



Drainage Report

15435 East Chaparral Loop, Peyton, CO 80831

PREPARED FOR: Mike Cartmell

PREPARED BY: WaterVation, PLLC

DATE: August 22nd, 2022

PCD File No. VR-225





Table of Contents

Engineer's Statement	1
Developer's Statement.....	1
El Paso County	1
Property Description	1
Purpose.....	3
Drainage Fee.....	3
Drainage Basin Characteristics	3
Proposed Drainage Characteristics	4
Detention & Water Quality	4
Regulatory Floodplains	4
References.....	5
Drainage Plan.....	6
Appendix A	7

Table of Tables


Table 1. Peak Flows for Existing Conditions	3
Table 2. Hydrologic Calculations for Existing Conditions	7

Table of Figures

Figure 1. Site Map.....	2
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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. #42636 _____]

8/22/2022

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.



Mike Cartmell (Aug 22, 2022 13:56 MDT)

Michael Cartmell, President
Maddie Investments, LLC
7702 Barnes Road #140-58
Colorado Springs, CO 80922

Aug 22, 2022

Date

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.

APPROVED
Engineering Review

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

Date 09/26/2022 11:00:22 AM

dsdrice

JeffRice@elpasoco.com
(719) 520-7877

Conditions:

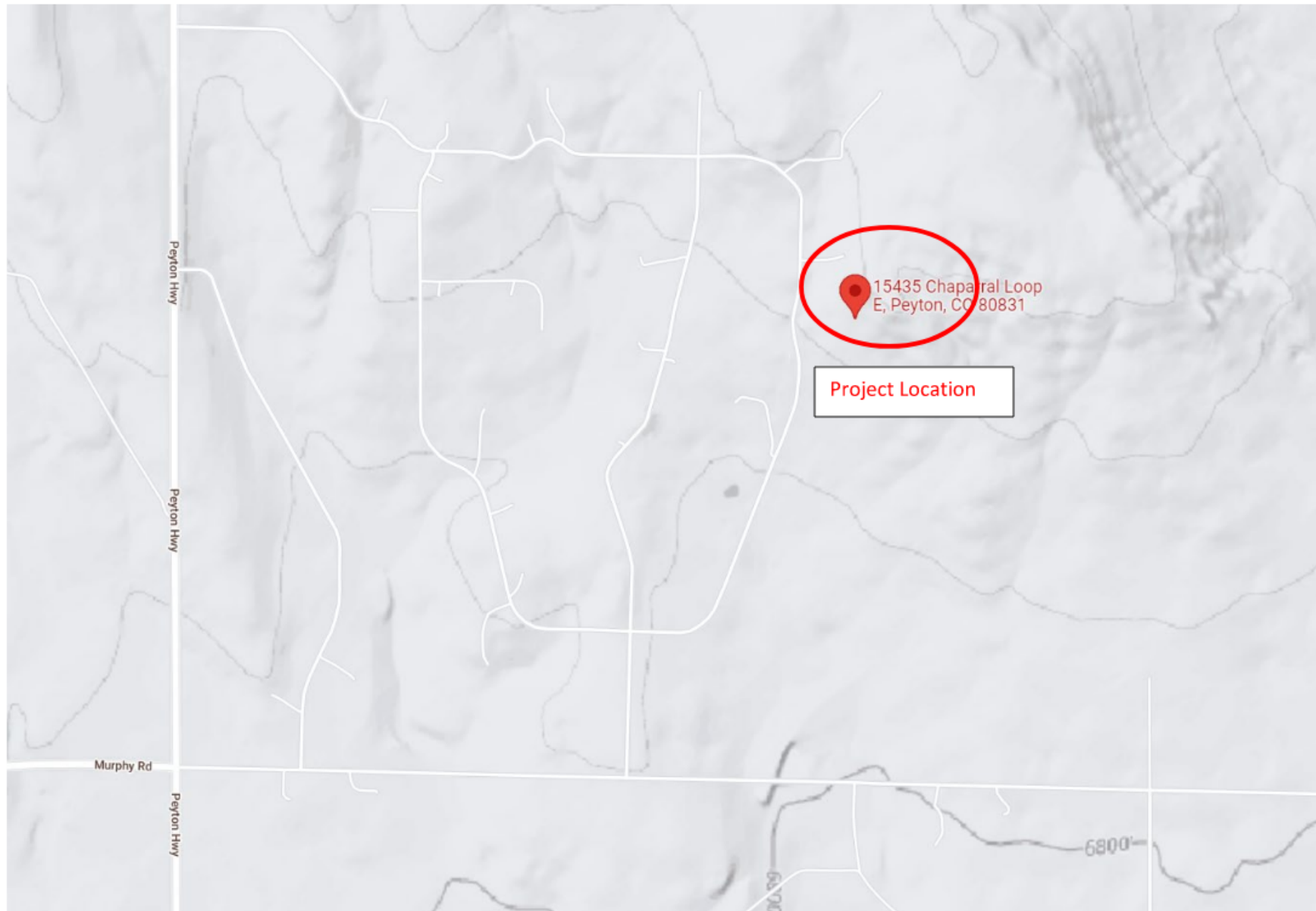
**EPC Planning & Community
Development Department**

Property Description

This Project is located approximately 0.75 miles to the northwest of the intersection of Murphy Road and Peyton Highway (Figure 1). The Project area is comprised of one 17.82-acre lot and is proposed to be subdivided into three lots.

15435 EAST CHAPARRAL LOOP
DRAINAGE REPORT

Figure 1. Site Map



Purpose

The purpose of this drainage report is to evaluate existing and proposed drainage characteristics for the proposed subdivision of 15435 East Chaparral Loop, Peyton, CO 80831 (Project). This report was prepared on September 24th, 2021.

Drainage Fee

There are no fees associated with the Upper Bracket Creek basin therefore drainage fees do not apply to this project.

Drainage Basin Characteristics

The existing and proposed lot slopes to the south and southwest at slopes ranging from 0.01 ft/ft to 0.015 ft/ft. The Project area was delineated into size drainage basins and two different design points. Existing impervious area was delineated using aerial imagery flown in July 2021.

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. Soil conditions for all basins will remain unchanged in proposed conditions.

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	5-YR	25-YR	100-YR
A	0.60	B	0.00%	0.00	0.00	0.75	1.66
B	3.10	B	0.72%	0.02	0.03	2.99	6.58
C	5.20	B	1.42%	0.07	0.13	5.56	12.12
D	6.70	B	0.47%	0.03	0.05	6.83	15.09
E	3.50	B	0.27%	0.01	0.02	4.24	9.40
F	1.70	B	0.00%	0.00	0.00	1.92	4.28

Proposed Drainage Characteristics

Proposed conditions are similar to existing conditions and will not significantly change the flow of drainage. The ultimate design points and sub basins are not affected by this replat and flows remain as per the existing conditions. This is a replat. Impervious area and stormwater runoff is not expected to increase therefore water quality and detention are not required per the ECM.

Detention & Water Quality

Detention and stormwater quality treatment are not required for this project since impervious area will not be significantly increased due to this replat. This is a replat. Impervious area and stormwater runoff is not expected to increase therefore detention and water quality are not needed.

Regulatory Floodplains

No regulatory floodplains exist on-site. The FEMA FIRM is 08041C0538G and is attached in the appendix of this report.

Conclusion

This is a replat of an existing 17-acre single family parcel into three approximately 5 acre parcels. Impervious area and stormwater runoff is not expected to increase so stormwater improvements or mitigations are not needed.

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

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 2. Hydrologic Calculations for Existing Conditions

Designer: L. Babbitt

Company: WaterVation

Date: 5/10/2022

Project: 15435 East Chaparral Loop

Location: El Paso County, CO

Version 2.00 released May 2022

Clear Worksheet

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

Computed $t_c = t_i + t_t$

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

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

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

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

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

1-hour rainfall depth, P1 (in) =

2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
1.20	1.45	1.80	2.00	2.45	2.60	

all Intensity Equation Coefficients =

a	b	c
28.50	10.00	0.786

$I(\text{in/hr}) = \frac{a}{(b + I)^c}$ 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)	0.60	B	0.00	0.00	0.00	0.06	0.25	0.33	0.43	0.54	84.00	7026.00	7015.00	0.131	7.79	518.00	7015.00	6974.00	0.079	7	1.97	4.38	12.17	29.41	12.17	2.99	3.62	4.49	4.99	6.11	6.49		0.00	0.00	0.15	0.75	1.20	1.66											
B (EX)	3.10	B	0.72								117.00	7051.00	7035.00	0.137	9.03	1333.00	7035.00	6946.00	0.067	7	1.81	12.28	21.31	35.33	21.31	2.28	2.76	3.42	3.80	4.66	4.95		0.02	0.03	0.67	2.99	4.80	6.58											
C (EX)	5.20	B	1.42	0.01	0.01	0.07	0.26	0.34	0.43	0.54	142.00	7051.00	7035.00	0.113	10.56	960.00	7035.00	6946.00	0.093	7	2.13	7.51	18.07	31.47	18.07	2.49	3.01	3.73	4.15	5.08	5.39		0.07	0.13	1.33	5.56	8.87	12.12											
D (EX)	6.70	B	0.47	0.00	0.00	0.06	0.25	0.33	0.43	0.54	111.00	7051.00	7040.00	0.099	9.79	1115.00	7040.00	6946.00	0.084	7	2.03	9.14	18.94	32.98	18.94	2.43	2.93	3.64	4.05	4.96	5.26		0.03	0.05	1.48	6.83	10.98	15.09											
E (EX)	3.50	B	0.27	0.00	0.00	0.06	0.25	0.33	0.43	0.54	114.00	7043.00	7030.00	0.114	9.49	481.00	7030.00	6981.00	0.102	7	2.23	3.59	13.07	28.73	13.07	2.90	3.51	4.35	4.84	5.92	6.29		0.01	0.02	0.90	4.24	6.83	9.40											
F (EX)	1.70	B	0.00	0.00	0.00	0.06	0.25	0.33	0.43	0.54	234.00	7043.00	7023.00	0.085	14.97	1.00	7023.00	7022.50	0.500	7	4.95	0.00	14.97	26.00	14.97	2.73	3.29	4.09	4.54	5.57	5.91		0.00	0.00	0.40	1.92	3.10	4.28											
DP 1 (EX)	15.60	B	0.20	0.00	0.00	0.06	0.25	0.33	0.43	0.54	142.00	7051.00	7035.00	0.113	10.63	960.00	7035.00	6946.00	0.093	7	2.13	7.51	18.14	31.79	18.14	2.48	3.00	3.72	4.14	5.07	5.38		0.02	0.05	3.40	16.15	26.02	35.82											
DP 2 (EX)	3.50	B	0.27	0.00	0.00	0.06	0.25	0.33	0.43	0.54	114.00	7043.00	7030.00	0.114	9.49	481.00	7030.00	6981.00	0.102	7	2.23	3.59	13.07	28.73	13.07	2.90	3.51	4.35	4.84	5.92	6.29		0.01	0.02	0.90	4.24	6.83	9.40											
DP 3 (EX)	1.70	B	0.0	0.00	0.00	0.06	0.25	0.33	0.43	0.54	234.00	7043.00	7023.00	0.085	14.97	1.00	7023.00	7022.50	0.500	7	4.95	0.00	14.97	26.00	14.97	2.73	3.29	4.09	4.54	5.57	5.91		0.00	0.00	0.40	1.92	3.10	4.28											

7

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 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, NNGS12
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.

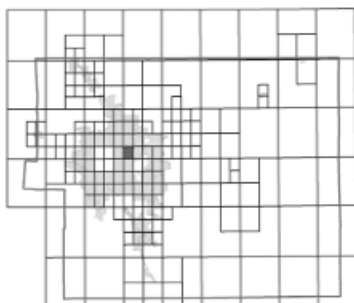
Contact **FEMA Map Service Center (MSC)** via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this 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/nfp>.

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	

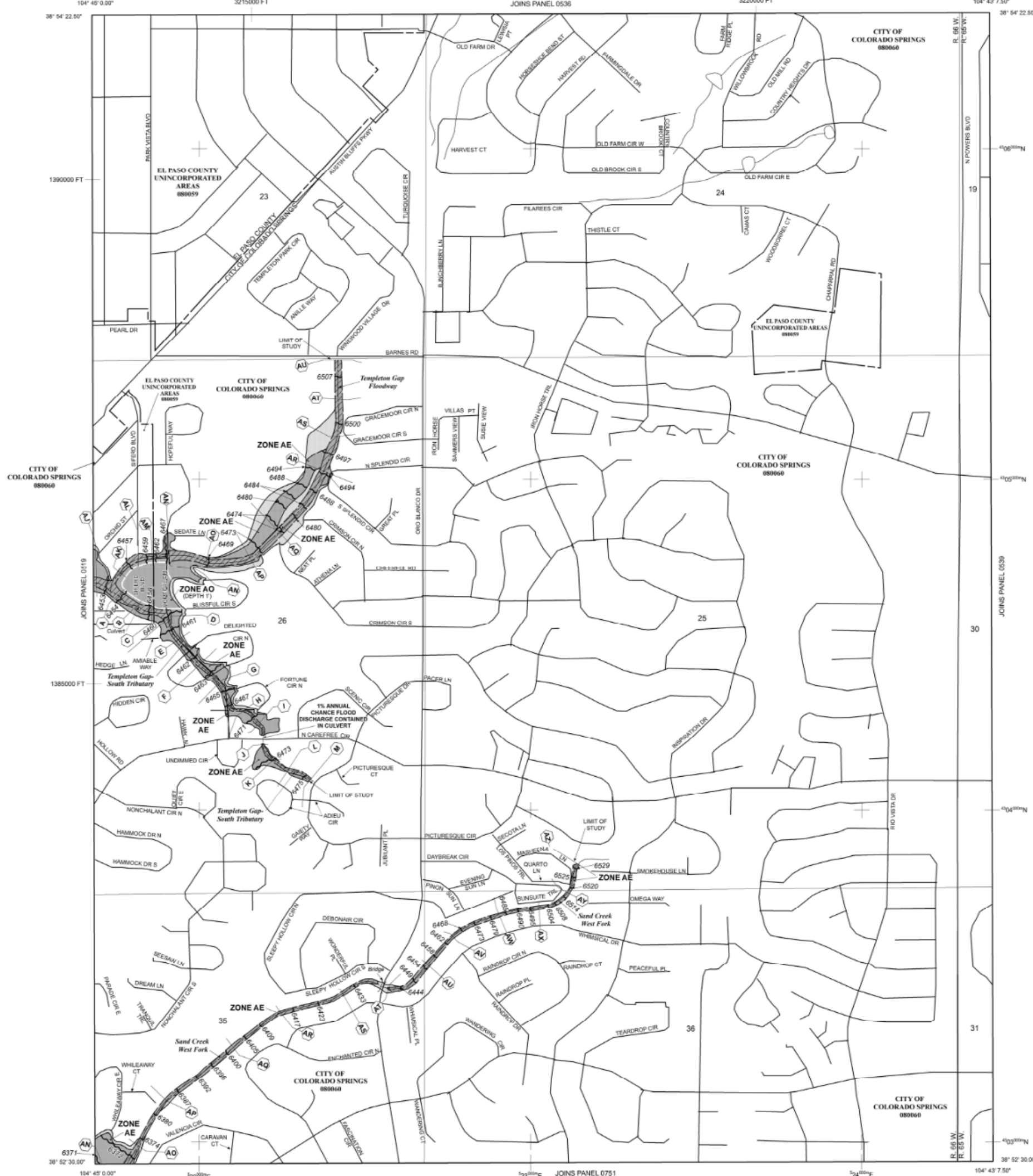
Panel Location Map



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



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



- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AR** Flood depths of 1 to 3 feet (usually areas of parking); 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 determined. Zone AR indicates that the former flood control system is being removed in provide protection from the 1% annual chance or greater flood.
- ZONE AR9** 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.
- Base Flood Elevation line and value; elevation in feet
- Base Flood Elevation value where uniform within zone; elevation in feet

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

- Cross section line
- Transsect line
- 67° 07' 30.00" 32° 22' 30.00" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 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

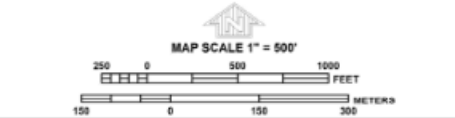
MAP REPOSITORIES
Refer to Map Repositories list on Map Index

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

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2016 - 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 courtwide 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 1-800-638-6626.



NFP PANEL 0538G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 538 OF 1300
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:	COMMUNITY	NUMBER	PANEL	SUFFIX
	COLORADO SPRINGS, CITY OF	08000	0508	0
	EL PASO COUNTY	08000	0508	0

Notice: This map was released on 05/15/2020 to make a correction. This version replaces any previous versions. See the Notice-to-User Letter that accompanied this correction for details.

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
08041C0538G

MAP REVISED


15435 East Chaparral Loop_Drainage Report_FINAL

Final Audit Report

2022-08-22

Created:	2022-08-22
By:	Lucas Babbitt (lucas.babbitt@water-vation.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAAUkaZOJZcdcwpiKrc6QVs9UFGop8C1ZZ2

"15435 East Chaparral Loop_Drainage Report_FINAL" History

-  Document created by Lucas Babbitt (lucas.babbitt@water-vation.com)
2022-08-22 - 7:34:43 PM GMT- IP address: 216.147.124.20
-  Document emailed to Mike Cartmell (cartmell.michael@gmail.com) for signature
2022-08-22 - 7:35:21 PM GMT
-  Email viewed by Mike Cartmell (cartmell.michael@gmail.com)
2022-08-22 - 7:56:33 PM GMT- IP address: 66.102.6.129
-  Document e-signed by Mike Cartmell (cartmell.michael@gmail.com)
Signature Date: 2022-08-22 - 7:56:53 PM GMT - Time Source: server- IP address: 71.34.147.244
-  Agreement completed.
2022-08-22 - 7:56:53 PM GMT