

# **PRELIMINARY/FINAL DRAINAGE REPORT FOR PINE VIEW ESTATES**

NOVEMBER 2020  
*REVISED APRIL 2021*

Prepared for:

Alice Owens  
18430 Lost Ranger Road  
Peyton, CO 80831

Prepared By:



**CATAMOUNT  
ENGINEERING**  
321 W. Henrietta Ave, Suite A  
Woodland Park, CO 80863  
719-426-2124

PCD FILE NO's: SP-20-004  
SF-20-019

PRELIMINARY/FINAL DRAINAGE REPORT  
PINE VIEW ESTATES

**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 the criteria established for drainage reports and said report is in conformity with the 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.

**Certification Statement:**

This report and plan for the preliminary and final drainage design for the PINE VIEW ESTATES was prepared by me (or under my direct supervision) in accordance with the provisions of City of Colorado Springs/El Paso County Drainage Criteria Manual Volumes 1 and 2 Drainage Design and Technical Criteria for the owners thereof. I understand that El Paso County does not and will not assume liability for drainage facilities designed by others.

\_\_\_\_\_  
David L. Mijares, Colorado PE #40510  
For and on behalf of Catamount Engineering

\_\_\_\_\_  
Date

**Developer's Statement:**

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

ALICE OWENS hereby certifies that the drainage facilities for PINE VIEW ESTATES shall be constructed according to the design presented in this report. I understand that El Paso County does not and will not assume liability for the drainage facilities designed and or certified by my engineer and that the El Paso County reviews drainage plans pursuant to Colorado Revised Statues, Title 30, Article 28; but cannot, on behalf of PINE VIEW ESTATES, guarantee that final drainage design review will absolve ALICE OWENS and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

\_\_\_\_\_  
Alice Owens  
Business Name

By: \_\_\_\_\_

Title: \_\_\_\_\_

Address: \_\_\_\_\_ 18430 Lost Ranger Road

\_\_\_\_\_  
Peyton, CO 80831

**El Paso County:**

Filed in accordance with the requirements of the El Paso County land Development Code and the Drainage Criteria manual Volumes 1 and 2, and the El Paso County Engineering Criteria Manual, as amended.

\_\_\_\_\_  
Jennifer Irvine, PE  
County Engineer/ECM Administrator

\_\_\_\_\_  
Date

Conditions:

# **PRELIMINARY/FINAL DRAINAGE REPORT for PINE VIEW ESTATES**

## **PURPOSE**

The purpose of this drainage report is to identify existing drainage patterns, quantify developed storm water runoff, and establish outfall scenarios from the proposed development.

## **GENERAL LOCATION AND DESCRIPTION**

The subject 38.828 acres consists of unplatted land to be developed into 7 rural residential lots (RR-5 zoning) located within the SW ¼ of the NW ¼ of Section 13, Township 11 South, Range 64 West of the 6<sup>th</sup> principal meridian in unincorporated El Paso County. The parcel is bounded to the north by unplatted land, to the east and south by platted RR-5 residential lots within Peyton Pines Filing No. 4, and to the west by unplatted agricultural land. Access to the parcel is from existing Red Barn Road to the east of the parcel, a gravel county local roadway.

The parcel is located on a ridge within the Bijou Creek drainage. The westerly portion of the parcel sheet flows west to an unnamed tributary of West Bijou Creek within the adjacent agriculturally zoned unplatted parcel at slopes between 2% and 6%. The southeasterly portion of the parcel sheet flows east to an unnamed tributary of West Bijou Creek within adjacent 5-acre residential parcels at slopes between 2% and 5%. The northeasterly portion of the parcel sheet flows north at slopes between 2% and 5% through a historic stock pond and continues north to an unnamed tributary of West Bijou Creek. The site is located within the Bijou Creek Basin.

Existing soils on the site consist of Brusset loam, hydrologic soil group B (86.8%), and Peyton - Pring complex, hydrologic soil group B (13.2%) as determined by the Natural Resources Conservation Service Web Soil Survey. The site is vegetated with native grasses. Moderate shrub and tree cover are evident and increases within the westerly portions of the site

No portion of the site lies within an F.E.M.A. designated floodplain per FIRM 08041C0350 G, effective December 07, 2018. A firmette exhibiting the parcel has been included in the appendix of this report.

## **EXISTING DRAINAGE CONDITIONS**

No existing studies on the site or overall basin have been identified. The parcel exists on a minor ridge between two unnamed tributaries of West Bijou Creek generally draining to the north. Parcel was historically used for agricultural grazing and an existing minor stock pond exists within the northerly reach of Basin E1. The stock pond was not used in hydrologic calculations. As the parcel is located on a ridge between minor tributaries, no significant offsite runoff enters the parcel.

Basin E1 (11.5 Acres,  $Q_2=0.7$  cfs,  $Q_5=2.5$  cfs,  $Q_{10}=5.5$  cfs,  $Q_{25}=9.6$  cfs,  $Q_{50}=12.9$  cfs, and  $Q_{100}=16.7$  cfs) consists of that portion within the westerly portion of the parcel that sheet flow northwest to the westerly unnamed tributary of West Bijou Creek.

Basin E2 (12.47 Acres,  $Q_2=0.6$  cfs,  $Q_5=2.4$  cfs,  $Q_{10}=5.2$  cfs,  $Q_{25}=9.1$  cfs,  $Q_{50}=12.2$  cfs, and  $Q_{100}=15.9$  cfs) consists of the southeasterly portion of the parcel that sheet flow northeasterly to the easterly unnamed tributary of West Bijou Creek.

Basin E3 (14.77 Acres,  $Q_2=0.8$  cfs,  $Q_5=2.9$  cfs,  $Q_{10}=6.4$  cfs,  $Q_{25}=11.2$  cfs,  $Q_{50}=15.1$  cfs, and  $Q_{100}=19.6$  cfs) consists of the central and northerly portion of the parcel that flows northerly to the historic stock pond prior to release to the easterly unnamed tributary of West Bijou Creek.

### DEVELOPED DRAINAGE BASINS

This is the 50yr flow. The 100 yr flow is greater than historic. Please revise accordingly.

The majority of the area within developed basins was modeled as agricultural land. A 1 acre developed area was assumed for each lot located in respective basins. Proposed roadway and shoulders were modeled as gravel where proposed.

Basin A1 (11.57 Acres,  $Q_2=1.1$  cfs,  $Q_5=3.3$  cfs,  $Q_{10}=6.6$  cfs,  $Q_{25}=11.0$  cfs,  $Q_{50}=14.7$  cfs, and  $Q_{100}=18.8$  cfs) represents portions of the proposed residential lots within the westerly portion of the parcel (Historic Basin E1). Runoff generated within the basin will sheet flow northwest in the historic pattern. Developed flows at Design Point 1 of  $Q_{10}=6.6$  cfs,  $Q_{100}=14.7$  cfs are less than Historic flows at Design Point 1 of  $Q_{10}=5.5$  cfs,  $Q_{100}=16.7$  cfs

i wouldn't consider a 30% increase in flow to be similar

Basin A2 (14.42 Acres,  $Q_2=1.5$  cfs,  $Q_5=4.0$  cfs,  $Q_{10}=7.5$  cfs,  $Q_{25}=12.4$  cfs,  $Q_{50}=16.3$  cfs, and  $Q_{100}=20.8$  cfs) represents portions of the proposed residential lots and the southerly half of the proposed roadway within the southeasterly portion of the parcel (Historic Basin E2). Runoff generated within the basin will sheetflow north and be conveyed in the proposed roadside ditch easterly to the existing roadside ditch within the ROW of existing Red Barn Road. Runoff will be conveyed in the ditch to the easterly unnamed tributary of West Bijou Creek. Developed flows at Design Point 2 of  $Q_{10}=7.5$  cfs,  $Q_{100}=20.8$  cfs are similar in scope to Historic flows at Design Point 1 of  $Q_{10}=5.2$  cfs,  $Q_{100}=15.9$  cfs.

I believe this should be design point 3 as DP1 is within basin A1 and E1

Basin A3 (11.34 Acres,  $Q_2=1.2$  cfs,  $Q_5=3.1$  cfs,  $Q_{10}=6.1$  cfs,  $Q_{25}=10.1$  cfs,  $Q_{50}=13.4$  cfs, and  $Q_{100}=17.1$  cfs) represents portions of the proposed residential lots and the westerly portion of the northern half of the proposed roadway within the central and northern portion of the parcel (Historic Basin E3). Runoff generated within the basin will sheetflow north to the existing stock pond within the northerly portion of the development. Runoff from Basin A3 will continue to the existing easterly reach of the unnamed tributary of West Bijou Creek. Developed flows at Design Point 3 of  $Q_{10}=6.1$  cfs,  $Q_{100}=17.1$  cfs are less than Historic flows at Design Point 1 of  $Q_{10}=6.4$  cfs,  $Q_{100}=19.6$  cfs. The northerly portion of existing basin 3, now bisected by the proposed roadway extension, sheetflows to the northeast at proposed design point 4 (Basin A4). Less than historic flow is contributed to the existing southerly roadside ditch along existing Red Barn Road.

northerly?

Comments have been provided on the GEC plan regarding the proposed roadside ditch area and compliance with the standard rural gravel local road detail. Please revise accordingly.

Please provide analysis of the existing roadside ditches that is accepting this flow as indicated in the previous review comment. Analyze the developed flow to a suitable outfall as indicated in the criteria (ECM 3.2.4)

Please fee free to give me a call to discuss if you'd like before re-submitting (719-208-6783)

Basin A4 (1.48 Acres,  $Q_2=0.3$  cfs,  $Q_5=0.6$  cfs,  $Q_{10}=1.1$  cfs,  $Q_{25}=1.8$  cfs,  $Q_{50}=2.3$  cfs, and  $Q_{100}=2.9$  cfs) represents portions of the proposed residential lots and the easterly portion of the northerly half of the proposed roadway within the easterly portion of the ROW and represents the portion of historic Basin E2 truncated by the proposed roadway. Runoff generated within the basin will sheetflow northeasterly to the unnamed easterly tributary of West Bijou Creek. Additive (conservatively not routed) flow from basin A3 and A4 of  $Q_{10}=7.2$  cfs,  $Q_{100}=19.41$  cfs are similar to Historic flows at Design Point 1 of  $Q_{10}=6.4$  cfs,  $Q_{100}=19.6$  cfs. No additional flow is contributed to the existing northerly roadside ditch along existing Red Barn Road.

The rational methodology was utilized in analyzing on-site basins for development of on-site improvements. The minor increase in impervious area due to roadway and homesite development within the 38.83-acre subdivision would not substantially impact historic drainage patterns. Detention is not typically pursued in rural development scenarios unless undetained upstream development would negatively affect the development. A significant portion of runoff generated within typical rural development does not flow directly into County stormwater systems, but leaves improved areas as sheetflow into undeveloped and vegetated portions of lots and infiltrates into the ground. The site was analyzed for Site-Level Low Impact Development (LID) Design Credit by Impervious Reduction Factor (IRF) exhibiting reductions from proposed building site, assuming a 5,000-sf impervious footprint per lot, and gravel roadways outfalling to substantial receiving pervious areas.

See Appendix for Calculations.

Revise text to match conditions of final plans, per Daniel's comments: if/where drainage ditches are placed along the roadside.

## **WATER QUALITY/4-STEP PROCESS**

The development addresses Low Impact Development strategies primarily through the utilization of large impervious areas and utilization of landscape swales receiving runoff generated within impervious roadways.

### **Step 1-Employ Runoff Reduction Practices**

Impervious areas generated within the development will flow across pervious disconnected areas prior to offsite discharge. Runoff generated within roadway improvements will be directed to grassed roadside ditches and conveyed overland with the development. Calculations for runoff reduction of gravel roadways are included in the appendix.

### **Step 2-Stabilize Drainageway**

The unnamed tributaries of West Bijou Creek receiving parcel runoff are not directly adjacent to the parcel and reduced runoff due to substantial conveyance across both onsite and offsite pervious area at relatively flat grades will mitigate minor increases in impervious area with 5-acre lot development and not affect the drainageways.

### **Step 3-Provide Water Quality Capture Volume**

Permanent water quality facility is not proposed for development of 5 acre lots per the requirements of El Paso County Engineering Criteria Manual Section I.7.1B. Runoff reduction calculation for the gravel roadways was analyzed utilizing UD-BMP Version 3.07. The

impervious area of gravel roadways were identified as disconnected impervious areas draining to and conveyed by roadside ditches and existing overland conveyance identified as receiving pervious areas. The analysis indicates 100% water quality capture volume reduction and is included in the appendix of this report.

#### Step4-Consider Need for Industrial and Commercial BMP's

A Grading, Erosion Control, and Stormwater Quality Plan and narrative have been submitted concurrently for the development and will be subject to county approval prior to any soil disturbance. The erosion control plan included specific source control BMP's as well as defined overall site management practices for the construction period. No industrial or Commercial density development is proposed.

### **COST ESTIMATE**

No drainage improvements are proposed with development of 5-acre residential lots.

### **DRAINAGE FEE CALCULATION**

The development proposes to plat 38.828 acres within El Paso County, all contained within the Bijou Creek Drainage Basin. The Bijou Creek Drainage Basin has not been studied and no drainage or bridge fees have been adopted.

### **DRAINAGE METHODOLOGY**

This drainage report was prepared in accordance to the criteria established in the El Paso County Drainage Criteria Manual Volumes 1 and 2, as revised May 2014.

The rational method for drainage basin study areas of less than 100 acres was utilized in the on-site analysis. For the Rational Method, flows were calculated for the 2, 5, 10, 25, 50, and 100-year recurrence intervals. The average runoff coefficients, 'C' values, are taken from Table 6-6 and the Intensity-Duration-Frequency curves are taken from Figure 6-5 of the City Drainage Criteria Manual. Time of concentration for overland flow and storm drain or gutter flow are calculated per Section 3.2 of the City Drainage Criteria Manual. Calculations for the Rational Method are shown in the Appendix of this report.

### **SUMMARY**

The Pine View Estates development consists of large lot development with minor increases in impervious areas consistent with surrounding development. The development will not adversely affect downstream properties or facilities.

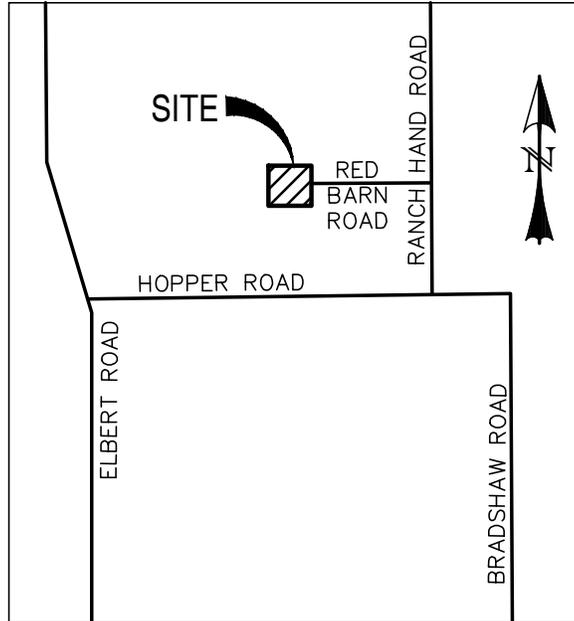
**REFERENCES:**

County of El Paso Drainage Criteria Manual Volumes 1 and 2, revised May 2014

Flood Insurance rate map 08041C00350 G, December 07. 2018

Natural Resources Conservation Service Web Soil Survey

## APPENDIX



VICINITY MAP  
SCALE: N.T.S.

# National Flood Hazard Layer FIRMMette



104°31'5"W 39°5'50"N



## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- |                                    |  |  |
|------------------------------------|--|--|
| <b>SPECIAL FLOOD HAZARD AREAS</b>  |  | Without Base Flood Elevation (BFE)<br><i>Zone A, V, A99</i>  |
|                                    |  | With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>   |
|                                    |  | Regulatory Floodway  |
| <b>OTHER AREAS OF FLOOD HAZARD</b> |  | 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 <i>Zone X</i> |
|                                    |  | Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>  |
|                                    |  | Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>  |
|                                    |  | Area with Flood Risk due to Levee <i>Zone D</i>  |
| <b>OTHER AREAS</b>                 |  | NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>   |
|                                    |  | Effective LOMRs  |
| <b>GENERAL STRUCTURES</b>          |  | Area of Undetermined Flood Hazard <i>Zone D</i>  |
|                                    |  | Channel, Culvert, or Storm Sewer   |
|                                    |  | Levee, Dike, or Floodwall  |
| <b>OTHER FEATURES</b>              |  | 20.2 Cross Sections with 1% Annual Chance  |
|                                    |  | 17.5 Water Surface Elevation   |
|                                    |  | Coastal Transect   |
|                                    |  | Base Flood Elevation Line (BFE)  |
|                                    |  | Limit of Study   |
| <b>MAP PANELS</b>                  |  | Jurisdiction Boundary  |
|                                    |  | Coastal Transect Baseline  |
|                                    |  | Profile Baseline   |
|                                    |  | Hydrographic Feature   |
|                                    |  | Digital Data Available   |
|                                    |  | No Digital Data Available  |
|                                    |  | Unmapped   |



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 **7/19/2020 at 2:51 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

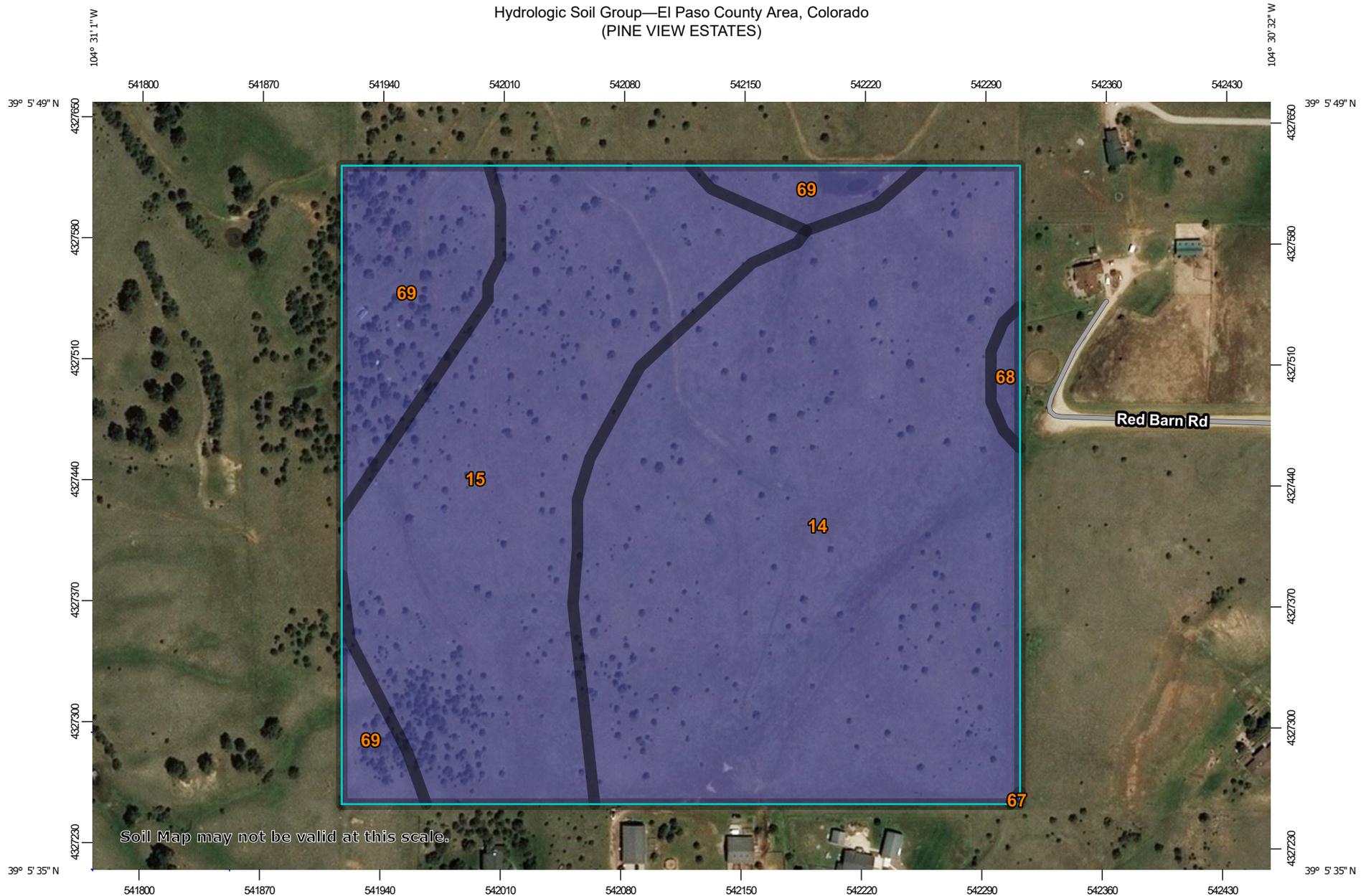
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

USGS The National Map: Orthoimagery. Data refreshed April 2020

104°30'28"W 39°5'22"N

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

Hydrologic Soil Group—El Paso County Area, Colorado  
(PINE VIEW ESTATES)



Map Scale: 1:3,130 if printed on A landscape (11" x 8.5") sheet.



Hydrologic Soil Group—El Paso County Area, Colorado  
(PINE VIEW ESTATES)

**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: Sep 8, 2018—May 26, 2019

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
14	Brussett loam, 1 to 3 percent slopes	B	19.7	54.5%
15	Brussett loam, 3 to 5 percent slopes	B	11.7	32.3%
67	Peyton sandy loam, 5 to 9 percent slopes	B	0.0	0.0%
68	Peyton-Pring complex, 3 to 8 percent slopes	B	0.3	0.7%
69	Peyton-Pring complex, 8 to 15 percent slopes	B	4.5	12.4%
<b>Totals for Area of Interest</b>			<b>36.2</b>	<b>100.0%</b>

## 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

## EXISTING HYDROLOGY

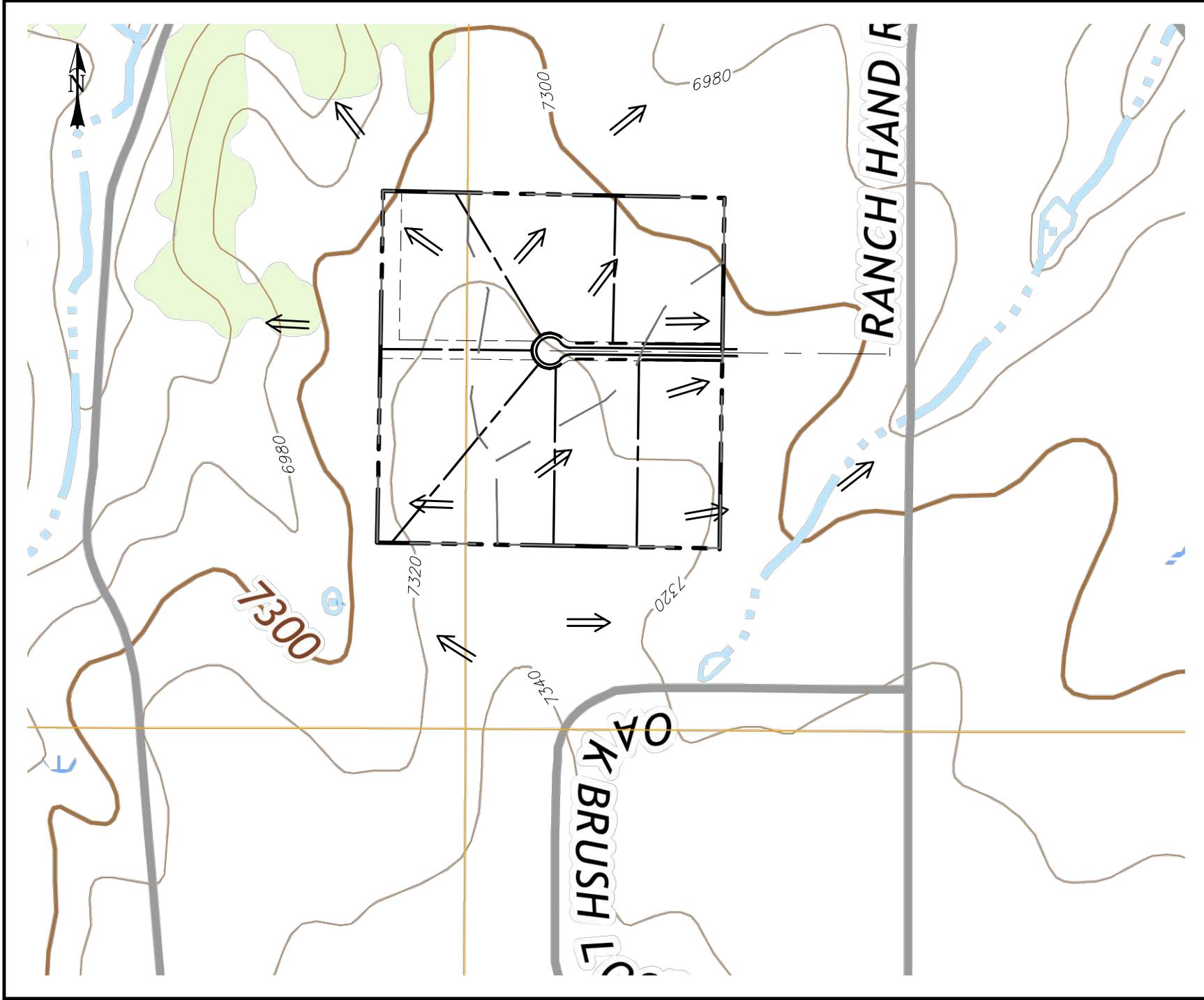
BASIN	AREA TOTAL (Acres)								CONVEYANCE TC							TT	INTENSITY						TOTAL FLOWS							
		C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>50</sub>	C <sub>100</sub>	Length (ft)	Height (ft)	TI (min)	Length (ft)	Height (ft)	C <sub>v</sub>	Slope (%)	Velocity (fps)	TC (min)	TOTAL (min)	I <sub>2</sub> (in/hr)	I <sub>5</sub> (in/hr)	I <sub>10</sub> (in/hr)	I <sub>25</sub> (in/hr)	I <sub>50</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>2</sub> (c.f.s.)	Q <sub>5</sub> (c.f.s.)	Q <sub>10</sub> (c.f.s.)	Q <sub>25</sub> (c.f.s.)	Q <sub>50</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)	
E1 <i>AGRICULTURE</i>	11.57	0.03	0.09	0.17	0.26	0.31	0.36	200	4	21.7	664	32	5	4.8%	1.1	10.1	31.8	1.9	2.4	2.8	3.2	3.6	4.0	0.7	2.5	5.5	9.6	12.9	16.7	
E2 <i>AGRICULTURE</i>	12.47	0.03	0.09	0.17	0.26	0.31	0.36	200	8	17.3	1019	26	5	2.6%	0.8	21.3	38.6	1.7	2.1	2.5	2.8	3.2	3.5	0.6	2.4	5.2	9.1	12.2	15.9	
E3 <i>AGRICULTURE</i>	14.77	0.03	0.09	0.17	0.26	0.31	0.36	200	5	20.2	943	36	5	3.8%	1.0	16.1	36.3	1.8	2.2	2.6	2.9	3.3	3.7	0.8	2.9	6.4	11.2	15.1	19.6	

Calculated by: DLM  
Date: 7/16/2020

## PROPOSED HYDROLOGY

BASIN	AREA TOTAL (Acres)	C						CONVEYANCE TC							TT	INTENSITY						TOTAL FLOWS								
		C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>50</sub>	C <sub>100</sub>	Length (ft)	Height (ft)	TI (min)	Length (ft)	Height (ft)	C <sub>v</sub>	Slope (%)	Velocity (fps)	TC (min)	TOTAL (min)	I <sub>2</sub> (in/hr)	I <sub>5</sub> (in/hr)	I <sub>10</sub> (in/hr)	I <sub>25</sub> (in/hr)	I <sub>50</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>2</sub> (c.f.s.)	Q <sub>5</sub> (c.f.s.)	Q <sub>10</sub> (c.f.s.)	Q <sub>25</sub> (c.f.s.)	Q <sub>50</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)	
<b>A1</b>	11.57	<b>0.05</b>	<b>0.11</b>	<b>0.19</b>	<b>0.28</b>	<b>0.33</b>	<b>0.37</b>	100	2	15.1	764	31	5	4.1%	1.0	12.6	27.8	2.1	2.6	3.0	3.5	3.9	4.4	<b>1.1</b>	<b>3.3</b>	<b>6.6</b>	<b>11.0</b>	<b>14.7</b>	<b>18.8</b>	
RESIDENTIAL	2.00	0.12	0.20	0.27	0.35	0.40	0.44																							
AGRICULTURE	9.57	0.03	0.09	0.17	0.26	0.31	0.36																							
<b>A2</b>	14.42	<b>0.06</b>	<b>0.12</b>	<b>0.20</b>	<b>0.29</b>	<b>0.34</b>	<b>0.38</b>	100	4	11.9	1041	23	5	2.2%	0.7	23.3	35.2	1.8	2.2	2.6	3.0	3.4	3.8	<b>1.5</b>	<b>4.0</b>	<b>7.5</b>	<b>12.4</b>	<b>16.3</b>	<b>20.8</b>	
RESIDENTIAL	3.00	0.12	0.20	0.27	0.35	0.40	0.44																							
GRAVEL	0.29	0.57	0.59	0.63	0.66	0.68	0.70																							
AGRICULTURE	11.13	0.03	0.09	0.17	0.26	0.31	0.36																							
<b>A3</b>	11.34	<b>0.05</b>	<b>0.12</b>	<b>0.19</b>	<b>0.28</b>	<b>0.33</b>	<b>0.38</b>	100	2	15.0	974	35	5	3.6%	0.9	17.1	32.1	1.9	2.4	2.8	3.2	3.6	4.0	<b>1.2</b>	<b>3.1</b>	<b>6.1</b>	<b>10.1</b>	<b>13.4</b>	<b>17.1</b>	
RESIDENTIAL	1.75	0.12	0.20	0.27	0.35	0.40	0.44																							
GRAVEL	0.22	0.57	0.59	0.63	0.66	0.68	0.70																							
AGRICULTURE	9.37	0.03	0.09	0.17	0.26	0.31	0.36																							
<b>A4</b>	1.48	<b>0.09</b>	<b>0.15</b>	<b>0.22</b>	<b>0.30</b>	<b>0.35</b>	<b>0.40</b>	100	2	14.6	299	6	5	2.0%	0.7	7.0	21.6	2.4	3.0	3.5	4.0	4.5	5.0	<b>0.3</b>	<b>0.6</b>	<b>1.1</b>	<b>1.8</b>	<b>2.3</b>	<b>2.9</b>	
RESIDENTIAL	0.25	0.12	0.20	0.27	0.35	0.40	0.44																							
GRAVEL	0.11	0.57	0.59	0.63	0.66	0.68	0.70																							
AGRICULTURE	1.12	0.03	0.09	0.17	0.26	0.31	0.36																							

Calculated by: DLM  
Date: 7/16/2020



PINE VIEW ESTATES

SCALE: 1"=500'

DATE: 07/18/20

OFFSITE TOPOGRAPHY

JOB NO.: 18-158

SHEET: 1 OF 1

# HYDRAULIC CALCULATIONS

Please remove this page to avoid confusion and conflicting results since it is the previous version (3.06) of the UD-BMP spreadsheet, whereas the next page is the current version (3.07)

**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)

<input type="text" value="User Input"/>		<input type="text" value="Calculated cells"/>	
***Design Storm: 1-Hour Rain Depth	WQCV Event	1.19	inches
***Minor Storm: 1-Hour Rain Depth	10-Year Event	1.50	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.52	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event		
Max Intensity for Optional User Defined Storm	<input type="text" value="0"/>		

Designer: **David Miajres**  
 Company: **Catamount Engineering**  
 Date: **July 19, 2020**  
 Project: **Pine View Estates**  
 Location: **Peyton, CO**

**SITE INFORMATION (USER-INPUT)**

Sub-basin Identifier	A1	A2	A3	A4														
Receiving Pervious Area Soil Type	Loam	Loam	Loam	Loam														
Total Area (ac, Sum of DCIA, UIA, RPA, & SPA)	11.570	14.420	11.340	1.480														
Directly Connected Impervious Area (DCIA, acres)	0.000	0.000	0.000	0.000														
Unconnected Impervious Area (UIA, acres)	0.230	0.630	0.420	0.140														
Receiving Pervious Area (RPA, acres)	11.340	13.790	10.920	1.340														
Separate Pervious Area (SPA, acres)	0.000	0.000	0.000	0.000														
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C	C	C	C														

**CALCULATED RESULTS (OUTPUT)**

Total Calculated Area (ac, check against input)	11.570	14.420	11.340	1.480														
Directly Connected Impervious Area (DCIA, %)	0.0%	0.0%	0.0%	0.0%														
Unconnected Impervious Area (UIA, %)	2.0%	4.4%	3.7%	9.5%														
Receiving Pervious Area (RPA, %)	98.0%	95.6%	96.3%	90.5%														
Separate Pervious Area (SPA, %)	0.0%	0.0%	0.0%	0.0%														
A <sub>i</sub> (RPA / UIA)	49.304	21.889	26.000	9.571														
I <sub>i</sub> Check	0.020	0.040	0.040	0.090														
f / I for WQCV Event:	0.4	0.4	0.4	0.4														
f / I for 10-Year Event:	0.4	0.4	0.4	0.4														
f / I for 100-Year Event:	0.2	0.2	0.2	0.2														
f / I for Optional User Defined Storm CUHP:																		
IRF for WQCV Event:	0.09	0.17	0.17	0.39														
IRF for 10-Year Event:	0.09	0.18	0.18	0.39														
IRF for 100-Year Event:	0.09	0.18	0.18	0.42														
IRF for Optional User Defined Storm CUHP:																		
Total Site Imperviousness, I <sub>total</sub>	2.0%	4.4%	3.7%	9.5%														
Effective Imperviousness for WQCV Event:	0.2%	0.8%	0.6%	3.7%														
Effective Imperviousness for 10-Year Event:	0.2%	0.8%	0.6%	3.7%														
Effective Imperviousness for 100-Year Event:	0.2%	0.8%	0.7%	3.9%														
Effective Imperviousness for Optional User Defined Storm CUHP:																		

**LID / EFFECTIVE IMPERVIOUSNESS CREDITS**

WQCV Event CREDIT: Reduce Detention By:	91.0%	81.6%	81.7%	57.2%	N/A												
10-Year Event CREDIT**: Reduce Detention By:	-14989.9%	152.2%	179.4%	77.0%	N/A												
100-Year Event CREDIT**: Reduce Detention By:	-10882.4%	150.9%	178.0%	74.1%	N/A												
User Defined CUHP CREDIT: Reduce Detention By:																	

Total Site Imperviousness:	3.7%
Total Site Effective Imperviousness for WQCV Event:	0.7%
Total Site Effective Imperviousness for 10-Year Event:	0.7%
Total Site Effective Imperviousness for 100-Year Event:	0.7%
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	

**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 purposes

**Design Procedure Form: Runoff Reduction**

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

**Designer:** DAVID MIJARES  
**Company:** CATAMOUNT ENGINEERING  
**Date:** April 9, 2021  
**Project:** PINE VIEW ESTATES  
**Location:** EL PASO COUNTY

**SITE INFORMATION (User Input in Blue Cells)**

WQCV Rainfall Depth = 0.60 inches  
 Depth of Average Runoff Producing Storm,  $d_b$  = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

Area Type	UIA:RPA	UIA:RPA	UIA:RPA								
Area ID	A3.1	A4.1	A2.1								
Downstream Design Point ID	A3	A4	A2.1								
Downstream BMP Type	None	None	None								
DCIA (ft <sup>2</sup> )	--	--	--								
UIA (ft <sup>2</sup> )	9,757	4,471	13,879								
RPA (ft <sup>2</sup> )	16,727	4,156	11,146								
SPA (ft <sup>2</sup> )	--	--	--								
HSG A (%)	0%	0%	0%								
HSG B (%)	100%	100%	100%								
HSG C/D (%)	0%	0%	0%								
Average Slope of RPA (ft/ft)	0.029	0.027	0.018								
UIA:RPA Interface Width (ft)	10.00	10.00	10.00								

**CALCULATED RUNOFF RESULTS**

Area ID	A3.1	A4.1	A2.1								
UIA:RPA Area (ft <sup>2</sup> )	26,484	8,627	25,025								
L / W Ratio	16.00	16.00	16.00								
UIA / Area	0.3684	0.5183	0.5546								
Runoff (in)	0.00	0.00	0.00								
Runoff (ft <sup>3</sup> )	0	0	0								
Runoff Reduction (ft <sup>3</sup> )	407	186	578								

**CALCULATED WQCV RESULTS**

Area ID	A3.1	A4.1	A2.1								
WQCV (ft <sup>3</sup> )	407	186	578								
WQCV Reduction (ft <sup>3</sup> )	407	186	578								
WQCV Reduction (%)	100%	100%	100%								
Untreated WQCV (ft <sup>3</sup> )	0	0	0								

**CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)**

Downstream Design Point ID	A3	A4	A2.1								
DCIA (ft <sup>2</sup> )	0	0	0								
UIA (ft <sup>2</sup> )	9,757	4,471	13,879								
RPA (ft <sup>2</sup> )	16,727	4,156	11,146								
SPA (ft <sup>2</sup> )	0	0	0								
Total Area (ft <sup>2</sup> )	26,484	8,627	25,025								
Total Impervious Area (ft <sup>2</sup> )	9,757	4,471	13,879								
WQCV (ft <sup>3</sup> )	407	186	578								
WQCV Reduction (ft <sup>3</sup> )	407	186	578								
WQCV Reduction (%)	100%	100%	100%								
Untreated WQCV (ft <sup>3</sup> )	0	0	0								

**CALCULATED SITE RESULTS (sums results from all columns in worksheet)**

Total Area (ft <sup>2</sup> )	60,136
Total Impervious Area (ft <sup>2</sup> )	28,107
WQCV (ft <sup>3</sup> )	1,171
WQCV Reduction (ft <sup>3</sup> )	1,171
WQCV Reduction (%)	100%
Untreated WQCV (ft <sup>3</sup> )	0

# DRAINAGE MAPS

ZONE: A-35  
USE: AG. GRAZING LAND  
OWNER: ADAM M. MOLACCCIO

ZONE: A-35  
USE: AG. GRAZING LAND  
OWNER: MIRMOHAMMAD ADLI

LOT 258  
ZONE: RR-5  
USE: SINGLE FAMILY RESIDENCE  
OWNER: GREENE FAMILY LIVING TRUST

LOT 259  
ZONE: RR-5  
USE: SINGLE FAMILY RESIDENCE  
OWNER: SANDRA STROH

PEYTON PINES FILING NO. 4  
RECEPTION NO. 785849

LOT 260  
ZONE: RR-5  
USE: SINGLE FAMILY RESIDENCE  
OWNER: MICHAEL MCMALE

LOT 261  
ZONE: RR-5  
USE: VACANT  
OWNER: FRANK W & TINA Y CHO

LOT 262  
ZONE: RR-5  
USE: SINGLE FAMILY RESIDENCE  
OWNER: MICHAEL H BARRAGAN

LOT 267  
ZONE: RR-5  
USE: SINGLE FAMILY RESIDENCE  
OWNER: JANICE M KELLEY REVOCABLE LIVING TRUST

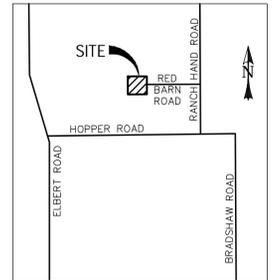
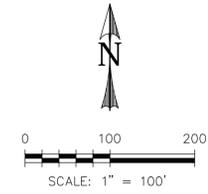
LOT 266  
ZONE: RR-5  
USE: SINGLE FAMILY RESIDENCE  
OWNER: CHAD L ANDERSON

LOT 265  
ZONE: RR-5  
USE: SINGLE FAMILY RESIDENCE  
OWNER: ROBERT M & D'ANN R AREA

LOT 264  
ZONE: RR-5  
USE: VACANT  
OWNER: ROBERTO GARZA

LOT 263  
ZONE: RR-5  
USE: VACANT  
OWNER: ROBERTO GARZA

PEYTON PINES FILING NO. 4  
RECEPTION NO. 785849



VICINITY MAP  
SCALE: N.T.S.

EXISTING DRAINAGE BASINS							
BASIN	AREA (ACRES)	Q2 (CFS)	Q5 (CFS)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)
E1	11.57	0.7	2.5	5.5	9.6	12.9	16.7
E2	12.47	0.6	2.4	5.2	9.1	12.2	15.9
E3	14.77	0.8	2.9	6.4	11.2	15.1	19.6

EXISTING DESIGN POINTS						
DESIGN POINT	Q2 (CFS)	Q5 (CFS)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)
1	0.7	2.5	5.5	9.6	12.9	16.7
2	0.6	2.4	5.2	9.1	12.2	15.9
3	0.8	2.9	6.4	11.1	15.1	19.6

**LEGEND**

- EXISTING (E)
- PROPOSED (P)
- BOUNDARY
- RIGHT-OF-WAY
- LOT LINE
- EASEMENT
- (E) CONTOUR, INDEX
- (E) CONTOUR
- (P) CONTOUR, INDEX
- (P) CONTOUR

REV.	DESCRIPTION	DATE



PREPARED FOR:

**ALICE OWENS**  
18430 LOST RANGER ROAD  
PEYTON, CO 80831-7650  
PHONE: (719) 596-7447



PO BOX 221 WOODLAND PARK, CO 80866 (719) 426-2124

**PINE VIEW ESTATES**

**EXISTING CONDITIONS**

DESIGNED BY: DLM	DRAWN BY:
SCALE: 1"=150'	DATE: 11/10/20
JOB NUMBER	SHEET
18-158	1 OF 1

ZONE: A-35  
USE: AG. GRAZING LAND  
OWNER: ADAM M. MOLACCCIO

ZONE: A-35  
USE: AG. GRAZING LAND  
OWNER: MIRMOHAMMAD ADLI

LOT 258  
ZONE: RR-5  
USE: SINGLE FAMILY RESIDENCE  
OWNER: GREENE FAMILY LIVING TRUST

LOT 259  
ZONE: RR-5  
SINGLE FAMILY RESIDENCE  
OWNER: SANDRA STROH

PEYTON PINES FILING NO. 4  
RECEPTION NO. 785849

LOT 260  
ZONE: RR-5  
SINGLE FAMILY RESIDENCE  
OWNER: MICHAEL MCMALE

LOT 261  
ZONE: RR-5  
USE: VACANT  
OWNER: FRANK W & TINA Y CHO

LOT 262  
ZONE: RR-5  
SINGLE FAMILY RESIDENCE  
OWNER: MICHAEL H BARRAGAN

LOT 267  
ZONE: RR-5  
SINGLE FAMILY RESIDENCE  
OWNER: JANICE M KELLEY REVOCABLE LIVING TRUST

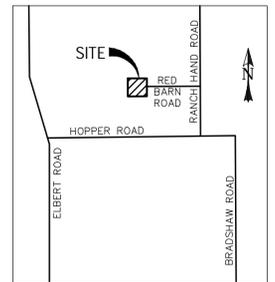
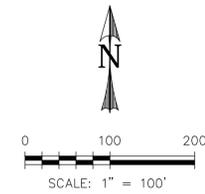
LOT 266  
ZONE: RR-5  
SINGLE FAMILY RESIDENCE  
OWNER: CHAD L ANDERSON

LOT 265  
ZONE: RR-5  
SINGLE FAMILY RESIDENCE  
OWNER: ROBERT M & D'ANN R AREA

LOT 264  
ZONE: RR-5  
USE: VACANT  
OWNER: ROBERTO GARZA

LOT 263  
ZONE: RR-5  
USE: VACANT  
OWNER: ROBERTO GARZA

PEYTON PINES FILING NO. 4  
RECEPTION NO. 785849



VICINITY MAP  
SCALE: N.T.S.

RUNOFF REDUCTION			
AREA	UIA (SF)	RPA (SF)	WCVY REDUCTION
A3.1	9757.00	16727.0	100.0
A4.1	4471.00	4156.0	100.0
A2.1	13879.00	11146.0	100.0

Show RPA more through natural ditch as shown in red

Label linetype as Time of Concentration and/or show on Legend.

Based on RR calcs, all runoff from cul-de-sac should be routed through this RPA ditch running to the northeast. But the proposed grading of the cul-de-sac does not show that happening. Revise grading as needed to accomplish goal shown in RR calcs.

LEGEND

- EXISTING (E)
- PROPOSED (P)
- BOUNDARY
- RIGHT-OF-WAY
- LOT LINE
- EASEMENT
- (E) CONTOUR, INDEX
- (E) CONTOUR
- (P) CONTOUR, INDEX
- (P) CONTOUR
- (P) DISCONNECTED IMPERVIOUS AREA
- (P) RECEIVING PERVIOUS AREA

REV.	DESCRIPTION	DATE



PREPARED FOR:

ALICE OWENS

18430 LOST RANGER ROAD  
PEYTON, CO 80831-7650  
PHONE: (719) 596-7447



PO BOX 221 WOODLAND PARK, CO 80866 (719) 426-2124

PINE VIEW ESTATES

RUNOFF REDUCTION

DESIGNED BY: DLM	DRAWN BY:
SCALE: 1"=150'	DATE: 11/10/20
JOB NUMBER	SHEET
18-158	1 OF 1

ZONE: A-35  
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ZONE: A-35  
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LOT 258  
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OWNER: MICHAEL MOHALE

LOT 261  
ZONE: RR-5  
USE: VACANT  
OWNER: FRANK W & TINA Y CHO

LOT 262  
ZONE: RR-5  
USE: SINGLE FAMILY RESIDENCE  
OWNER: MICHAEL H BARRAGAN

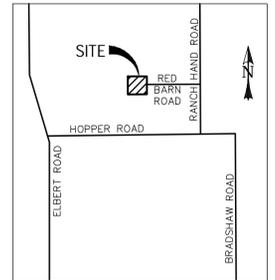
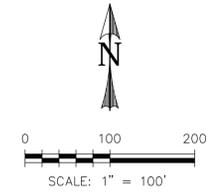
LOT 267  
ZONE: RR-5  
USE: SINGLE FAMILY RESIDENCE  
OWNER: JANICE M KELLEY REVOCABLE LIVING TRUST

LOT 266  
ZONE: RR-5  
USE: SINGLE FAMILY RESIDENCE  
OWNER: CHAD L ANDERSON

LOT 265  
ZONE: RR-5  
USE: SINGLE FAMILY RESIDENCE  
OWNER: ROBERT M & D'ANN R AREA

LOT 264  
ZONE: RR-5  
USE: VACANT  
OWNER: ROBERTO GARZA

LOT 263  
ZONE: RR-5  
USE: VACANT  
OWNER: ROBERTO GARZA



VICINITY MAP  
SCALE: N.T.S.

PROPOSED DRAINAGE BASINS							
BASIN	AREA (ACRES)	Q2 (CFS)	Q5 (CFS)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)
A1	11.57	1.1	3.3	6.6	11.0	14.7	18.8
A2	14.42	1.5	4.0	7.5	12.4	16.3	20.8
A3	11.34	1.2	3.1	6.1	10.1	13.4	17.1
A4	1.48	0.3	0.6	1.1	1.8	2.3	2.9

PROPOSED DESIGN POINTS						
DESIGN POINT	Q2 (CFS)	Q5 (CFS)	Q10 (CFS)	Q25 (CFS)	Q50 (CFS)	Q100 (CFS)
1	1.1	3.3	6.6	11.0	14.7	18.8
2	1.5	4.0	7.5	12.4	16.3	20.8
3	1.2	3.1	6.1	10.1	13.4	17.1
4	0.3	0.6	1.1	1.8	2.3	2.9

This is 5 cfs greater than historic at this design point. This may not be considered a minor increase of flow that wouldn't affect the downstream. Comments have been provided in the narrative regarding this basin/design point. Please address accordingly.

Please refer to comments in the narrative regarding the roadside ditch area.

LEGEND	
EXISTING	(E)
PROPOSED	(P)
BOUNDARY	---
RIGHT-OF-WAY	----
LOT LINE	=====
EASEMENT	-----
(E) CONTOUR, INDEX	---8820---
(E) CONTOUR	-----
(P) CONTOUR, INDEX	---6820---
(P) CONTOUR	-----

REV.	DESCRIPTION	DATE



PREPARED FOR:  
**ALICE OWENS**  
18430 LOST RANGER ROAD  
PEYTON, CO 80831-7650  
PHONE: (719) 596-7447



PINE VIEW ESTATES

PROPOSED CONDITIONS

DESIGNED BY: DLM	DRAWN BY:
SCALE: 1"=150'	DATE: 11/10/20
JOB NUMBER: 18-158	SHEET: 1 OF 1