# Drainage Report
# 8830 Mustang Place, Colorado Springs, CO 80908

**PREPARED FOR:** Mike Cartmell

**PREPARED BY:** WaterVation, PLLC

**DATE:** May 10th, 2022

PCD File No. VR-224

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## 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.

_____          _____
*[Name, P.E. #_____ ]*                          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, Title]*                                    Date
*[Business Name]*
*[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.

_____          _____
Jennifer Irvine, P.E.                                Date
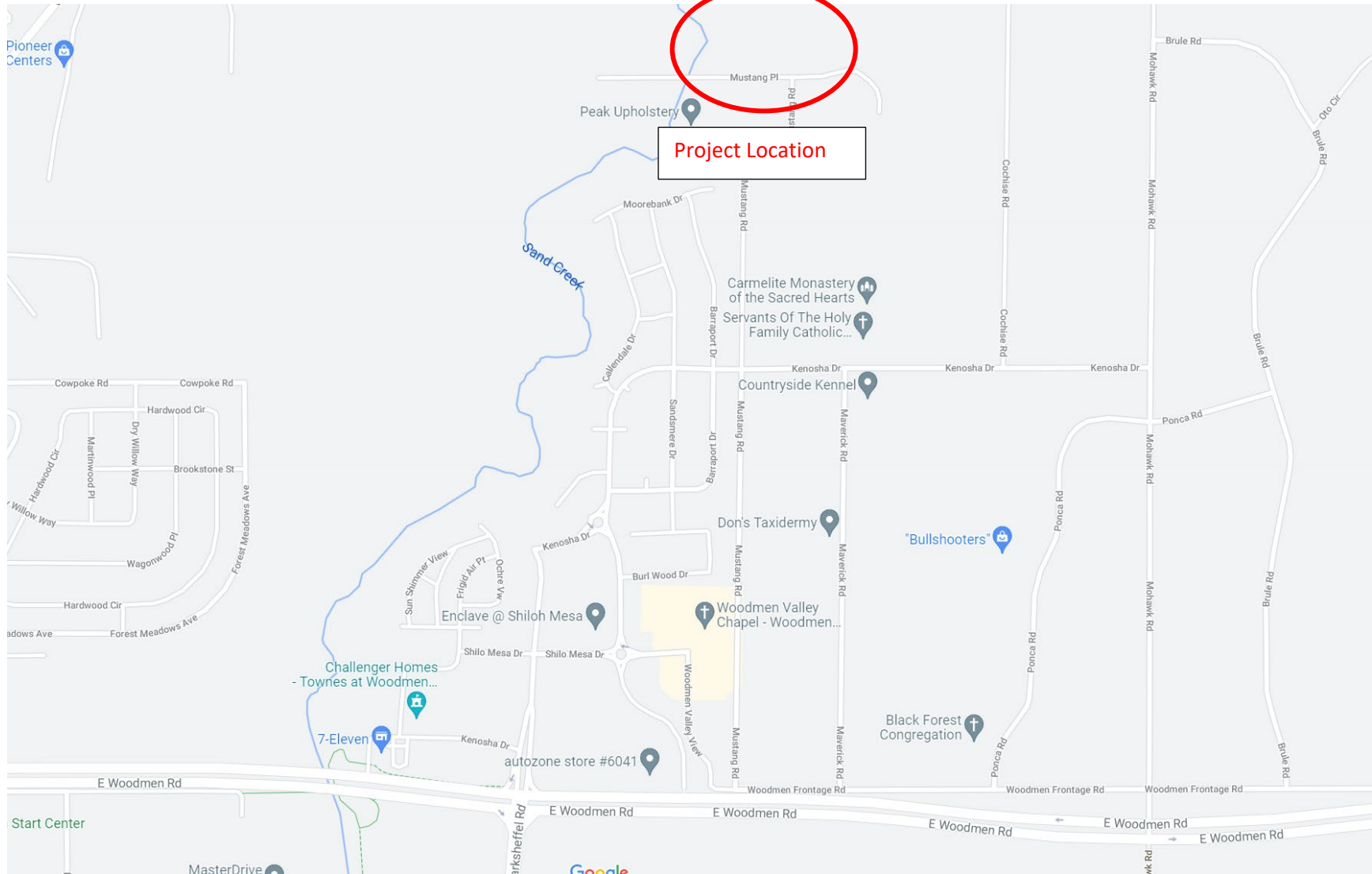County Engineer / ECM Administrator

Conditions:


## Project Description

This Project is located approximately 0.75 miles to the north of the intersection of East Woodmen Road and Marksheffel Road (Figure 1). The Project area is comprised of one 5.37-acre lot and is proposed to be subdivided into two lots.

*Figure 1. Site Map*

Update drainage fee calculations to use the 2022 fee schedule. Also, show breakdown of calculations in this narrative.

## Purpose

The purpose of this drainage report is to evaluate existing and proposed drainage characteristics for the proposed subdivision of 8830 Mustang Place, Colorado Springs, CO 80908 (Project).  This report was prepared on September 24th, 2021.

## Drainage Fee

The property is in Sand Creek Drainage basin, which is studied and has drainage/bridge fees associated with it.  Per ECM table 3-1 in appendix L the drainage fee is $18,940/impervious acre and bridge fee is $5,559/impervious acre.  The property has a total of 0.31 impervious acres which equates to $5863.05 of bridge fee and $1720.84 of drainage fee.

## Drainage Basin Characteristics

The existing and proposed lot slopes to the south and southwest at slopes ranging from 0.005 ft/ft to 0.01 ft/ft.  The Project area was delineated into five drainage basins and four different design points.  Existing impervious area was delineated using aerial imagery flown in July 2021. Proposed impervious area was established by the property owner.

The Natural Resources Conservation Service (NRCS) Web Soil Survey was referenced to identify hydrologic soil groups within the Project area.  The Project area is comprised of Hydrologic Soil Group (HSG) A and HSG B soils.  However, HSG B soils were assumed to be the most representative of existing conditions since most of the existing Project area has either been developed or the soils have been modified (compacted) through the process of development. Soil conditions for all basins will remain unchanged in proposed conditions.

Hydrologic soil groups are based on estimates of runoff potential.  HSG A soils have 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.  HSG B soils have 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.  Soil maps for the Project area are provided in Appendix A.

Peak flow rates were calculated using the Rational Method with precipitation data from Figure 6-5 of El Paso County's DCM.  Runoff coefficients were calculated as a function of impervious area storm frequency using impervious area.  A summary of estimated peak flows for existing conditions is provided in Table 1.

*Table 1. Peak Flows for Existing Conditions*

| EXISTING SUBBASIN CHARACTERISTICS | | | | EXISTING PEAK FLOW (CFS) | | |
|---|---|---|---|---|---|---|
| SUBBASIN | AREA (AC) | NRCS HYDROLOGIC SOIL GROUP | PERCENT IMPERVIOUS | 2-YR | 25-YR | 100-YR |
| A | 0.36 | B | 0.00% | 0.00 | 0.40 | 0.90 |
| B | 0.96 | B | 7.16% | 0.09 | 1.21 | 2.46 |
| C | 3.60 | B | 3.84% | 0.15 | 3.59 | 7.59 |
| D | 1.49 | B | 1.14% | 0.02 | 1.74 | 3.81 |
| E | 0.55 | B | 1.39% | 0.01 | 0.56 | 1.23 |

Unresolved. Please provide a narrative for each basin and design points in the existing and proposed conditions.
Please see DCM Vol.1 section 4.4 for final drainage report contents. Revise report to include missing sections.
Address where do flows go after they exit the property and do they exit at a suitable outfall?

Analysis of the 5-year and the 100-year storms are required. Update the tables to include flows for the 5-year storm.

## Proposed Drainage Characteristics

The only alteration to proposed conditions is the addition of 3,000 square-feet of impervious area in Subbasin B. A summary of estimated peak flows for proposed conditions is provided in Table 2.

*Table 2. Peak Flows for Proposed Conditions*

| PROPOSED SUBBASIN CHARACTERISTICS | | | | PROPOSED PEAK FLOW (CFS) | | |
|---|---|---|---|---|---|---|
| SUBBASIN | AREA (AC) | NRCS HYDROLOGIC SOIL GROUP | PERCENT IMPERVIOUS | 2-YR | 25-YR | 100-YR |
| A | 0.36 | B | 0.00% | 0.00 | 0.40 | 0.90 |
| B | 0.96 | B | 15.28% | 0.24 | 1.46 | 2.73 |
| C | 3.60 | B | 3.84% | 0.15 | 3.59 | 7.59 |
| D | 1.49 | B | 1.14% | 0.02 | 1.74 | 3.81 |
| E | 0.55 | B | 1.39% | 0.01 | 0.56 | 1.23 |

## Detention & Water Quality

It is assumed that detention is not required for this site since the increase in peak flow rate does not exceed 0.22 cfs for any design point (Table 3).

*Table 3. Peak Flow Increase at Design Point*

| DESIGN POINT SUMMARY | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DESIGN POINT | EXISTING PEAK FLOW (CFS) | | | PROPOSED PEAK FLOW (CFS) | | | DIFFERENCE (CFS) | | |
| | 2-YR | 25-YR | 100-YR | 2-YR | 25-YR | 100-YR | 2-YR | 25-YR | 100-YR |
| 1 | 0.00 | 0.40 | 0.90 | 0.00 | 0.40 | 0.90 | 0.00 | 0.00 | 0.00 |
| 2 | 0.22 | 4.63 | 9.69 | 0.33 | 4.83 | 9.91 | 0.11 | 0.20 | 0.22 |
| 3 | 0.02 | 1.74 | 3.81 | 0.02 | 1.74 | 3.81 | 0.00 | 0.00 | 0.00 |
| 4 | 0.01 | 0.56 | 1.23 | 0.01 | 0.56 | 1.23 | 0.00 | 0.00 | 0.00 |

## Regulatory Floodplains

No regulatory floodplains exist on-site.

Provide FIRM Panel number and effective date in narrative.

Provide any exceptions that justify water quality not being necessary for the development.

Unresolved. Please provide a conclusion summarizing what is being proposed and include potential impacts and mitigation if applicable.

## References

City of Colorado Springs, Drainage Criteria Manual Volume 1, May 2014.

El Paso Engineering Criteria Manual, 2018

Mile High Flood Control District, UD Rational 2.00

Natural Resources Conservation Service (NRCS) Web Soil Survey

## Drainage Plan

## GENERAL NOTES & LEGEND

1. TBD



**A** — SUBBASIN ID
1.1 | 3.6 — IMPERVIOUS AREA (%)
— SUBBASIN AREA (ACRES)

**1** — DESIGN POINT

———— SUBBASIN BOUNDARY
LONGEST FLOW PATH

IMPERVIOUS AREA (EXISTING)

IMPERVIOUS AREA (PROPOSED)

— — — — EXISTING CONTOUR

———— PROPOSED CONTOUR

(2000)  EXISTING CONTOUR ELEVATION
2000   PROPOSED CONTOUR ELEVATION

## SURVEY CONTROL

CONTROL POINT NUMBER XXXX
NORTHING:  XXX
EASTING:  XXX
ELEVATION:  XXX
NAD 83 COLORADO STATE PLANES, U.S. FOOT, CODE CO83-CF
NAVD 88

Sub-Consultants

Horizontal Scale & Orientation

Legend

| Revision | | | By | Appd. | YY.MM.DD |
|---|---|---|---|---|---|

| Issued | | | By | Appd. | YY.MM.DD |
|---|---|---|---|---|---|

| File Name: | | LTB | ---- | LTB | 21.09.20 |
|---|---|---|---|---|---|
| | | Dwn. | Chkd. | Dsgn. | YY.MM.DD |

Permit-Seal

**Client/Project**
----
MUSTANG PL. & CHAPARRAL LP. DRAINAGE

EL PASO COUNTY,          CO

**Project Milestone**
----

**Sheet Name**
GENERAL NOTES & LEGEND

| 2021006027 | NTS |
|---|---|
| Project No. | Horizontal Scale |

Sheet 1 of 7

Offiste flow is not expected for this project based on evaluation of existing topography.

Move drainage maps to the end of the report contents.

Unresolved. Update drainage map to include offsite subbasins that drain into the site. Show contours in the adjacent areas.

Provide a basin/ design point summary table in each drainge map sheet.

A | 0.36 | 0.0%
B | 0.96 | 7.2%
C | 3.6 | 3.8%
D | 1.49 | 1.1%
E | 0.55 | 1.4%

Sub-Consultants

Horizontal Scale & Orientation

N

0        100        200

Legend

Revision | | By | Appd. | YY.MM.DD

Issued | | By | Appd. | YY.MM.DD

File Name: | LTB | ---- | LTB | 21.09.20
 | Dwn. | Chkd. | Dsgn. | YY.MM.DD

Permit-Seal

Client/Project
----
MUSTANG PL. & CHAPARRAL LP. DRAINAGE

EL PASO COUNTY,        CO

Project Milestone
----

Sheet Name
EX DRAINAGE PLAN-MUSTANG PLACE

2021006027 | 1" = 100'
Project No. | Horizontal Scale

Sheet 2 of 7

ORIGINAL SHEET - ANSI B

Offiste flow is not expected for this project based on evaluation of existing topography.

Move drainage maps to the end of the report contents.

Unresolved. Update drainage map to include offsite subbasins that drain into the site. Show contours in the adjacent areas.

A 0.36 0.0%

E 0.55 1.4%

C 3.6 3.8%

B 0.96 7.2%

D 1.49 1.1%

Unresolved. Please provide a drainage easement for any areas where runoff exceeds 15 cfs per ECM 3.3.4.A. Discuss in a narrative whether a drainage easement is necessary or not. Provide justification.

Provide a basin/ design point summary table in each drainge map sheet.

Sub-Consultants

Horizontal Scale & Orientation

N

0          100          200

Legend

Revision                    By   Appd.  YY.MM.DD

Issued                      By   Appd.  YY.MM.DD

File Name:          LTB    ----   LTB    21.09.20
                    Dwn.  Chkd.  Dsgn.  YY.MM.DD

Permit-Seal

Client/Project
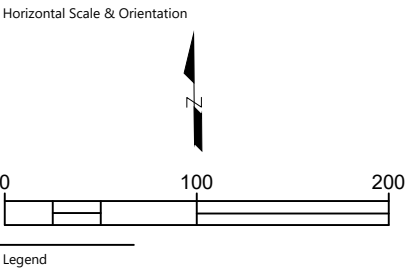----
MUSTANG PL. & CHAPARRAL LP. DRAINAGE

EL PASO COUNTY,          CO

Project Milestone
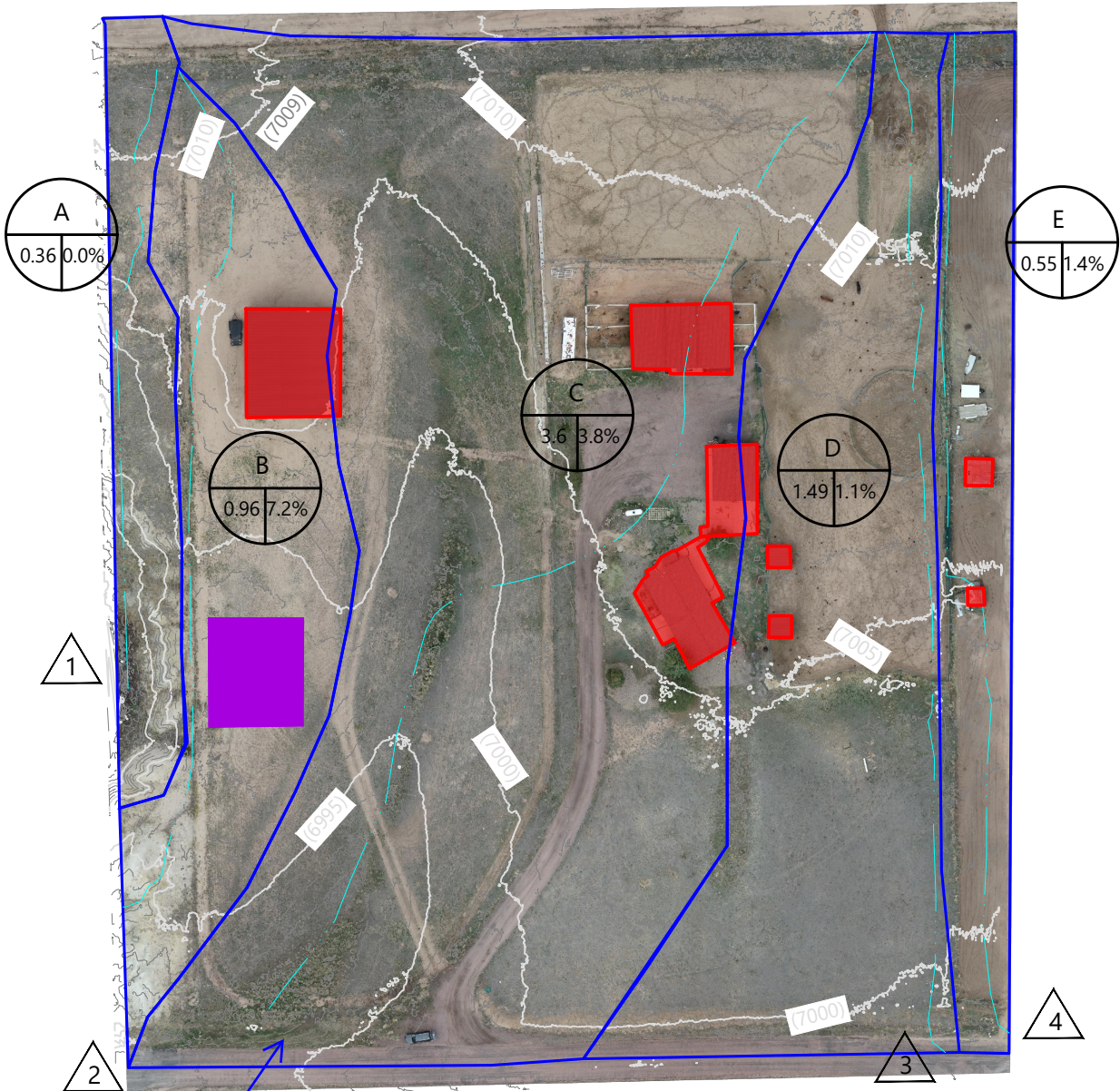----

Sheet Name
PR DRAINAGE PLAN-MUSTANG PLACE

2021006027     1" = 100'
Project No.        Horizontal Scale

Sheet 3   of  7

ORIGINAL SHEET - ANSI B

## Appendix A

A summary of the hydrologic calculations for this Project are provided in Table 3 and Table 4.  Rational calculations were performed using the UD-RATIONAL 2.00 software.

*Table 4. Hydrologic Calculations for Existing Conditions*

### Calculation of Peak Runoff using Rational Method

**Designer:** L. Babbitt    Version 2.00 released May 20    Clear Worksheet
**Company:** WaterVation
**Date:** 5/10/2022
**Project:** 8330 Mustang Place
**Location:** El Paso County, CO

Cells of this color are for required user-inp
Cells of this color are for optional override
Cells of this color are for calculated results

$t_i = \dfrac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$

Computed $t_c = t_i + t_t$

$t_t = \dfrac{L_t}{60K\sqrt{S_t}} = \dfrac{L_t}{60V_t}$

Regional $t_c = (26 - 17i) + \dfrac{L_t}{60(14i + 9)\sqrt{S_t}}$

$t_{minimum} = 5$ (urban)
$t_{minimum} = 10$ (non-urban)

Selected $t_c = \max\{t_{minimum}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$

...ation for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA wet

| | 2-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | 500-yr |
|---|---|---|---|---|---|---|---|
| 1-hour rainfall depth, P1 (in) = | 1.20 | 1.45 | 1.80 | 2.00 | 2.45 | 2.60 | |

| a | b | c |
|---|---|---|
| 28.50 | 10.00 | 0.786 |

Rainfall Intensity Equation Coefficients =     $I(in/hr) = \dfrac{a}{(b + ...}$   Use Denver Area Intensity

$Q(cfs) = CIA$

| Subcatchment Name | Area (ac) | NRCS Hydrologic Soil Group | Percent Imperviousness | Runoff Coefficient, C |||||||| Overland (Initial) Flow Time |||||| Channelized (Travel) Flow Time ||||||| Time of Concentration ||| Rainfall Intensity, I (in/hr) ||||||| Peak Flow, Q (cfs) |||||||
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | 500-yr | Overland Flow Length L_i (ft) | U/S Elevation (ft) (Optional) | D/S Elevation (ft) (Optional) | Overland Flow Slope S_i (ft/ft) | Overland Flow Time t_i (min) | Channelized Flow Length L_t (ft) | U/S Elevation (ft) (Optional) | D/S Elevation (ft) (Optional) | Channelized Flow Slope S_t (ft/ft) | NRCS Conveyance Factor K | Channelized Flow Velocity V_t (ft/sec) | Channelized Flow Time t_t (min) | Computed t_c (min) | Regional t_c (min) | Selected t_c (min) | 2-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | 500-yr | 2-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | 500-yr |
| A (EX) | 0.36 | B | 0.00 | 0.00 | 0.00 | 0.06 | 0.25 | 0.33 | 0.43 | 0.54 | 126.00 | 7012.00 | 7006.00 | 0.048 | 13.32 | 236.00 | 7006.00 | 6986.00 | 0.085 | 7 | 2.04 | 1.93 | 15.25 | 27.50 | 15.25 | 2.70 | 3.27 | 4.05 | 4.50 | 5.52 | 5.86 | | 0.00 | 0.00 | 0.08 | 0.40 | 0.65 | 0.90 | |
| B (EX) | 0.96 | B | 7.16 | 0.04 | 0.05 | 0.11 | 0.29 | 0.37 | 0.46 | 0.56 | 141.00 | 7012.00 | 7005.00 | 0.050 | 13.28 | 369.00 | 7005.00 | 6994.00 | 0.030 | 10 | 1.73 | 3.56 | 16.85 | 28.34 | 16.85 | 2.58 | 3.11 | 3.86 | 4.29 | 5.26 | 5.58 | | 0.09 | 0.15 | 0.43 | 1.21 | 1.86 | 2.46 | |
| C (EX) | 3.60 | B | 3.84 | 0.02 | 0.02 | 0.09 | 0.27 | 0.35 | 0.44 | 0.55 | 71.00 | 7012.00 | 7011.00 | 0.014 | 14.61 | 627.00 | 7011.00 | 6991.00 | 0.032 | 7 | 1.25 | 8.36 | 22.97 | 31.48 | 22.97 | 2.19 | 2.65 | 3.29 | 3.65 | 4.47 | 4.75 | | 0.15 | 0.24 | 1.04 | 3.59 | 5.63 | 7.59 | |
| D (EX) | 1.49 | B | 1.14 | 0.00 | 0.01 | 0.07 | 0.26 | 0.33 | 0.43 | 0.54 | 36.00 | 7012.00 | 7011.00 | 0.028 | 8.45 | 560.00 | 7011.00 | 6999.00 | 0.021 | 10 | 1.46 | 6.38 | 14.83 | 32.77 | 14.83 | 2.74 | 3.31 | 4.11 | 4.56 | 5.59 | 5.93 | | 0.02 | 0.03 | 0.41 | 1.74 | 2.79 | 3.81 | |
| E (EX) | 0.55 | B | 1.39 | 0.01 | 0.01 | 0.07 | 0.26 | 0.34 | 0.43 | 0.54 | 86.00 | 7012.00 | 7010.00 | 0.023 | 13.84 | 506.00 | 7010.00 | 6999.00 | 0.022 | 10 | 1.47 | 5.72 | 19.56 | 31.98 | 19.56 | 2.39 | 2.89 | 3.58 | 3.98 | 4.88 | 5.17 | | 0.01 | 0.01 | 0.13 | 0.56 | 0.90 | 1.23 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DP 1 (EX) | 0.36 | B | 0.00 | 0.00 | 0.00 | 0.06 | 0.25 | 0.33 | 0.43 | 0.54 | 126.00 | 7012.00 | 7006.00 | 0.048 | 13.32 | 236.00 | 7006.00 | 6986.00 | 0.08 | 7 | 2.04 | 1.93 | 15.25 | 27.50 | 15.25 | 2.70 | 3.27 | 4.05 | 4.50 | 5.52 | 5.86 | | 0.00 | 0.00 | 0.08 | 0.40 | 0.65 | 0.90 | |
| DP 2 (EX) | 4.56 | B | 4.50 | 0.02 | 0.03 | 0.09 | 0.28 | 0.35 | 0.45 | 0.55 | 71.00 | 7012.00 | 7011.00 | 0.014 | 14.55 | 627.00 | 7011.00 | 6991.00 | 0.032 | 7 | 1.25 | 8.36 | 22.91 | 31.31 | 22.91 | 2.20 | 2.65 | 3.29 | 3.66 | 4.48 | 4.76 | | 0.22 | 0.36 | 1.40 | 4.63 | 7.22 | 9.69 | |
| DP 3 (EX) | 1.49 | B | 1.14 | 0.00 | 0.01 | 0.07 | 0.26 | 0.33 | 0.43 | 0.54 | 36.00 | 7012.00 | 7011.00 | 0.028 | 8.45 | 560.00 | 7011.00 | 6999.00 | 0.021 | 10 | 1.46 | 6.38 | 14.83 | 32.77 | 14.83 | 2.74 | 3.31 | 4.11 | 4.56 | 5.59 | 5.93 | | 0.02 | 0.03 | 0.41 | 1.74 | 2.79 | 3.81 | |
| DP 4 (EX) | 0.55 | B | 1.39 | 0.01 | 0.01 | 0.07 | 0.26 | 0.34 | 0.43 | 0.54 | 86.00 | 7012.00 | 7010.00 | 0.023 | 13.84 | 506.00 | 7010.00 | 6999.00 | 0.022 | 10 | 1.47 | 5.72 | 19.56 | 31.98 | 19.56 | 2.39 | 2.89 | 3.58 | 3.98 | 4.88 | 5.17 | | 0.01 | 0.01 | 0.13 | 0.56 | 0.90 | 1.23 | |

## Calculation of Peak Runoff using Rational Method

**Designer:** L. Babbitt   Version 2.00 released May 20   Clear Worksheet
**Company:** WaterVation
**Date:** 5/10/2022
**Project:** 8330 Mustang Place
**Location:** El Paso County, CO

Cells of this color are for required user-inp
Cells of this color are for optional override
Cells of this color are for calculated results

$$t_i = \frac{0.395(1.1 - C_5)\sqrt{L_i}}{S_i^{0.33}}$$

Computed $t_c = t_i + t_t$

$$t_t = \frac{L_t}{60K\sqrt{S_t}} = \frac{L_t}{60V_t}$$

$$\text{Regional } t_c = (26 - 17i) + \frac{L_t}{60(14i + 9)\sqrt{S_t}}$$

$t_{minimum} = 5$ (urban)
$t_{minimum} = 10$ (non-urban)

Selected $t_c = \max\{t_{minimum}, \min(\text{Computed } t_c, \text{Regional } t_c)\}$

on for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA v

| | 2-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | 500-yr |
|---|---|---|---|---|---|---|---|
| 1-hour rainfall depth, P1 (in) = | 1.20 | 1.45 | 1.80 | 2.00 | 2.45 | 2.60 | |

Rainfall Intensity Equation Coefficients =

| a | b | c |
|---|---|---|
| 28.50 | 10.00 | 0.786 |

$I(in/hr) = \frac{a}{(b + }$   Use Denver Area Intensity

$Q(cfs) = CIA$

| Subcatchment Name | Area (ac) | NRCS Hydrologic Soil Group | Percent Imperviousness | Runoff Coefficient, C | | | | | | | Overland Flow Length $L_i$ (ft) | U/S Elevation (ft) (Optional) | D/S Elevation (ft) (Optional) | Overland Flow Slope $S_i$ (ft/ft) | Overland Flow Time $t_i$ (min) | Channelized Flow Length $L_t$ (ft) | U/S Elevation (ft) (Optional) | D/S Elevation (ft) (Optional) | Channelized Flow Slope $S_t$ (ft/ft) | NRCS Conveyance Factor K | Channelized Flow Velocity $V_t$ (ft/sec) | Channelized Flow Time $t_t$ (min) | Computed $t_c$ (min) | Regional $t_c$ (min) | Selected $t_c$ (min) | Rainfall Intensity, I (in/hr) | | | | | | | Peak Flow, Q (cfs) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | 500-yr | | | | | | | | | | | | | | | | 2-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | 500-yr | 2-yr | 5-yr | 10-yr | 25-yr | 50-yr | 100-yr | 500-yr |
| A (PR) | 0.36 | B | 0.00 | 0.00 | 0.00 | 0.06 | 0.25 | 0.33 | 0.43 | 0.54 | 126.00 | 7012.00 | 7006.00 | 0.048 | 13.32 | 236.00 | 7006.00 | 6986.00 | 0.085 | 7 | 2.04 | 1.93 | 15.25 | 27.50 | 15.25 | 2.70 | 3.27 | 4.05 | 4.50 | 5.52 | 5.86 | | 0.00 | 0.00 | 0.08 | 0.40 | 0.65 | 0.90 | |
| B (PR) | 0.96 | B | 15.28 | 0.09 | 0.11 | 0.18 | 0.34 | 0.41 | 0.50 | 0.59 | 141.00 | 7012.00 | 7005.00 | 0.050 | 12.50 | 369.00 | 7005.00 | 6994.00 | 0.030 | 10 | 1.73 | 3.56 | 16.06 | 26.60 | 16.06 | 2.64 | 3.19 | 3.96 | 4.39 | 5.38 | 5.71 | | 0.24 | 0.34 | 0.68 | 1.46 | 2.14 | 2.73 | |
| C (PR) | 3.60 | B | 3.84 | 0.02 | 0.02 | 0.09 | 0.27 | 0.35 | 0.44 | 0.55 | 71.00 | 7012.00 | 7011.00 | 0.014 | 14.61 | 627.00 | 7011.00 | 6991.00 | 0.032 | 7 | 1.25 | 8.36 | 22.97 | 31.48 | 22.97 | 2.19 | 2.65 | 3.29 | 3.65 | 4.47 | 4.75 | | 0.15 | 0.24 | 1.04 | 3.59 | 5.63 | 7.59 | |
| D (PR) | 1.49 | B | 1.14 | 0.00 | 0.01 | 0.07 | 0.26 | 0.33 | 0.43 | 0.54 | 36.00 | 7012.00 | 7011.00 | 0.028 | 8.45 | 560.00 | 7011.00 | 6999.00 | 0.021 | 10 | 1.46 | 6.38 | 14.83 | 32.77 | 14.83 | 2.74 | 3.31 | 4.11 | 4.56 | 5.59 | 5.93 | | 0.02 | 0.03 | 0.41 | 1.74 | 2.79 | 3.81 | |
| E (PR) | 0.55 | B | 1.39 | 0.01 | 0.01 | 0.07 | 0.26 | 0.34 | 0.43 | 0.54 | 86.00 | 7012.00 | 7010.00 | 0.023 | 13.84 | 506.00 | 7010.00 | 6999.00 | 0.022 | 10 | 1.47 | 5.72 | 19.56 | 31.98 | 19.56 | 2.39 | 2.89 | 3.58 | 3.98 | 4.88 | 5.17 | | 0.01 | 0.01 | 0.13 | 0.56 | 0.90 | 1.23 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DP 1 (PR) | 0.36 | B | 0.00 | 0.00 | 0.00 | 0.06 | 0.25 | 0.33 | 0.43 | 0.54 | 126.00 | 7012.00 | 7006.00 | 0.048 | 13.32 | 236.00 | 7006.00 | 6986.00 | 0.08 | 7 | 2.04 | 1.93 | 15.25 | 27.50 | 15.25 | 2.70 | 3.27 | 4.05 | 4.50 | 5.52 | 5.86 | | 0.00 | 0.00 | 0.08 | 0.40 | 0.65 | 0.90 | |
| DP 2 (PR) | 4.56 | B | 6.25 | 0.03 | 0.04 | 0.11 | 0.29 | 0.36 | 0.46 | 0.56 | 71.00 | 7012.00 | 7011.00 | 0.014 | 14.38 | 627.00 | 7011.00 | 6991.00 | 0.032 | 7 | 1.25 | 8.36 | 22.73 | 30.86 | 22.73 | 2.20 | 2.66 | 3.31 | 3.67 | 4.50 | 4.78 | | 0.33 | 0.51 | 1.62 | 4.83 | 7.45 | 9.91 | |
| DP 3 (PR) | 1.49 | B | 1.14 | 0.00 | 0.01 | 0.07 | 0.26 | 0.33 | 0.43 | 0.54 | 36.00 | 7012.00 | 7011.00 | 0.028 | 8.45 | 560.00 | 7011.00 | 6999.00 | 0.021 | 10 | 1.46 | 6.38 | 14.83 | 32.77 | 14.83 | 2.74 | 3.31 | 4.11 | 4.56 | 5.59 | 5.93 | | 0.02 | 0.03 | 0.41 | 1.74 | 2.79 | 3.81 | |
| DP 4 (PR) | 0.55 | B | 1.39 | 0.01 | 0.01 | 0.07 | 0.26 | 0.34 | 0.43 | 0.54 | 86.00 | 7012.00 | 7010.00 | 0.023 | 13.84 | 506.00 | 7010.00 | 6999.00 | 0.022 | 10 | 1.47 | 5.72 | 19.56 | 31.98 | 19.56 | 2.39 | 2.89 | 3.58 | 3.98 | 4.88 | 5.17 | | 0.01 | 0.01 | 0.13 | 0.56 | 0.90 | 1.23 | |

104° 40' 25" W

104° 40' 18" W

528260 528290 528320 528350 528380 528410 528440

38° 57' 19" N

4311870
4311840
4311810
4311780
4311750
4311720
4311690
4311660
4311630

71

19

**Mustang Pl**

Soil Map may not be valid at this scale.

38° 57' 10" N

528260 528290 528320 528350 528380 528410 528440

104° 40' 25" W

104° 40' 18" W

N

Map Scale: 1:1,290 if printed on A portrait (8.5" x 11") sheet.

Meters
0 15 30 60 90

Feet
0 50 100 200 300

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

# MAP LEGEND

## Area of Interest (AOI)
☐ Area of Interest (AOI)

## Soils

### Soil 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 18, Jun 5, 2020

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

Date(s) aerial images were photographed:   Aug 19, 2018—Sep 23, 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 |
|---|---|---|---|---|
| 19 | Columbine gravelly sandy loam, 0 to 3 percent slopes | A | 4.8 | 58.5% |
| 71 | Pring coarse sandy loam, 3 to 8 percent slopes | B | 3.4 | 41.5% |
| **Totals for Area of Interest** | | | **8.2** | **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.

USDA  **Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

9/16/2021
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## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff: None Specified*

*Tie-break Rule:* Higher