL 80 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988
CONTOUR SMOOTHNESS = Medium



QUADRANGLE LOCATION



ADJOINING QUADRANGLES

ROAD CLASSIFICATION

Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

7.5-MINUTE TOPO 2, CO
2022

APPENDIX B

BASELINE
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NOAA Atlas 14, Volume 8, Version 2
Location name: Colorado, USA*
Latitude: 38.5744°, Longitude: -104.9385°
Elevation: 6466.82 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.247** (0.195-0.313)	**0.294** (0.232-0.373)	**0.380** (0.299-0.484)	**0.459** (0.359-0.588)	**0.579** (0.442-0.788)	**0.680** (0.504-0.939)	**0.789** (0.563-1.12)	**0.908** (0.619-1.34)	**1.08** (0.704-1.64)	**1.21** (0.768-1.87)
10-min	**0.361** (0.286-0.458)	**0.431** (0.340-0.547)	**0.557** (0.438-0.709)	**0.672** (0.526-0.861)	**0.848** (0.647-1.15)	**0.996** (0.738-1.38)	**1.16** (0.825-1.65)	**1.33** (0.907-1.96)	**1.58** (1.03-2.40)	**1.78** (1.13-2.74)
15-min	**0.440** (0.348-0.558)	**0.526** (0.415-0.667)	**0.679** (0.534-0.865)	**0.820** (0.641-1.05)	**1.03** (0.789-1.41)	**1.22** (0.900-1.68)	**1.41** (1.00-2.01)	**1.62** (1.11-2.39)	**1.92** (1.26-2.93)	**2.17** (1.37-3.34)
30-min	**0.632** (0.500-0.801)	**0.756** (0.597-0.959)	**0.979** (0.771-1.25)	**1.18** (0.926-1.52)	**1.49** (1.14-2.03)	**1.76** (1.30-2.42)	**2.04** (1.45-2.90)	**2.34** (1.60-3.46)	**2.78** (1.82-4.24)	**3.14** (1.99-4.83)
60-min	**0.801** (0.634-1.01)	**0.945** (0.747-1.20)	**1.22** (0.957-1.55)	**1.47** (1.15-1.89)	**1.88** (1.44-2.57)	**2.23** (1.65-3.09)	**2.61** (1.87-3.73)	**3.03** (2.07-4.49)	**3.64** (2.39-5.57)	**4.15** (2.63-6.39)
2-hr	**0.970** (0.773-1.22)	**1.14** (0.903-1.43)	**1.45** (1.15-1.83)	**1.76** (1.39-2.24)	**2.26** (1.75-3.08)	**2.70** (2.02-3.72)	**3.18** (2.30-4.52)	**3.72** (2.57-5.47)	**4.51** (2.99-6.84)	**5.16** (3.30-7.88)
3-hr	**1.06** (0.845-1.32)	**1.22** (0.975-1.53)	**1.55** (1.23-1.95)	**1.88** (1.49-2.38)	**2.43** (1.90-3.31)	**2.92** (2.20-4.02)	**3.46** (2.52-4.92)	**4.08** (2.84-5.99)	**5.00** (3.33-7.56)	**5.76** (3.70-8.75)
6-hr	**1.23** (0.990-1.52)	**1.40** (1.12-1.73)	**1.75** (1.40-2.18)	**2.12** (1.69-2.65)	**2.74** (2.16-3.72)	**3.30** (2.52-4.53)	**3.95** (2.90-5.57)	**4.68** (3.29-6.81)	**5.77** (3.89-8.66)	**6.68** (4.35-10.1)
12-hr	**1.44** (1.17-1.78)	**1.63** (1.32-2.01)	**2.03** (1.64-2.51)	**2.44** (1.96-3.03)	**3.13** (2.49-4.20)	**3.75** (2.89-5.09)	**4.46** (3.31-6.23)	**5.27** (3.74-7.60)	**6.47** (4.41-9.62)	**7.47** (4.91-11.1)
24-hr	**1.69** (1.38-2.06)	**1.92** (1.56-2.34)	**2.38** (1.94-2.91)	**2.85** (2.30-3.51)	**3.61** (2.89-4.79)	**4.30** (3.33-5.76)	**5.07** (3.79-7.00)	**5.95** (4.26-8.47)	**7.23** (4.97-10.6)	**8.31** (5.52-12.3)
2-day	**1.94** (1.60-2.34)	**2.23** (1.84-2.70)	**2.80** (2.29-3.39)	**3.35** (2.73-4.09)	**4.24** (3.41-5.55)	**5.02** (3.92-6.65)	**5.89** (4.44-8.03)	**6.86** (4.96-9.66)	**8.28** (5.75-12.0)	**9.46** (6.35-13.8)
3-day	**2.11** (1.75-2.53)	**2.45** (2.02-2.95)	**3.10** (2.55-3.74)	**3.72** (3.05-4.52)	**4.71** (3.80-6.12)	**5.57** (4.37-7.32)	**6.52** (4.94-8.83)	**7.58** (5.50-10.6)	**9.11** (6.36-13.2)	**10.4** (7.01-15.1)
4-day	**2.26** (1.88-2.71)	**2.63** (2.18-3.15)	**3.32** (2.75-4.00)	**3.99** (3.28-4.83)	**5.04** (4.08-6.52)	**5.96** (4.68-7.80)	**6.96** (5.29-9.39)	**8.08** (5.89-11.3)	**9.70** (6.80-13.9)	**11.0** (7.48-16.0)
7-day	**2.68** (2.24-3.19)	**3.08** (2.57-3.67)	**3.83** (3.19-4.58)	**4.55** (3.76-5.46)	**5.67** (4.62-7.27)	**6.65** (5.26-8.63)	**7.73** (5.91-10.3)	**8.92** (6.55-12.3)	**10.6** (7.52-15.2)	**12.1** (8.26-17.3)
10-day	**3.07** (2.58-3.64)	**3.50** (2.94-4.15)	**4.31** (3.60-5.12)	**5.06** (4.21-6.06)	**6.24** (5.09-7.93)	**7.25** (5.76-9.34)	**8.36** (6.42-11.1)	**9.57** (7.06-13.1)	**11.3** (8.05-16.1)	**12.8** (8.79-18.3)
20-day	**4.17** (3.52-4.89)	**4.78** (4.04-5.61)	**5.83** (4.91-6.88)	**6.76** (5.67-8.02)	**8.13** (6.63-10.1)	**9.24** (7.37-11.7)	**10.4** (8.03-13.6)	**11.7** (8.65-15.7)	**13.4** (9.57-18.7)	**14.8** (10.3-20.9)
30-day	**5.05** (4.29-5.90)	**5.82** (4.94-6.80)	**7.10** (6.00-8.32)	**8.18** (6.88-9.64)	**9.69** (7.92-11.9)	**10.9** (8.70-13.6)	**12.1** (9.37-15.6)	**13.4** (9.95-17.8)	**15.0** (10.8-20.8)	**16.4** (11.5-23.0)
45-day	**6.14** (5.24-7.14)	**7.09** (6.05-8.24)	**8.62** (7.33-10.1)	**9.87** (8.35-11.6)	**11.6** (9.46-14.1)	**12.9** (10.3-15.9)	**14.1** (11.0-18.0)	**15.4** (11.5-20.4)	**17.1** (12.3-23.3)	**18.3** (12.9-25.6)
60-day	**7.05** (6.04-8.16)	**8.13** (6.96-9.42)	**9.85** (8.40-11.5)	**11.2** (9.53-13.1)	**13.1** (10.7-15.8)	**14.4** (11.6-17.8)	**15.8** (12.3-20.0)	**17.0** (12.8-22.4)	**18.7** (13.5-25.4)	**19.9** (14.1-27.7)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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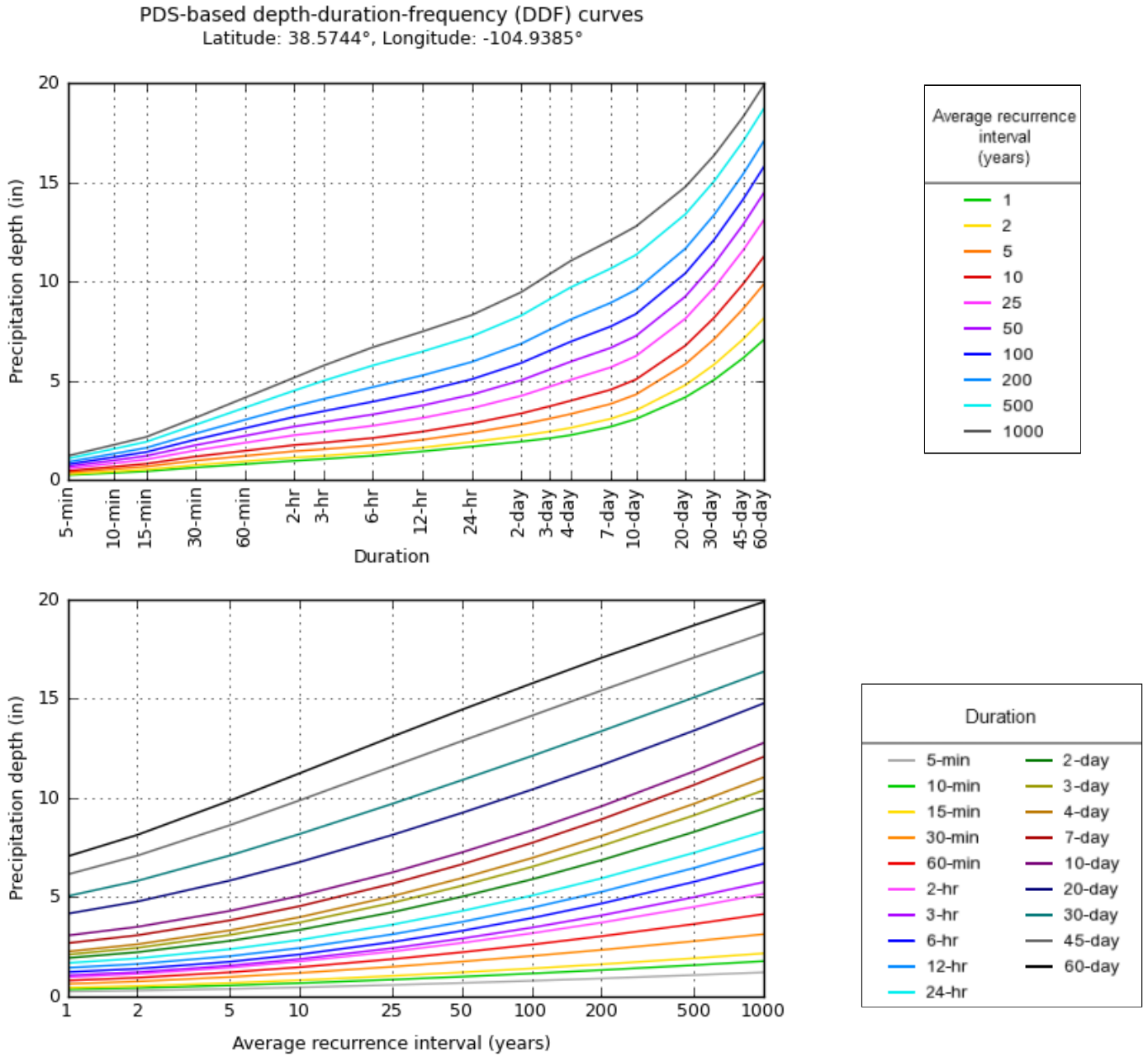
PF graphical



NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Fri Jun 24 18:50:52 2022

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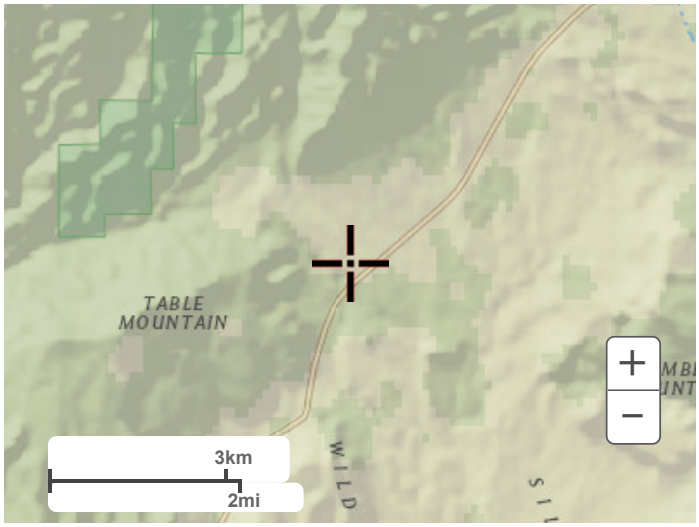
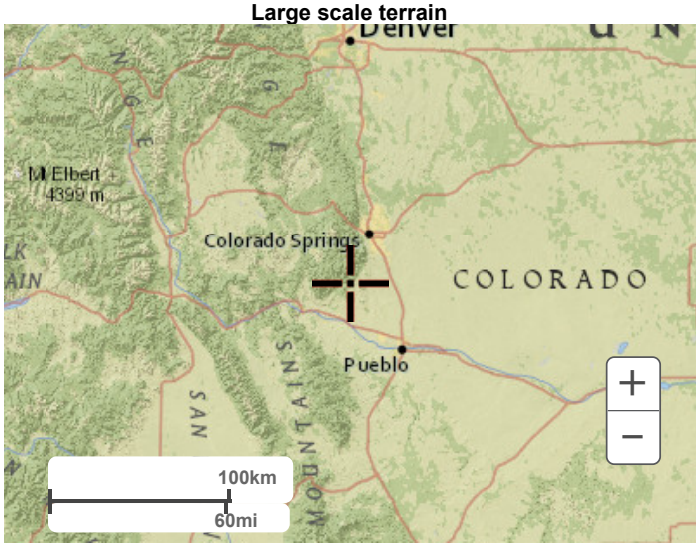
Maps & aerials

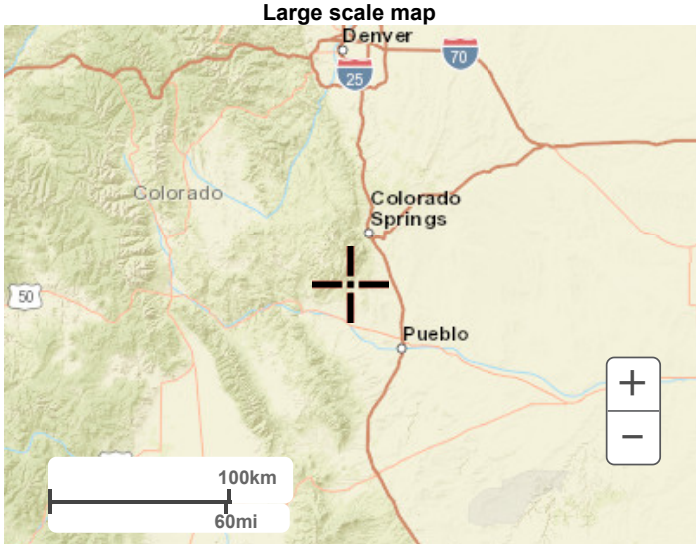
Small scale terrain



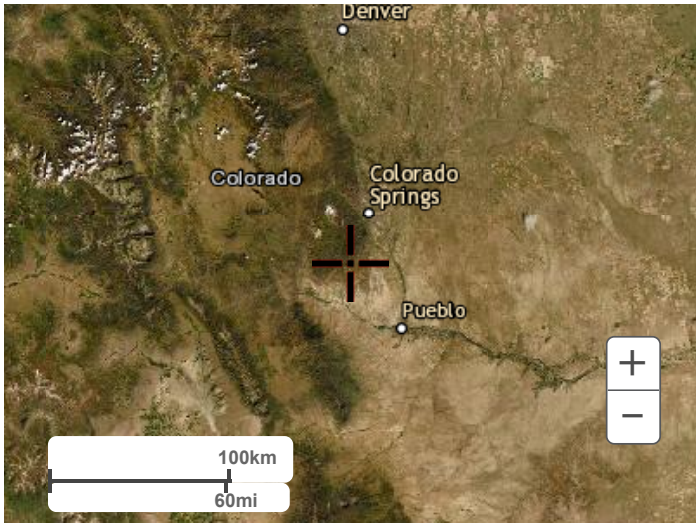
Large scale terrain



Large scale map



Large scale aerial



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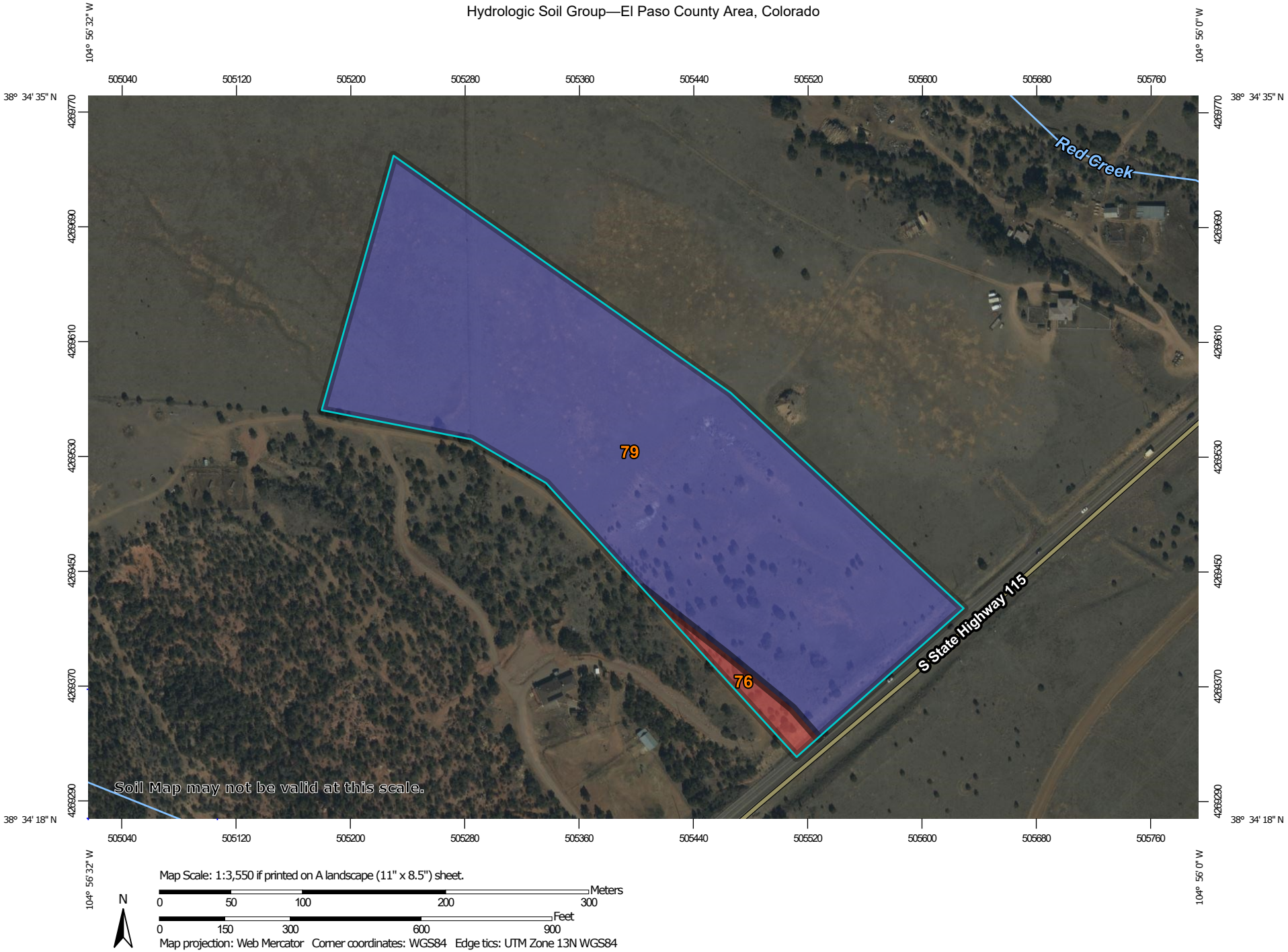
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer


104° 56' 32" W
104° 56' 0" W
38° 34' 35" N
38° 34' 18" N
505040
505120
505200
505280
505360
505440
505520
505600
505680
505760
4269770
4269690
4269610
4269530
4269450
4269370
4269290
Red Creek
79
76
S State Highway 115
Soil Map may not be valid at this scale.
Map Scale: 1:3,550 if printed on A landscape (11" x 8.5") 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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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: Sep 11, 2018—Oct 20, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
76	Rizozo-Neville complex, 3 to 30 percent slopes	D	0.5	3.0%
79	Satanta loam, 0 to 3 percent slopes	B	16.2	97.0%
Totals for Area of Interest			**16.7**	**100.0%**

Description

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.

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.

Rating Options

Aggregation Method: Dominant Condition

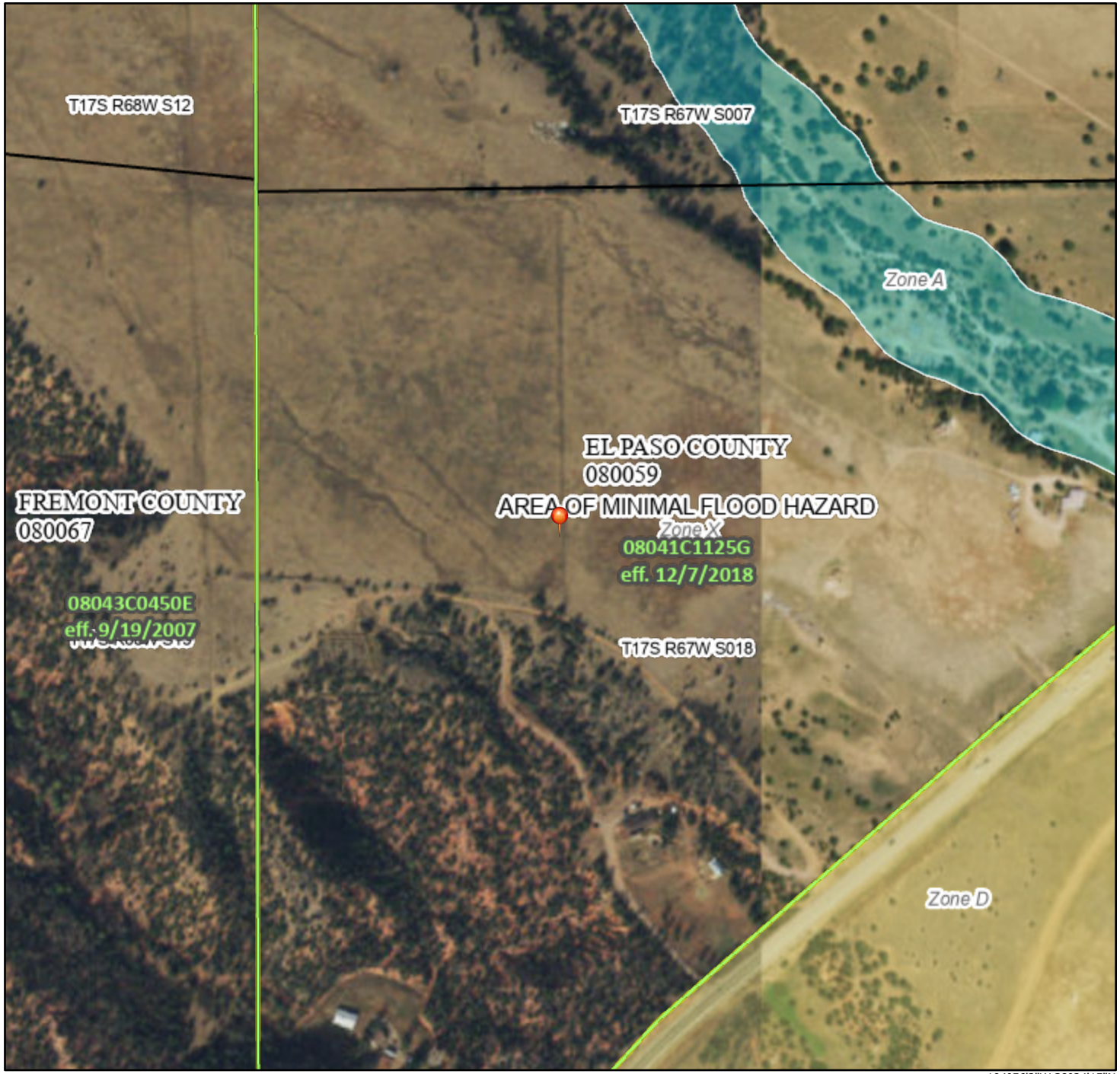
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

National Flood Hazard Layer FIRMette

FEMA

104°56'40"W 38°34'44"N



Feet

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

1:6,000

104°56'3"W 38°34'15"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
- 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 6/20/2022 at 11:41 AM 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.

BASELINE
Engineering · Planning · Surveying

= FORMULA CELLS
= USER INPUT CELLS

PROJECT: ORTON PIT SITE
JOB NO.: 35059
CALC. BY: SPC
DATE: 8/16/2022

Project Location
User Input

IDF Rainfall Data

D	P_1: 1-hour Rainfall Depths (inches)	
	Minor Storm	**Major Storm**
	5-Year	100-Year
Minutes	**1.47**	**2.61**
5	5.22	8.53
10	4.20	6.73
20	3.18	4.92
30	2.58	3.86
40	2.16	3.11
50	1.83	2.52
60	1.56	2.05

Figure 6-5 $I_5=-P_1 \ln(D) + 7.583$; $I_{100}= -P_1 \ln(D) + 12.735$

I = rainfall intensity (inches per hour)

P_1 = 1-hour point rainfall depth (inches)

D = storm duration (minutes)

Reference:

1) El Paso County - Drainage Criteria Manual Volume I, Revised 1987
2) City of Colorado Springs - Drainage Criteria Manual Volume I, May 2014
3) Rainfall depths determined via the NOAA Atlas 14, Volume 8, Version 2 (https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=co)

PROJECT: ORTON PIT SITE
JOB NO.: 35059
CALC. BY: SPC
DATE: 8/16/2022

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Runoff Coefficients & Impervious Values for Rational Method - per CS DCM Vol I, Table 6-6.

	Impervious Percentage	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
UA- Historic Flow Analysis -- Greenbelts	2%	0.03	0.09	0.17	0.26	0.31	0.36
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00

	Impervious Percentage	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00

Hydrologic Soil Group: A or B

PROPOSED COMPOSITE IMPERVIOUSNESS

		Weighted Impervious and C Values							Areas (ac)							
Basin	**Area (ac)**	**Imp.**	**C_2**	**C_5**	**C_{10}**	**C_{25}**	**C_{50}**	**C_{100}**	**UA- Historic Flow Analysis -- Greenbelts, Agriculture**	**Land Use**	**Land Use**	**Land Use**	**Land Use**	**Land Use**	**Land Use**	**Land Use**
Existing Conditions Subbasins																
E1	16.43	2%	0.03	0.09	0.17	0.26	0.31	0.36	16.43							
E2	26.40	2%	0.03	0.09	0.17	0.26	0.31	0.36	26.40							

PROJECT: ORTON PIT SITE
JOB NO.: 35059
CALC. BY: SPC
DATE: 8/16/2022

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Runoff Coefficients & Impervious Values for Rational Method - per CS DCM Vol I, Table 6-6.

	Impervious Percentage	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
UA- Historic Flow Analysis -- Greenbelts	2%	0.03	0.09	0.17	0.26	0.31	0.36
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00

	Impervious Percentage	C_2	C_5	C_{10}	C_{25}	C_{50}	C_{100}
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00
Land Use	0%	0.00	0.00	0.00	0.00	0.00	0.00

Hydrologic Soil Group: A or B

PROPOSED COMPOSITE IMPERVIOUSNESS

		Weighted Impervious and C Values							Areas (ac)							
Basin	**Area (ac)**	**Imp.**	**C_2**	**C_5**	**C_{10}**	**C_{25}**	**C_{50}**	**C_{100}**	**UA- Historic Flow Analysis -- Greenbelts, Agriculture**	**Land Use**	**Land Use**	**Land Use**	**Land Use**	**Land Use**	**Land Use**	**Land Use**
Proposed Conditions Subbasins																
P1	16.43	2%	0.03	0.09	0.17	0.26	0.31	0.36	16.43							

STANDARD FORM SF-1

TIME OF CONCENTRATION SUMMARY

Calculated By: SPC
Date: 8/16/2022

Project: ORTON PIT SITE
Job No.: 35059
Checked By: SGB

SUB-BASIN DATA				INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS)				FINAL t_c	REMARKS
Basin	i	C_5	AREA Ac	LENGTH Ft	SLOPE %	t_i Min	LENGTH Ft	Cv	SLOPE %	VEL. FPS	t_t Min	COMP. t_c	TOT. LENGTH Ft	S_o %	tc (Equation 6-7) Min	Min	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	
Existing Conditions Subbasins																	
E1	0.02	0.09	16.43	100	3.5	12.06	1,516	5	4.0	1.00	25.27	37.3	1,616	3.97	40.2	37.33	
E2	0.02	0.09	26.40	100	3.8	11.74	2,484	5	3.8	0.97	42.48	54.2	2,584	3.80	49.5	49.47	
Proposed Conditions Subbasins																	
P1	0.02	0.09	16.43	100	5.5	10.39	1,578	5	3.7	0.97	27.24	37.6	1,678	3.84	41.0	37.62	

$t_c = t_i + t_t$

$t_i=((0.395(1.1-C_5)SQRT(L))/(S_o\text{^}0.33))$

$V=C_v*S_w^{0.5}$

= FORMULA CELLS
= USER INPUT CELLS

Table 6-7. Conveyance Coefficient, C_v

Heavy meadow	2.5
Tillage/Field	5
Riprap (not buried)*	6.5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

*For bured riprap, select C_v value based on type of vegetative cover.

Calculated By: SPC
Date: 8/16/2022
Checked By: SGB
5-Year 1-hour rainfall= 1.47

STANDARD FORM SF-2

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project: ORTON PIT SITE
Job No.: 35059
Design Storm: 5-Year

= FORMULA CELLS
= USER INPUT CELLS

BASIN	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE			LENGTH (FT)	VELOCITY (FPS)	t_t (MIN)	REMARKS
	DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	t_c (MIN)	C * A (AC)	I (IN/HR)	Q (CFS)	t_c (MIN)	S (C * A) (CA)	I (IN/HR)	Q (CFS)	SLOPE (%)	STREET FLOW	DESIGN FLOW (CFS)	SLOPE (%)	PIPE DIAM. (IN.)				
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Existing Conditions Subbasins																					
E1	1	DP1	16.43	0.09	37.3	1.48	2.15	**3.18**													
E2	2	DP1	26.40	0.09	49.5	2.38	1.73	**4.11**													
Proposed Conditions Subbasins																					
P1	1	DP1	16.43	0.09	37.6	1.48	2.14	**3.17**													

Calculated By: SPC
Date: 8/16/2022
Checked By: SGB
100-Year 1-hour rainfall= 2.61

STANDARD FORM SF-2

STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Project: ORTON PIT SITE
Job No.: 35059
Design Storm: 100-Year

= FORMULA CELLS
= USER INPUT CELLS

BASIN	DIRECT RUNOFF								TOTAL RUNOFF				STREET		PIPE						REMARKS
	DESIGN POINT	AREA DESIGN	AREA (AC)	RUNOFF COEFF	t_c (MIN)	C * A (AC)	I (IN/HR)	Q (CFS)	t_c (MIN)	S (C * A) (CA)	I (IN/HR)	Q (CFS)	SLOPE (%)	STREET FLOW	DESIGN FLOW (CFS)	SLOPE (%)	PIPE DIAM. (IN.)	LENGTH (FT)	VELOCITY (FPS)	t_t (MIN)	
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Existing Conditions Subbasins																					
E1	1	DP1	16.43	0.36	37.3	5.92	3.61	**21.37**													
E2	2	DP1	26.40	0.36	49.5	9.50	2.90	**27.60**													
Proposed Conditions Subbasins																					
P1	1	DP1	16.43	0.36	37.6	5.92	3.59	**21.26**													

PROJECT: ORTON PIT SITE
JOB NO.: 35059
CALC. BY: SPC
DATE: 8/16/2022

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DIRECT RUNOFF SUMMARY

BASIN LABEL	DESIGN POINT	AREA [ac]	Imp. %	C5	C100	LOCAL (CFS)		ACCUMULATIVE (CFS)		Notes
						Q5	Q100	Q5	Q100	
Existing Subbasins										
E2	2	26.40	2%	0.09	0.36	4.11	27.60			
E1	1	16.43	2%	0.09	0.36	3.18	21.37	7.30	48.97	
Proposed Subbasins										
P1	1	16.43	2%	0.09	0.36	3.17	21.26	7.28	48.85	

Worksheet Protected

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

Designer: SPC
Company: Baseline Engineering Corp
Date: August 16, 2022
Project: Orton Pit
Location: El Paso County

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.02	inches
***Minor Storm: 1-Hour Rain Depth	5-Year Event	1.22	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.61	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event	2.61	
Max Intensity for Optional User Defined Storm	2.60478		

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	**P1**													
Receiving Pervious Area Soil Type	Loam													
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	16.43													
Directly Connected Impervious Area (DCIA, acres)	0.00													
Unconnected Impervious Area (UIA, acres)	0.00													
Receiving Pervious Area (RPA, acres)	0.00													
Separate Pervious Area (SPA, acres)	16.43													
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C													

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	16.430													
Directly Connected Impervious Area (DCIA, %)	0.0%													
Unconnected Impervious Area (UIA, %)	0.0%													
Receiving Pervious Area (RPA, %)	0.0%													
Separate Pervious Area (SPA, %)	100.0%													
A_R (RPA / UIA)	0.000													
I_a Check	1.000													
f / I for WQCV Event:	28.7													
f / I for 5-Year Event:	0.4													
f / I for 100-Year Event:	0.2													
f / I for Optional User Defined Storm CUHP:	0.18													
IRF for WQCV Event:	1.00													
IRF for 5-Year Event:	1.00													
IRF for 100-Year Event:	1.00													
IRF for Optional User Defined Storm CUHP:	1.00													
Total Site Imperviousness: I_{total}	0.0%													
Effective Imperviousness for WQCV Event:	0.0%													
Effective Imperviousness for 5-Year Event:	0.0%													
Effective Imperviousness for 100-Year Event:	0.0%													
Effective Imperviousness for Optional User Defined Storm CUHP:	0.0%													

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
This line only for 10-Year Event	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:	0.0%													

Total Site Imperviousness:	**0.0%**
Total Site Effective Imperviousness for WQCV Event:	**0.0%**
Total Site Effective Imperviousness for 5-Year Event:	**0.0%**
Total Site Effective Imperviousness for 100-Year Event:	**0.0%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	**0.0%**

Notes:

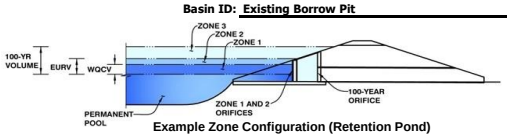
* Use Green-Ampt average infiltration rate values from Table 3-3.
** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.
*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: **Orton Pit (THIS SHEET ONLY USED FOR VOLUME CALCULATIONS)**

Basin ID: **Existing Borrow Pit**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	RP		**Note: L / W Ratio > 8**
Watershed Area =	42.83	acres	**L / W Ratio = 8.6**
Watershed Length =	4,005	ft	
Watershed Length to Centroid =	1,825	ft	
Watershed Slope =	0.020	ft/ft	
Watershed Imperviousness =	2.00%	percent	
Percentage Hydrologic Soil Group A =	0.0%	percent	
Percentage Hydrologic Soil Group B =	100.0%	percent	
Percentage Hydrologic Soil Groups C/D =	0.0%	percent	
Target WQCV Drain Time =		hours	**Drain Time Too Short**
Location for 1-hr Rainfall Depths =	User Input		

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =		acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =		acre-feet		acre-feet
2-yr Runoff Volume (P1 = 0.95 in.) =	0.039	acre-feet	0.95	inches
5-yr Runoff Volume (P1 = 1.22 in.) =	0.288	acre-feet	1.22	inches
10-yr Runoff Volume (P1 = 1.47 in.) =	0.787	acre-feet	1.47	inches
25-yr Runoff Volume (P1 = 1.88 in.) =	2.485	acre-feet	1.88	inches
50-yr Runoff Volume (P1 = 2.23 in.) =	3.612	acre-feet	2.23	inches
100-yr Runoff Volume (P1 = 2.61 in.) =	5.216	acre-feet	2.61	inches
500-yr Runoff Volume (P1 = 3.64 in.) =	8.873	acre-feet	3.64	inches
Approximate 2-yr Detention Volume =		acre-feet		
Approximate 5-yr Detention Volume =		acre-feet		
Approximate 10-yr Detention Volume =		acre-feet		
Approximate 25-yr Detention Volume =		acre-feet		
Approximate 50-yr Detention Volume =		acre-feet		
Approximate 100-yr Detention Volume =		acre-feet		

Define Zones and Basin Geometry

Select Zone 1 Storage Volume (Required) =		acre-feet
Select Zone 2 Storage Volume (Optional) =		acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =		acre-feet
Initial Surcharge Volume (ISV) =	N/A	ft^3
Initial Surcharge Depth (ISD) =	N/A	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	N/A	ft
Slope of Trickle Channel (S_{TC}) =	N/A	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

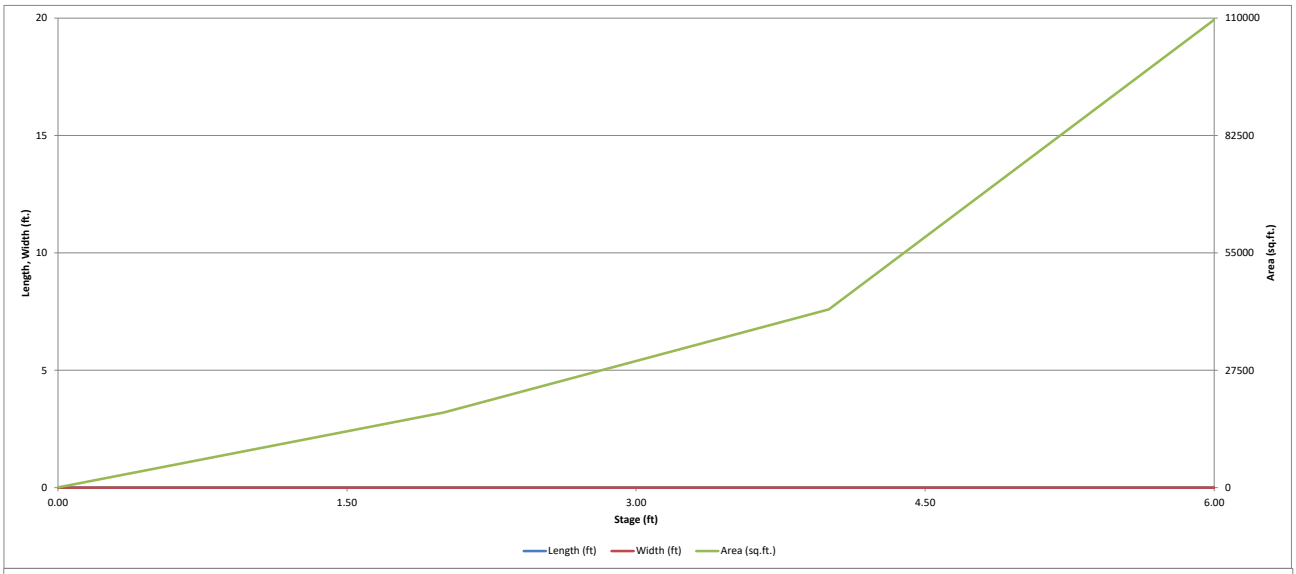
Initial Surcharge Area (A_{ISV}) =		ft^2
Surcharge Volume Length (L_{ISV}) =		ft
Surcharge Volume Width (W_{ISV}) =		ft
Depth of Basin Floor (H_{FLOOR}) =		ft
Length of Basin Floor (L_{FLOOR}) =		ft
Width of Basin Floor (W_{FLOOR}) =		ft
Area of Basin Floor (A_{FLOOR}) =		ft^2
Volume of Basin Floor (V_{FLOOR}) =		ft^3
Depth of Main Basin (H_{MAIN}) =		ft
Length of Main Basin (L_{MAIN}) =		ft
Width of Main Basin (W_{MAIN}) =		ft
Area of Main Basin (A_{MAIN}) =		ft^2
Volume of Main Basin (V_{MAIN}) =		ft^3
Calculated Total Basin Volume (V_{total}) =		acre-feet

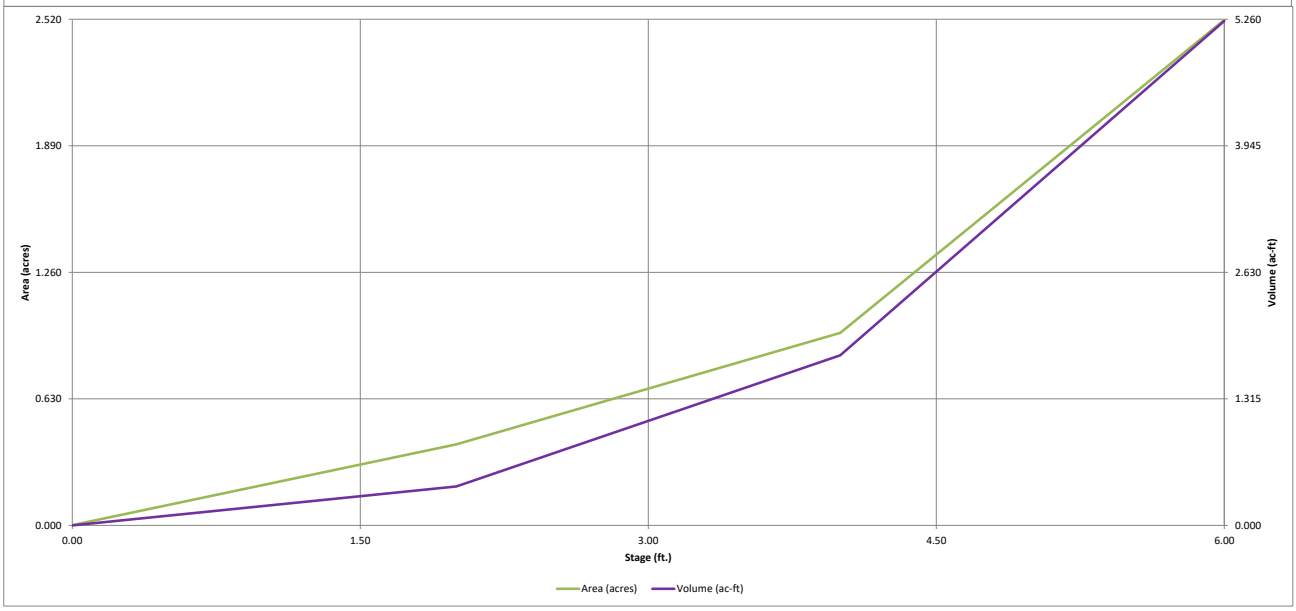
Depth Increment = ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Permanent Pool	--	0.00	--	--	--	54	0.001		
	--	2.00	--	--	--	17,574	0.403	17,628	0.405
	--	4.00	--	--	--	41,758	0.959	76,960	1.767
	--	6.00	--	--	--	109,623	2.517	228,341	5.242

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)





PROJECT NAME: ORTON PIT
PROJECT NUMBER: 385
CALCULATED BY: SPC
CHECKED BY: SGB

Existing Borrow Pit Storage Calculations

Existing Volume

Stage (ft)	Contour Elevation (ft)	Area (ft^2)	Total Volume (ft^3)	Total Volume (ac-ft)
0	6374	54	0	0.000
2	6376	17,574	17,628	0.405
4	6378	41,758	76,960	1.767
6	6380	109,623	228,341	5.242

Stormwater Runoff Quantities (from MHFD Detention Workbook v.4.06)

	Volume (AC-FT)	Volume (CF)	WSEL	Depth (ft)
5-YR	0.288	12,545	6375.42	1.42
100-YR	5.216	227,209	6379.99	5.99

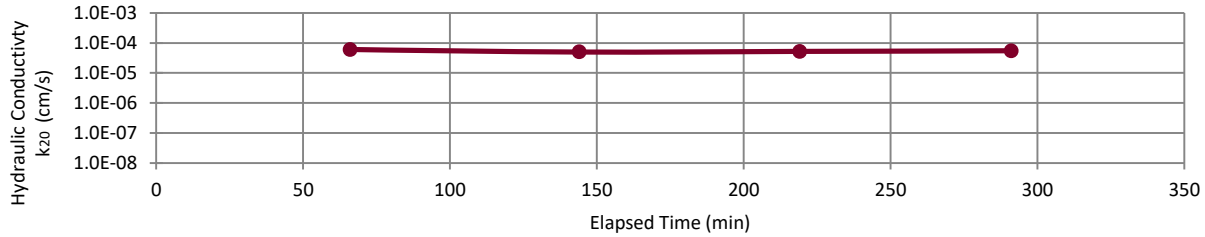
*This calculation assumes no additional infiltration within the exisitng borrow pit depression. Runoff quantities reaching the existing borrow pit depression will remain unchanged from historic to proposed conditions.

GROUND ENGINEERING

Client:	Castle Rock Construction Company, Inc.
Project No.:	22-1154
Report Date:	8/12/2022
Reviewed By:	EK

CRCC Laboratory Testing Services

Permeability - Flexible Wall (ASTM D5084)



Method	Tested By	Prep.	Specific Gravity	Water Density (pcf)
C - Falling Head, Rising Tailwater	JW	Remold	2.65 Estimated	62.24

Specimen Data		
Property	**Pre-Test**	**Post-Test**
Mass (gm)	653.1	662.7
Average Diameter (in)	2.790	2.788
Diameter Variation (%)	0.1	0.1
Average Length (in)	2.987	2.970
Length Variation (%)	0.1	0.1
Area (in^2)	6.112	6.105
Volume (in^3)	18.255	18.133
Wet Density (pcf)	136.3	139.2
Moisture (%)	10.2	12.1
Dry Density (pcf)	123.6	124.2
Void Ratio	0.334	0.328
Saturation (%)	81	98

Back Pressure Saturation / Consolidation	
Permeant	Deaired Tap Water
Start Date	8/9/22
Cell Pressure (psi)	45.0
Back Pressure (psi)	40.0
Effective Consol. Stress (psi)	5.0
B-Value	0.98

Permeation Conditions	
Inflow Burette Area (cm^2)	1.00
Outflow Burette Area (cm^2)	1.00
Cell Pressure (psi)	45.0
Top Cap Pressure (psi)	40.0
Base Cap Pressure (psi)	40.0

Permeation Trial Data

Date	Time	Temp. ºC	Heads (cm)			Incremental Volumes (cm^3)		Gradient	Hydraulic Conductivity at 20ºC	
			Elev.	Pressure	Total	Outflow	Inflow		m/s	cm/s
8/11	8:00	23.0	15.0	0.0	15.0	0.00	0.00	2.0	-	-
8/11	9:06	23.3	1.0	0.0	1.0	7.00	7.00	0.1	6.1E-07	6.1E-05
8/11	10:00	23.3	15.0	0.0	15.0	0.00	0.00	2.0	-	-
8/11	11:18	23.7	1.0	0.0	1.0	7.00	7.00	0.1	5.1E-07	5.1E-05
8/11	11:30	23.7	15.0	0.0	15.0	0.00	0.00	2.0	-	-
8/11	12:45	24.1	1.0	0.0	1.0	7.00	7.00	0.1	5.2E-07	5.2E-05
8/11	13:00	24.1	15.0	0.0	15.0	0.00	0.00	2.0	-	-
8/11	14:12	23.4	1.0	0.0	1.0	7.00	7.00	0.1	5.5E-07	5.5E-05
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
								Average	**5.5E-07**	**5.5E-05**

Sample:	Client delivered	*Classification:*	-	*< No. 200 (%):*	22.3
Description:	Sand with silt and gravel	*Liquid Limit:*	-		
		Plasticity Index:	-		

Test Remarks: Only the material passing the 1/2 inch sieve was used for testing.

Results apply only to the specific items and locations referenced and at the time of testing. Results should be evaluated and applied to the project by qualified personnel. This report should not be reproduced, except in full, without the written permission of GROUND Engineering Consultants, Inc.

APPENDIX C

BASELINE
Engineering · Planning · Surveying

LEGEND

EXISTING LINETYPES	PROPOSED LINETYPES	
		PROPERTY BOUNDARY
		RIGHT-OF-WAY
81	81	MINOR CONTOUR (2' INTERVAL)
5280	5280	MAJOR CONTOUR (10' INTERVAL)
		EDGE OF ASPHALT
		EDGE OF GRAVEL
		WIRE FENCE
		DRAINAGE BASIN
HVT	HVT	HIGH VOLTAGE TRANSMISSION

EXISTING SYMBOLS / PROPOSED SYMBOLS

3:1 / 3:1 — NOMINAL SLOPE ON CUT OR FILL

FLOW DIRECTION

0 — DESIGN POINT DESIGNATION

A — BASIN ID
B — BASIN AREA (ACRES)
C — 100YR COEFFICIENT
D — 5YR COEFFICIENT

DIRECT RUNOFF SUMMARY

BASIN LABEL	DESIGN POINT	AREA [ac]	Imp. %	C5	C100	LOCAL (CFS)		ACCUMULATIVE (CFS)		Notes
						Q5	Q100	Q5	Q100	
Existing Subbasins										
E2	2	26.40	2%	0.09	0.36	4.11	27.60			
E1	1	16.43	2%	0.09	0.36	3.18	21.37	7.30	48.97	

EL PASO COUNTY NOTE:
CITY/COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH CITY/COUNTY DESIGN CRITERIA. THE CITY/COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE CITY/COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

N

GRAPHIC SCALE
100 0 100 200
(IN FEET)
1 INCH = 100 FT

BASELINE
Engineering · Planning · Surveying
1046 ELKTON DRIVE · COLORADO SPRINGS, COLORADO 80907
P. 7193318200 · F. 7193318299 · www.baselinecorp.com

DESIGNED BY SPC
DRAWN BY SPC
CHECKED BY SGB

PREPARED BY SPC
DATE 08/19/22

REVISION DESCRIPTION
REVISED PER EPC COMMENTS

CASTLE ROCK CONSTRUCTION COMPANY
UNINCORPORATED
EL PASO COUNTY

ORTON PIT SITE
17710 COLO 115
EXISTING CONDITIONS DRAINAGE PLAN

PREPARED UNDER THE DIRECT SUPERVISION OF

FOR AND ON BEHALF OF BASELINE CORPORATION

INITIAL SUBMITTAL	01/12/22
DRAWING SIZE	24" X 36"
SURVEY FIRM	SURVEY DATE
JOB NO.	35059
DRAWING NAME	35059 – Drainage Plans.dwg
SHEET	01 OF 02

DNG01

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LEGEND

EXISTING LINETYPES	PROPOSED LINETYPES	
		PROPERTY BOUNDARY
		RIGHT-OF-WAY
81	81	MINOR CONTOUR (2' INTERVAL)
5280	5280	MAJOR CONTOUR (10' INTERVAL)
		EDGE OF ASPHALT
		EDGE OF GRAVEL
		WIRE FENCE
		DRAINAGE BASIN
HVT	HVT	HIGH VOLTAGE TRANSMISSION

EXISTING SYMBOLS / PROPOSED SYMBOLS

3:1 / 3:1 — NOMINAL SLOPE ON CUT OR FILL

FLOW DIRECTION

0 — DESIGN POINT DESIGNATION

A / B / C D

A = BASIN ID

B = BASIN AREA (ACRES)

C = 100YR COEFFICIENT

D = 5YR COEFFICIENT

DIRECT RUNOFF SUMMARY

BASIN LABEL	DESIGN POINT	AREA [ac]	Imp. %	C5	C100	LOCAL (CFS) Q5	LOCAL (CFS) Q100	ACCUMULATIVE (CFS) Q5	ACCUMULATIVE (CFS) Q100	Notes
Proposed Subbasins										
E2	2	26.40	2%	0.09	0.36	4.11	27.60			
P1	1	16.43	2%	0.09	0.36	3.17	21.26	7.28	48.85	

EL PASO COUNTY NOTE:
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DESIGNED BY SPC | DRAWN BY SPC | CHECKED BY SGB

REVISION DESCRIPTION	PREPARED BY	DATE
REVISED PER EPC COMMENTS	SPC	08/19/22

CASTLE ROCK CONSTRUCTION COMPANY
UNINCORPORATED EL PASO COUNTY

ORTON PIT SITE
17710 COLO 115
PROPOSED DRAINAGE PLAN

PREPARED UNDER THE DIRECT SUPERVISION OF

FOR AND ON BEHALF OF BASELINE CORPORATION

INITIAL SUBMITTAL	07/12/22
DRAWING SIZE	24" X 36"
SURVEY FIRM	SURVEY DATE
JOB NO.	35059
DRAWING NAME	35059 – Drainage Plans.dwg
SHEET	02 OF 02

DNG02

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APPENDIX D

BASELINE
Engineering · Planning · Surveying

Office (303) 688-6611
Fax (303) 688-6685

6374 S. Racine Circle Centennial, Colorado 80111

www.castlerockconstructionco.com

August 17th, 2022

El Paso County Planning and
Community Development Department
2880 International Circle, Suite 110
Colorado Springs, CO 80910

Re: Water Rights Documents for the Proposed Orton Pit

To Whom it Concerns,

Following the completion of the final drainage report it was confirmed by Baseline Engineering that the Orton Pit will not retain water following completion of the project, and will convey all storm drainage in the same pattern that the existing drainage follows. Due to this fact CRCC does not intend to acquire water rights, since they will not be legally required.

Following conversations with Dan Henrichs the Division 2, District 12 Water Commissioner for the Colorado Division of Water Resources, it was confirmed that no water rights are required for the proposed pit. Attached is an email from Mr. Henrichs confirming this.

Sincerely,

Travis Bell
General Superintendent

Travis Bell

From: Henrichs - DNR, Dan <dan.henrichs@state.co.us>
Sent: Wednesday, August 17, 2022 12:06 PM
To: Travis Bell
Cc: Amy Brooks
Subject: Re: Orton Borrow Pit

Follow Up Flag: Follow up
Flag Status: Flagged

Travis yes you are good with DWR

On Tue, Aug 16, 2022 at 5:25 PM Travis Bell <tbell@crccllc.com> wrote:

> Dan-
>
> Like we spoke earlier today I just want to confirm that we are in the clear concerning the Orton Borrow pit which is currently permitted through the Division of Mining Reclamation and Safety. This pit has been designed to freely drain to an existing depression and the newly excavated pit will not retain any water in accordance with our mining permit. Baseline Engineering performed a drainage report for us which confirmed that all the final flow patterns will remain the same as the historic flows going into the existing depression, thus we will not be affecting the historic drainage patterns in this area. All dust suppression water will be obtained through our SWSP in Penrose (WDID 1203393). In accordance with our mining permit, we will be leaving a minimum of two feet of cover above any ground water we encounter. If all the above is true, can you please confirm that we should be clear with regards to Division of Water Resources regulations?
>
> Best Regards,
>
> Travis Bell
>
> General Superintendent
>
> Castle Rock Construction Company of Colo. LLC
>
> (720) 273-6227

--

Dan Henrichs
District 12 Water commissioner

COLORADO
Division of Water Resources
Department of Natural Resources

dan.henrichs@state.co.us
719-269-2800 cell
P.O. Box 304
Florence CO 81226
water.state.co.us