

**DRAINAGE LETTER
FOR
CIRCLE A SUBDIVISION FILING NO. 1

EL PASO COUNTY, COLORADO**

MAY 2021

Prepared for:

**Daniel B. Andres Trust
17110 Goshawk Road
Colorado Springs, CO 80908**

Prepared by:



212 Wahsatch Ave., Ste. 305
Colorado Springs, CO 80903
(719) 955-5485

Project #72-072
PCD – MS 20-007

**DRAINAGE LETTER
FOR
CIRCLE A SUBDIVISION FILING NO. 1
EL PASO COUNTY COLORADO**

DRAINAGE PLAN STATEMENTS

ENGINEERS STATEMENT

The attached drainage plan and letter was prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage letter has been prepared according to the criteria established by the County 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.

Virgil A. Sanchez, P.E. #37160
For and on Behalf of M&S Civil Consultants, Inc

DEVELOPER'S STATEMENT

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

BY: _____

TITLE: _____

DATE: _____

ADDRESS: Daniel B. Andres (Owner)
17110 Goshawk Road
Colorado Springs, CO 80908

EL PASO COUNTY'S STATEMENT

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

BY: _____ DATE: _____

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

CONDITIONS:



May 24, 2021

El Paso County Planning & Community Development
2880 International Circle Suite 110
Colorado Springs, Colorado 80910
Attn: Jennifer Irvine P.E./County Engineer

RE: Drainage Letter for Circle A Subdivision Filing No. 1

Dear Jennifer,

The following is the Drainage Letter for Minor Subdivision application to the Circle A Subdivision Filing No. 1. The Circle A Subdivision is located in the NE quarter of Section 23, Township 11 South, Range 65 West of the 6th P.M. in El Paso County, Colorado. The site is bound to the north, south, east, and west by large-lot single-family residential lots land uses.

The existing parcel in its entirety consists of 14.867 AC and is currently zoned "RR-5" for Residential Rural under TSN: 51230-00-015. The proposal consists of subdividing an existing 14.867 AC into three (3) separate approx. ~5 AC parcels and is planned for (1) single-family unit on each lot. Lot 1 has an existing residential home and shop located on the lot, and after subdividing the parcel, Lot 1 shall consist of 4.957 AC, Lot 2 shall consist of 4.960 AC, and Lot 3 shall consist of 4.950 AC. A new single-family residential home is planned to be constructed on each of Lot 2 and 3.

The subject property generally slopes to the southeast. There are two natural drainage swales on the subject property, one on the northern portion of the project site (Lot 2) and one west on (Lot 3) that convey storm events towards West Kiowa Creek. The natural drainage swales shall be left unaltered as not to change the natural drainage patterns. The surface topography across the site is predominantly flat, with gentle slopes of less than 5%. Ponderosa Pines and native grasses cover the property.

No portion of this site is within a designated FEMA floodplain as determined by the Federal Emergency Management Agency (FEMA) Flood Insurance Map Rate Map (FIRM) Panel No. 08041C0310G, effective date of December 7, 2018. It is anticipated that the lot's general drainage patterns will not change, except for the construction and drainage protection of the future home structures.

No drainage Improvements are proposed with the minor subdivision application of the Circle A Subdivision. The proposed development of two (2) new residential units shall be less than 1 AC of disturbance areas combined, thereby complying with the El Paso County ECM code.

The Circle A Subdivision is not subject to ESQCP requirements per ECM 5.6.3. The project development falls under "Large Lot Single Family Home Construction." It's estimated that, including the construction of single-family homes, associated landscaping, gravel driveways, utility sheds, well location, and septic systems, it is expected that each lot will disturb approximately 5% on each respective lot. The estimated disturbance will be less than the maximum of 10%. Therefore the Circle A subdivision shall not be required to provide a water

quality treatment or a formal drainage study at this time, as the anticipated disturbance is less than the impervious surface area threshold identified within the ECM Section 5.6.3.

FOUR STEP PROCESS

Step 1 Employ Runoff Reduction Practices –Roof runoff shall be allowed to runoff to the natural and landscaping area of the yards on the new home structures. The goal is to minimize the overall impervious surfaces areas and to route potential runoff from impervious surfaces over grassy areas to slow down runoff and promote infiltration. Grass buffer areas will slow down the impervious surface runoff and encourage infiltration.

Step 2 Stabilize Drainage ways – The project site proposes the addition of two (2) typical residential home sites, to include landscaping, gravel driveways, a utility sheds. The estimated disturbance will be less than the maximum of 10%. Therefore it's not anticipated to have negative effects on the downstream drainage ways, nor anticipate a need to stabilize the natural drainage ways through the site.

Step 3 Provide Water Quality Capture Volume – The estimated disturbance will be less than the maximum of 10%. Therefore the Circle A subdivision shall not be required to provide a water quality treatment or a formal drainage study at this time, as the anticipated disturbance is less than the impervious surface area threshold identified within the ECM Section 5.6.3.

Step 4 Consider Need for Industrial and Commercial BMP's – This project consists of constructing two (2) new typical residences (one home per 5+/- ac parcel). It is not anticipated that the project site locations will require any specialized BMPs. It is recommended that any grading activities shall employ the use of silt fencing to mitigate erosion across the site and minimize sediment being carried downstream to the natural drainage ways. It is recommended that reseeded the disturbed areas once construction of the home is completed.

EXISTING DRAINAGE CONDITIONS

The Circle A Subdivision Fil No. 1 site consists of 14.867 acres and is situated within the West Kiowa Creek Drainage Basin. The subject property generally slopes in a southeasterly direction. There are two natural drainage swales on the subject property, one on the northeastern portion of the project site (Lots 1 and 2) and one to the west on (Lot 3) that conveys storm events to West Kiowa Creek. A runoff flow analysis was performed on the existing natural swales that traverse the proposed lots to determine the current cumulative flow runoff.

An existing offsite natural drainage swale enters Lot 2 at the northwest corner of the lot and crosses through to the southeast corner. The natural swale continues onto Lot 1 at the northeast corner of the lot, where the cumulative runoff travels within an open swale in a southeasterly direction. The existing runoff flows are conveyed under Goshawk Rd via an existing 12" culvert, where the flows continue to be conveyed downstream in an open swale in a southeasterly direction to West Kiowa Creek. (A proposed Drainage Map is provided in appendix of this report)

DP 11, Q5=6.7 cfs and Q100=45.2cfs (Downstream offsite, east of Goshawk Road, the outfall of existing 12" culvert. DP 10, Q5=6.3 cfs and Q100=43.1 cfs (Property line between Lot 1 and 2). DP 7, Q5=3.8 cfs, and Q100=28.0 cfs (Natural swale enters the project site of Lot 2). Other runoff routes contributing to the swales cumulative are identified on the proposed drainage map as DP 8 and 9. DP 8 Q5=0.6 cfs, and Q100=4.1 cfs and DP 9, Q5=1.4 cfs and Q100=10.3 cfs.

Lot 1 has an additional smaller outlet area at the south property line that flows continue downstream to the adjacent property in the same general southeasterly direction. **DP 6, Q5=1.2 cfs and Q100=4.6 cfs.**

The second-largest natural swale passes through the project site, crosses onto Lot 3 at the north property line, and conveys runoff flows in a southeasterly direction. The swale travels to the south property line of Lot 3 at **DP 3, Q5=2.0 cfs and Q100=12.9 cfs.**

Lot 3 has some additional smaller, less significant flows travel over and across Lot 3 in the same general southeasterly direction. These are identified as **DP 1, Q5=0.1 cfs and Q100=0.5 cfs, DP 2, Q5=0.4 cfs and Q100=2.6 cfs, DP 4, Q5=0.3 cfs and Q100=1.5 cfs, and DP 5, Q5=0.4 cfs and Q100=2.5 cfs.**

Due to the cohesive nature of the existing soils and velocities determined to be less than 5.0fts, it is anticipated that erosion within the existing swales shall be negligible. Runoff flows at DP 7, DP 10, and DP 11 combined, is calculated to be over 15 cfs in the natural swale during significant storm events. Therefore a 60' Drainage easement has been provided along the natural alignment of the swale through Lots 1 and 2. These two mentioned natural drainage swales shall be left unaltered as not to change the natural drainage patterns.

Should the owner desire to construct additional outbuildings in the future, increasing the total impervious surface area exceeding the allowable 10% (up to a maximum of 20%), the owner would be required to submit a watershed study. This study would be specific to the watershed for the parcel and shall be approved by the ECM Administrator, demonstrating that expected soil and vegetation are suitable to infiltrate 100% of the Water Quality Capture Volume (WQCV).

This site is in the West Kiowa Creek Drainage Basin. Per the El Paso County Drainage Basin Fee under Res. No. 20-424. The project site falls outside of any specific Drainage Basin specified in the 2021 El Paso County Drainage Basin / Bridge Fees. Therefore final plat of Circle A Subdivision Filing NO.1 shall not be subject to the drainage Basin or bridge fees.

This final drainage letter for the Circle A Subdivision anticipates minimal disturbance with the construction of (2) single-family homes, one on Lot 2 and one on Lot 3, with associated, gravel driveways, utility sheds, dry utilities, well service and septic service. Therefore, it's anticipated that there will be no negative impacts to the adjacent properties, downstream improvements or facilities with this drainage letter approval.

Respectfully,

Georgianne Willard
Project Manager
M&S Civil Consultants, Inc.

Unresolved. Please provide a narrative and runoff calculations for proposed conditions. The drainage map and the end of the report is called "proposed drainage map" but shows runoff calculations from the existing conditions narrative.

REFERENCES

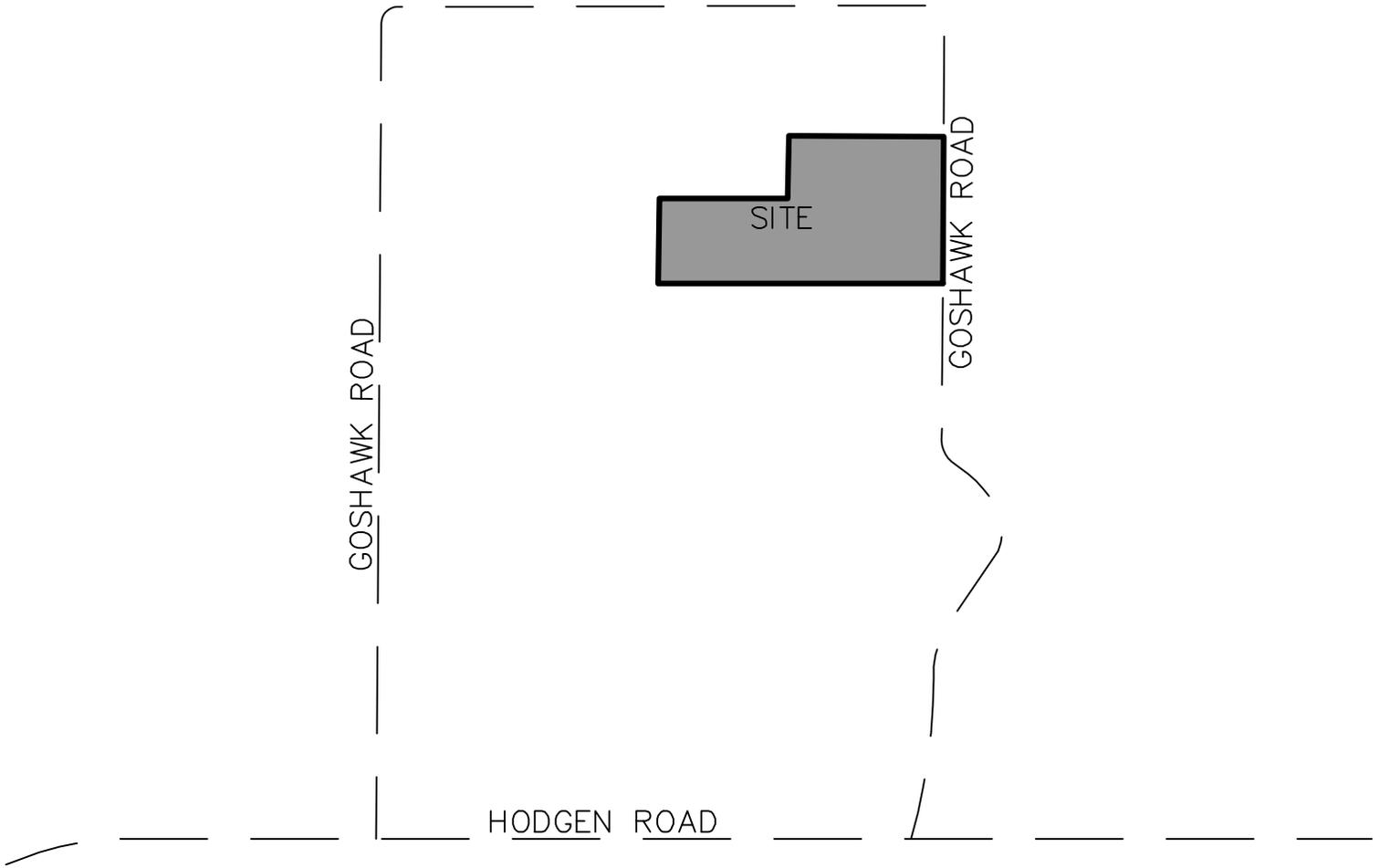
- 1.) "City of Colorado Springs/County of El Paso County Drainage Criteria Manual, as revised in November 1991 and 1994 with County adopted Chapter 6 and Section 3.2.1 of Chapter 13 of the City of Colorado Springs. El Paso County Drainage Criteria Manual as revised in May 2014"
- 2.) "ECM El Paso County Engineering Criteria Manual, Revised December 13, 2016"
- 3.) "Urban Storm Drainage Criteria Manual, Volume 1, 2 § 3, Urban Drainage and Flood Control District, dated January 2016"
- 4.) "Flood Insurance Rate Map (FIRM), Federal Emergency Management Agency, Effective date December 7, 2018"

ATTACHMENTS:

VICINITY MAP
CIRCLE A SUBDIVISION FILING NO. 1 FINAL PLAT
FEMA MAP
SOILS MAP
HYDROLOGIC CALCULATIONS
PROPOSED DRAINAGE MAP

ATTACHMENTS

VICINITY MAP



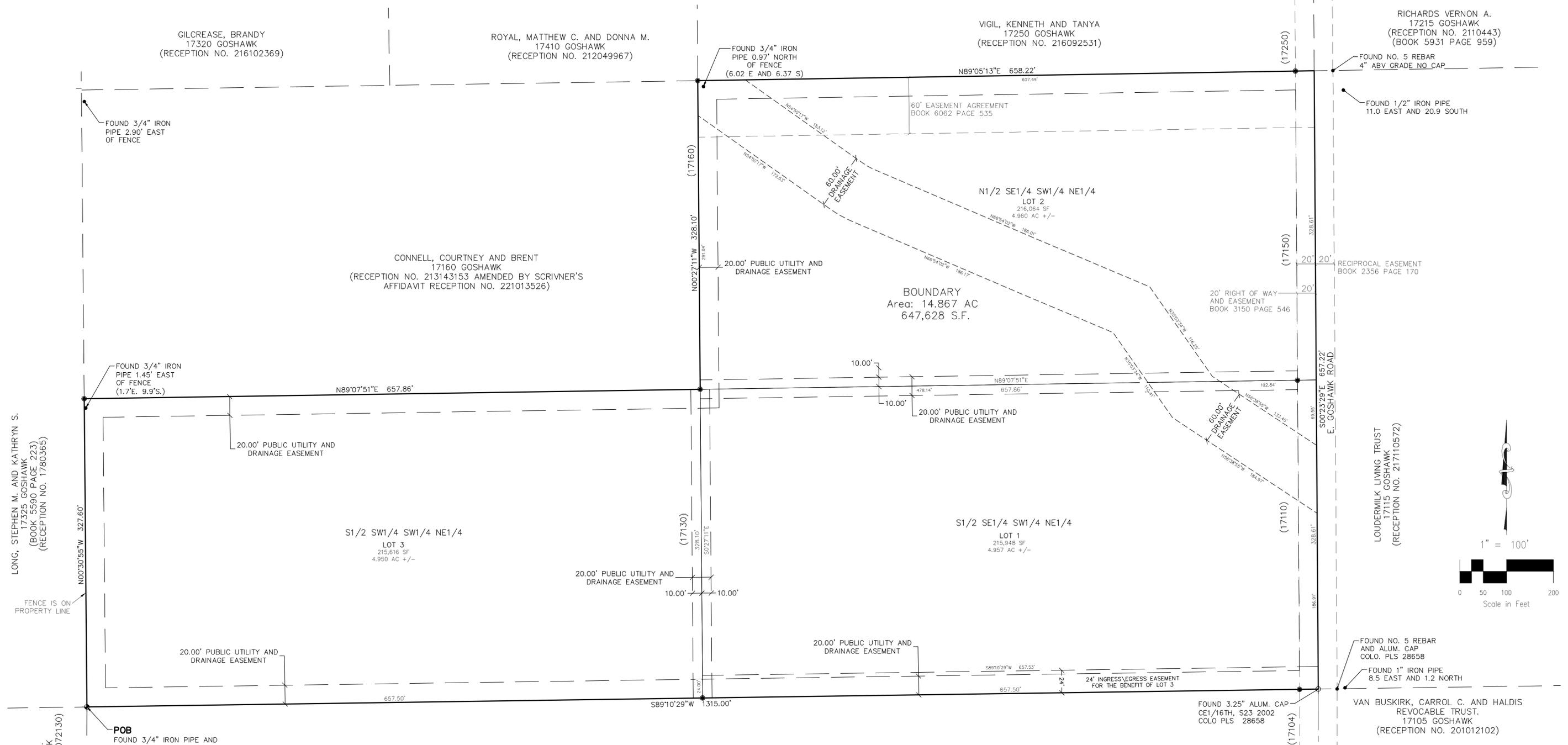
VICINITY MAP
NOT TO SCALE



**CIRCLE A SUBDIVISION FILING NO. 1
FINAL PLAT**

CIRCLE A SUBDIVISION FILING NO. 1

A SUBDIVISION OF THE SOUTH HALF OF THE SOUTH HALF OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 23 AND THE NORTH HALF OF THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 23. ALL IN TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL MERIDIAN, EL PASO COUNTY, COLORADO



LONG, STEPHEN M. AND KATHRYN S.
17325 GOSHAWK
(BOOK 5590 PAGE 223)
(RECEPTION NO. 1780365)

NEFF, BRIAN J.
16955 GOSHAWK
(RECEPTION NO. 218072130)

GILCREASE, BRANDY
17320 GOSHAWK
(RECEPTION NO. 216102369)

ROYAL, MATTHEW C. AND DONNA M.
17410 GOSHAWK
(RECEPTION NO. 212049967)

VIGIL, KENNETH AND TANYA
17250 GOSHAWK
(RECEPTION NO. 216092531)

RICHARDS VERNON A.
17215 GOSHAWK
(RECEPTION NO. 2110443)
(BOOK 5931 PAGE 959)

CONNELL, COURTNEY AND BRENT
17160 GOSHAWK
(RECEPTION NO. 213143153 AMENDED BY SCRIVNER'S
AFFIDAVIT RECEPTION NO. 221013526)

LOT 3
215,616 SF
4.950 AC +/-

BOUNDARY
Area: 14.867 AC
647,628 S.F.

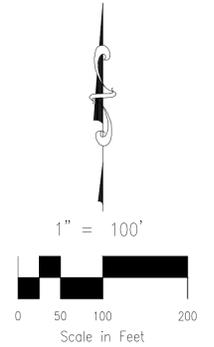
LOT 1
215,948 SF
4.957 AC +/-

LOUDERMILK LIVING TRUST
17115 GOSHAWK
(RECEPTION NO. 217110572)

VAN BUSKIRK, CARROL C. AND HALDIS
REVOCABLE TRUST.
17105 GOSHAWK
(RECEPTION NO. 201012102)

COPE, GLEN A. AND LINDA R.
17104 GOSHAWK
(BOOK 5358 PAGE 38)
(RECEPTION NO. 001560609)

- LEGEND**
- FOUND PROPERTY CORNER AS NOTED
 - ⊕ FOUND QUARTER SECTION CORNER AS NOTED
 - ⊕ FOUND SIXTEENTH CORNER AS NOTED
 - SET NO. 5 REBAR AND ORANGE CAP COLORADO PLS NO. 25966



FINAL PLAT
ANDRES SUBDIVISION FILING NO. 1
JOB NO. 70-072
DATE PREPARED: 07/15/2019
DATE REVISED: 01/27/2021
DATE REVISED: 05/12/2021
DATE REVISED: 05/24/2021



212 N. WAHSATCH AVE., STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

FILE NO. AR FP MS-20-007

SHEET 2 OF 2

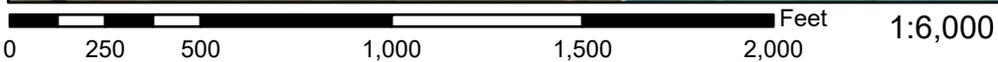
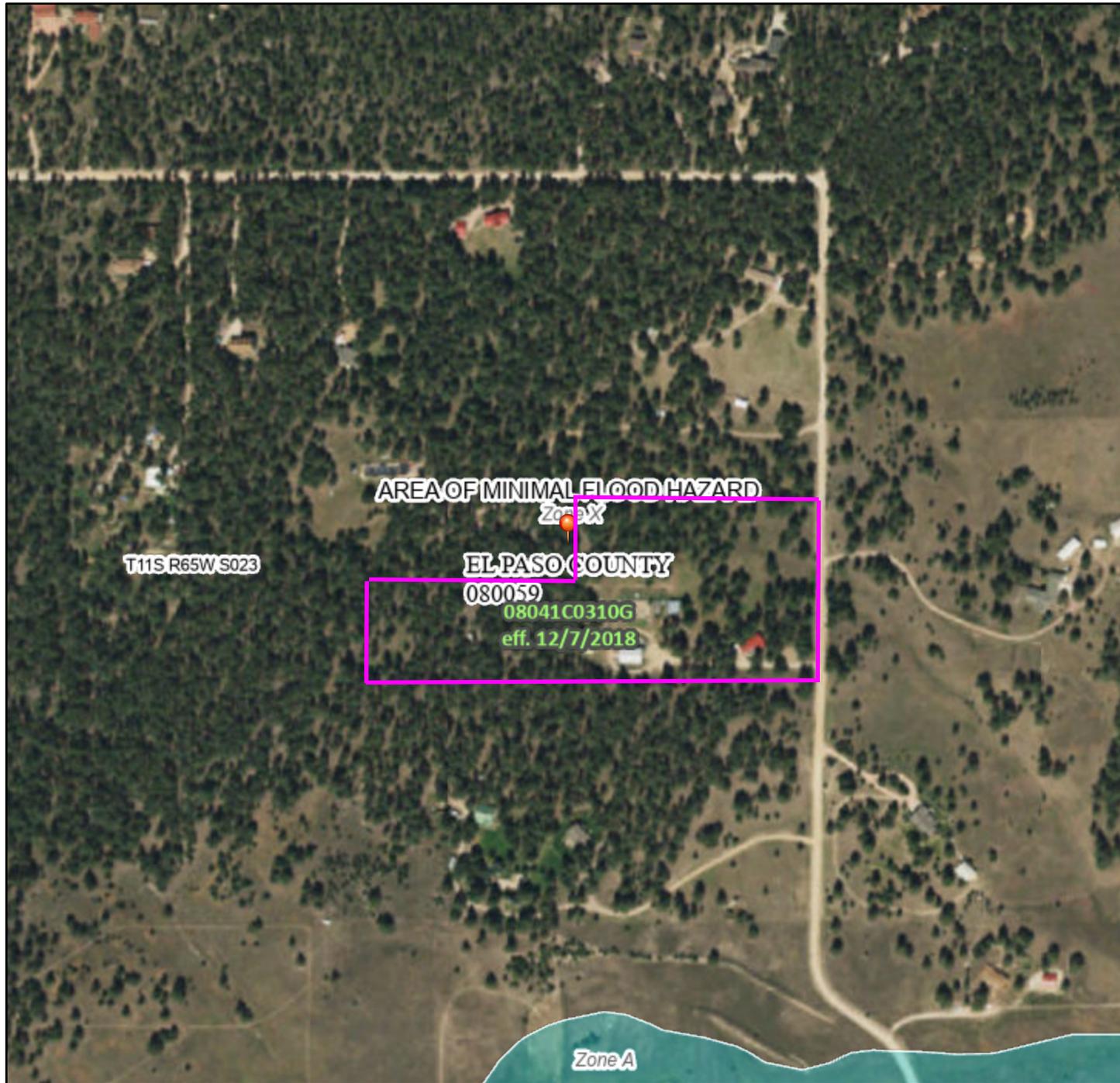
File: G:\2022\24-Goshawk\17110-Goshawk-60\Draws\Survey\Plot\170072130.dwg Plotstamp: 5/24/2021 9:35 AM

FEMA FLOOD MAP

National Flood Hazard Layer FIRMMette



104°38'16"W 39°5'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) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		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 <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>
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
MAP PANELS		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.

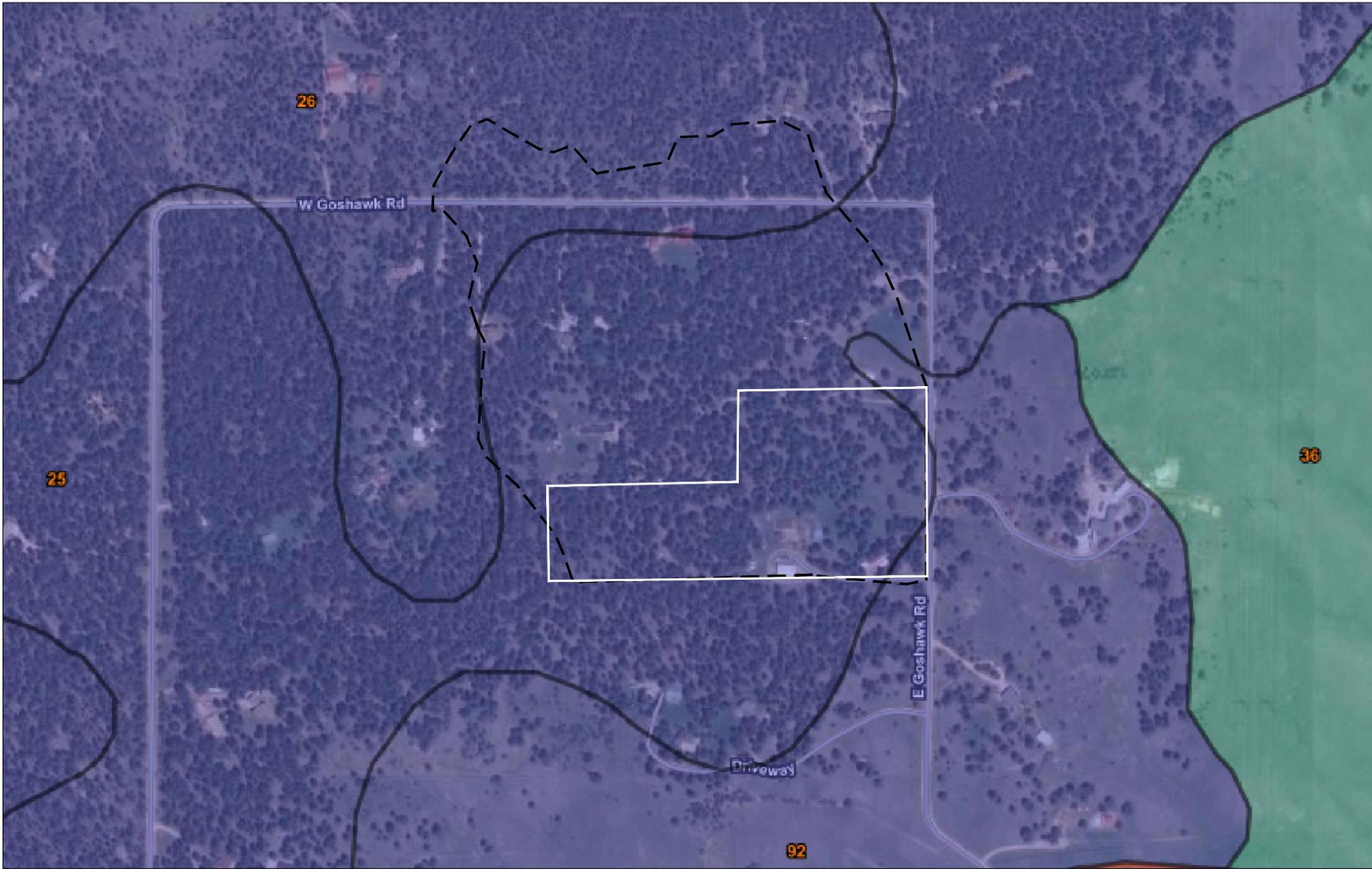


This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **3/13/2021 at 10:27 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.

SOILS MAP



25	Elbeth sandy loam, 3 to 8 percent slopes	B
26	Elbeth sandy loam, 8 to 15 percent slopes	B
92	Tomah-Crowfoot loamy sands, 3 to 8 percent slopes	B

HYDROLOGIC TYPE B SOILS 

SITE BOUNDARY 

GOSHAWK SOILS MAP
JOB NO. 70-002A

HYDROLOGIC CALCULATIONS

17110 GOSHAWK FINAL DRAINAGE REPORT (Area Drainage Summary)

From Area Runoff Coefficient Summary				OVERLAND				STREET / CHANNEL FLOW				Time of Travel (T _t)		INTENSITY *		TOTAL FLOWS	
BASIN	AREA TOTAL (Acres)	C ₅	C ₁₀₀	C ₅	Length (ft)	Height (ft)	T _C (min)	Length (ft)	Slope (%)	Velocity (fps)	T _t (min)	TOTAL (min)	CHECK (min)	I ₅ (in/hr)	I ₁₀₀ (in/hr)	Q ₅ (c.f.s.)	Q ₁₀₀ (c.f.s.)
		From DCM Table 5-1															
A	0.23	0.08	0.35	0.08	175	8	14.8	0	0.0%	0.0	0.0	14.8	11.0	3.5	6.0	0.1	0.5
B	1.39	0.08	0.35	0.08	200	10	15.3	275	4.4%	1.5	3.1	18.4	12.6	3.2	5.4	0.4	2.6
C	7.48	0.09	0.36	0.09	300	26	15.5	685	4.2%	1.4	7.9	23.4	15.5	2.9	4.8	2.0	12.9
D	0.69	0.12	0.38	0.12	150	7	13.0	150	2.7%	1.1	2.2	15.2	11.7	3.5	5.9	0.3	1.5
E	1.35	0.10	0.37	0.10	300	22	16.2	305	3.0%	1.2	4.2	20.4	13.4	3.1	5.1	0.4	2.5
F	2.23	0.18	0.42	0.18	300	23	14.8	400	2.0%	1.0	6.7	21.5	13.9	3.0	5.0	1.2	4.6
G	18.29	0.08	0.35	0.08	300	22	16.5	1050	5.1%	1.6	11.0	27.6	17.5	2.6	4.4	3.8	28.0
H	2.25	0.08	0.35	0.08	300	23	16.3	380	5.8%	1.7	3.8	20.0	13.8	3.1	5.2	0.6	4.1
I	6.89	0.08	0.35	0.08	300	15	18.8	850	4.2%	1.4	9.8	28.6	16.4	2.6	4.3	1.4	10.3
J	6.28	0.11	0.37	0.11	300	31	14.3	700	2.9%	1.2	9.9	24.1	15.6	2.8	4.7	2.0	11.0
K	2.96	0.11	0.39	0.11	300	18	17.1	230	5.2%	1.6	2.4	19.5	12.9	3.1	5.2	1.0	6.0

* Intensity equations assume a minimum travel time of 5 minutes.

3

Calculated by: DLM

Date: 5/23/2021

Checked by: _____

**17110 GOSHAWK
PROPOSED DRAINAGE CALCULATIONS
(Area Runoff Coefficient Summary)**

BASIN	AREA	TOTAL AREA (Acres)	STREETS / DEVELOPED			DEVELOPED LOTS			DEVELOPED LANDSCAPING			RUNOFF COEFFICIENT	
			AREA (Acres)	C ₅	C ₁₀₀	AREA (Acres)	C ₅	C ₁₀₀	AREA (Acres)	C ₅	C ₁₀₀	C ₅	C ₁₀₀
<i>A</i>	<i>10166.94</i>	0.23	0.00	0.59	0.70	0.00	0.73	0.81	0.23	0.08	0.35	<i>0.08</i>	<i>0.35</i>
<i>B</i>	<i>60680.21</i>	1.39	0.00	0.59	0.70	0.00	0.73	0.81	1.39	0.08	0.35	<i>0.08</i>	<i>0.35</i>
<i>C</i>	<i>325933.100</i>	7.48	0.13	0.59	0.70	0.04	0.73	0.81	7.31	0.08	0.35	<i>0.09</i>	<i>0.36</i>
<i>D</i>	<i>29909.74</i>	0.69	0.04	0.59	0.70	0.01	0.73	0.81	0.63	0.08	0.35	<i>0.12</i>	<i>0.38</i>
<i>E</i>	<i>58934.16</i>	1.35	0.06	0.59	0.70	0.00	0.73	0.81	1.29	0.08	0.35	<i>0.10</i>	<i>0.37</i>
<i>F</i>	<i>96930.600</i>	2.23	0.40	0.59	0.70	0.02	0.73	0.81	1.81	0.08	0.35	<i>0.18</i>	<i>0.42</i>
<i>G</i>	<i>796865.41</i>	18.29	0.00	0.59	0.70	0.00	0.73	0.81	18.29	0.08	0.35	<i>0.08</i>	<i>0.35</i>
<i>H</i>	<i>97798.1</i>	2.25	0.00	0.59	0.70	0.00	0.73	0.81	2.25	0.08	0.35	<i>0.08</i>	<i>0.35</i>
<i>I</i>	<i>300152.65</i>	6.89	0.00	0.59	0.70	0.00	0.73	0.81	6.89	0.08	0.35	<i>0.08</i>	<i>0.35</i>
<i>J</i>	<i>273448.68</i>	6.28	0.35	0.59	0.70	0.05	0.73	0.81	5.88	0.08	0.35	<i>0.11</i>	<i>0.37</i>
<i>K</i>	<i>128951.18</i>	2.96	0.15	0.59	0.70	0.00	0.73	0.81	2.96	0.08	0.35	<i>0.11</i>	<i>0.39</i>

Unresolved. Please provide a similar summary for existing conditions. Use CSDCM Vol. 1 table 6-6 for runoff coefficients.

**17110 GOSHAWK
FINAL DRAINAGE REPORT
(Basin Routing Summary)**

		<i>From Area Runoff Coefficient Summary</i>		OVERLAND				PIPE / CHANNEL FLOW				Time of Travel (T_t)	INTENSITY*		TOTAL FLOWS		COMMENTS	
DESIGN POINT	CONTRIBUTING BASINS	CA₅	CA₁₀₀	C_s	Length (ft)	Height (ft)	T_c (min)	Length (ft)	Slope (%)	Velocity (fps)	T₁ (min)	TOTAL (min)	I₅ (in/hr)	I₁₀₀ (in/hr)	Q₅ (c.f.s.)	Q₁₀₀ (c.f.s.)		
1	Basin A	0.02	0.08				14.8					14.8	3.5	6.0	0.1	0.5		
				Basin A Tc Was Used														
2	Basin B	0.11	0.49				18.4					18.4	3.2	5.4	0.4	2.6		
				Basin B Tc Was Used														
3	Basin C	0.69	2.68				23.4					23.4	2.9	4.8	2.0	12.9		
				Basin C Tc Was Used														
4	Basin D	0.08	0.26				15.2					15.2	3.5	5.9	0.3	1.5		
				Basin D Tc Was Used														
5	Basin E	0.14	0.49				20.4					20.4	3.1	5.1	0.4	2.5		
				Basin E Tc Was Used														
6	Basin F	0.39	0.93				21.5					21.5	3.0	5.0	1.2	4.6		
				Basin F Tc Was Used														
7	Basin G	1.46	6.40				27.6					27.6	2.6	4.4	3.8	28.0		
				Basin G Tc Was Used														
8	Basin H	0.18	0.79				20.0					20.0	3.1	5.2	0.6	4.1		
				Basin H Tc Was Used														
9	Basin I	0.55	2.41				16.2					28.6	2.6	4.3	1.4	10.3		
				Basin I Tc Was Used														
10	DP7, DP8, DP9 Basin J	2.91	11.94				27.6	700	2.9%	1.2	9.9	37.4	2.2	3.6	6.3	43.1		
				DP7 Tc Was Used														
11	DP10, K	3.23	13.09				37.4	125	1.6%	0.9	2.4	39.8	2.1	3.5	6.7	45.2		
				DP 10 Tc Was Used														

Worksheet for Section - A-A

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.035 ft/ft
Discharge	11.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	1.80
0+45	0.00
0+90	3.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 1.80)	(0+90, 3.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	5.0 in
Roughness Coefficient	0.030
Elevation	0.41 ft
Elevation Range	0.0 to 3.0 ft
Flow Area	3.4 ft ²
Wetted Perimeter	16.5 ft
Hydraulic Radius	2.5 in
Top Width	16.50 ft
Normal Depth	5.0 in
Critical Depth	5.4 in
Critical Slope	0.022 ft/ft
Velocity	3.23 ft/s
Velocity Head	0.16 ft
Specific Energy	0.57 ft
Froude Number	1.254
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.0 in
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Worksheet for Section - A-A

GVF Input Data

Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.0 in
Critical Depth	5.4 in
Channel Slope	0.035 ft/ft
Critical Slope	0.022 ft/ft

Worksheet for Section - B-B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.033 ft/ft
Discharge	43.00 cfs

Section Definitions

	Station (ft)	Elevation (ft)	
	0+00		2.00
	0+45		0.00
	0+90		2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient	
(0+00, 2.00)	(0+90, 2.00)	0.030	

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	8.0 in
Roughness Coefficient	0.030
Elevation	0.67 ft
Elevation Range	0.0 to 2.0 ft
Flow Area	10.0 ft ²
Wetted Perimeter	30.0 ft
Hydraulic Radius	4.0 in
Top Width	29.94 ft
Normal Depth	8.0 in
Critical Depth	8.9 in
Critical Slope	0.018 ft/ft
Velocity	4.32 ft/s
Velocity Head	0.29 ft
Specific Energy	0.95 ft
Froude Number	1.320
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.0 in
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Worksheet for Section - B-B

GVF Input Data

Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	8.0 in
Critical Depth	8.9 in
Channel Slope	0.033 ft/ft
Critical Slope	0.018 ft/ft

Worksheet for Section - C-C

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.026 ft/ft
Discharge	43.00 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	2.00
0+45	0.00
0+90	2.10

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.00)	(0+90, 2.10)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	8.4 in
Roughness Coefficient	0.030
Elevation	0.70 ft
Elevation Range	0.0 to 2.1 ft
Flow Area	10.8 ft ²
Wetted Perimeter	30.9 ft
Hydraulic Radius	4.2 in
Top Width	30.84 ft
Normal Depth	8.4 in
Critical Depth	9.0 in
Critical Slope	0.018 ft/ft
Velocity	3.97 ft/s
Velocity Head	0.25 ft
Specific Energy	0.95 ft
Froude Number	1.182
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.0 in
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Worksheet for Section - C-C

GVF Input Data

Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	8.4 in
Critical Depth	9.0 in
Channel Slope	0.026 ft/ft
Critical Slope	0.018 ft/ft

Worksheet for Section - D-D

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.025 ft/ft
Discharge	45.20 cfs

Section Definitions

Station (ft)	Elevation (ft)
0+00	2.00
1+00	0.00
1+40	2.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 2.00)	(1+40, 2.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	7.3 in
Roughness Coefficient	0.030
Elevation	0.61 ft
Elevation Range	0.0 to 2.0 ft
Flow Area	12.8 ft ²
Wetted Perimeter	42.4 ft
Hydraulic Radius	3.6 in
Top Width	42.37 ft
Normal Depth	7.3 in
Critical Depth	7.6 in
Critical Slope	0.019 ft/ft
Velocity	3.53 ft/s
Velocity Head	0.19 ft
Specific Energy	0.80 ft
Froude Number	1.130
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.0 in
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Worksheet for Section - D-D

GVF Input Data	
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	7.3 in
Critical Depth	7.6 in
Channel Slope	0.025 ft/ft
Critical Slope	0.019 ft/ft

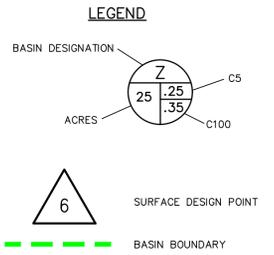
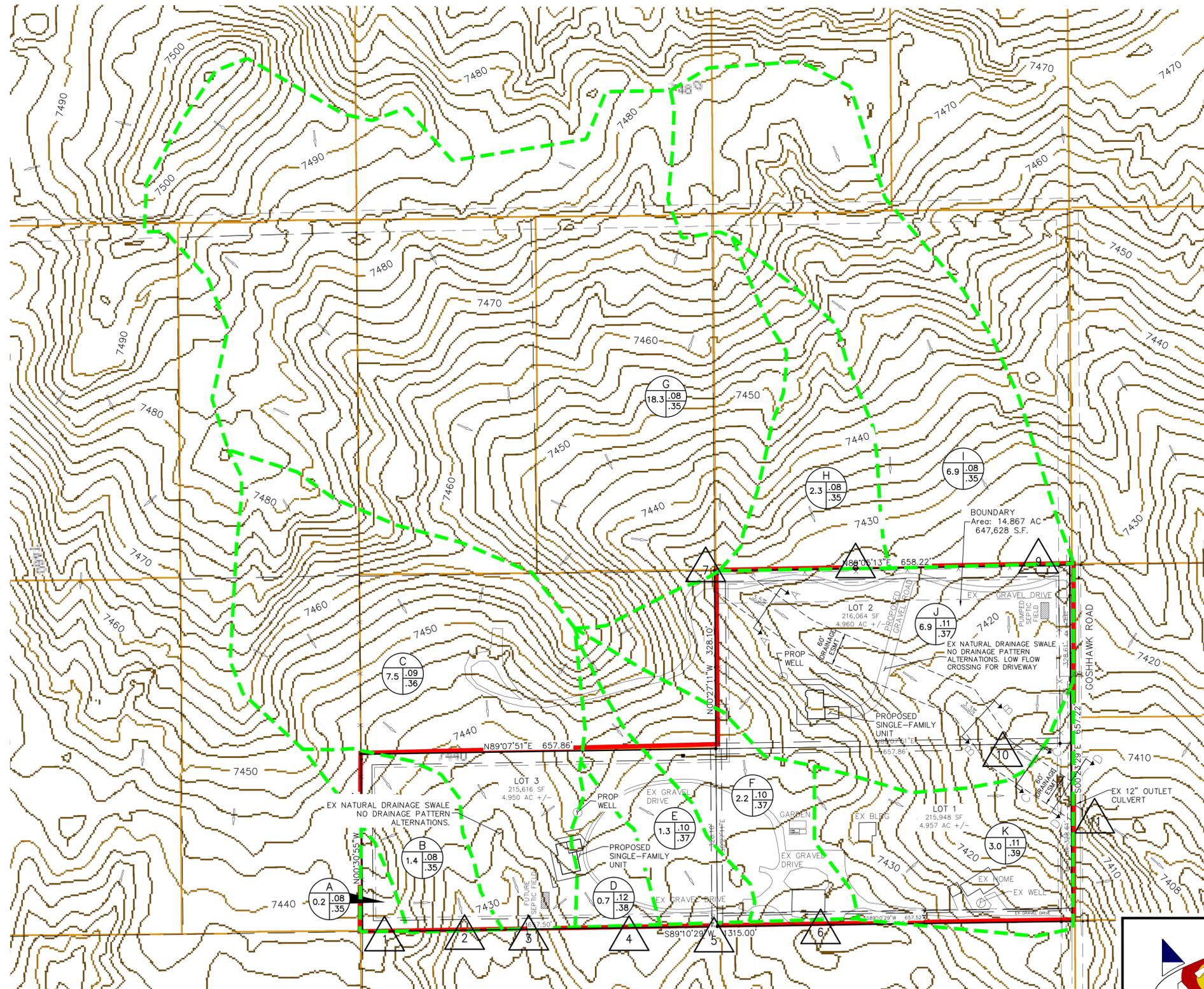
PROPOSED DRAINAGE MAP

FINAL DRAINAGE LETTER FOR CIRCLE A SUBDIVISION FILING NO. 1

COUNTY OF EL PASO, STATE OF COLORADO

PROPOSED DRAINAGE MAP

MAY 2021



EXISTING DRAINAGE CONDITIONS

The Circle A Subdivision Fil No. 1 site consists of 14,867 acres and is situated within the West Kiowa Creek Drainage Basin. The subject property generally slopes in a southeasterly direction. There are two natural drainage swales on the subject property, one on the northeastern portion of the project site (Lots 1 and 2) and one to the west on (Lot 3) that conveys storm events to West Kiowa Creek. A runoff flow analysis was performed on the existing natural swales that traverse the proposed lots to determine the current cumulative flow runoff.

An existing offsite natural drainage swale enters Lot 2 at the northwest corner of the lot and crosses through to the southeast corner. The natural swale continues onto Lot 1 at the northeast corner of the lot, where the cumulative runoff travels within an open swale in a southeasterly direction. The existing runoff flows are conveyed under Goshawk Rd via an existing 12" culvert, where the flows continue to be conveyed downstream in an open swale in a southeasterly direction to West Kiowa Creek. (A proposed Drainage Map is provided in appendix of the report)

DP 11, Q5=6.7 cfs and Q100=45.2cfs (Downstream offsite, east of Goshawk Road, the outfall of existing 12" culvert. DP 10, Q5=6.3 cfs and Q100=43.1 cfs (Property line between Lot 1 and 2). DP 7, Q5=3.8 cfs, and Q100=28.0 cfs (Natural swale enters the project site of Lot 2). Other runoff routes contributing to the swales cumulative are identified on the proposed drainage map as DP 8 and 9. DP 8 Q5=0.6 cfs, and Q100=4.1 cfs and DP 9, Q5=1.4 cfs and Q100=10.3 cfs.

Lot 1 has an additional smaller outlet area at the south property line that flows continue downstream to the adjacent property in the same general southeasterly direction. DP 6, Q5=1.2 cfs and Q100=4.6 cfs.

BASIN SUMMARY

BASIN	AREA (ACRES)	Q ₅	Q ₁₀₀
A	0.23	0.1	0.5
B	1.39	0.4	2.6
C	7.48	2.0	12.9
D	0.69	0.3	1.5
E	1.35	0.4	2.5
F	2.23	1.2	4.6
G	18.29	3.8	28.0
H	2.25	0.6	4.1
I	6.89	1.4	10.3
J	6.28	2.0	11.0
K	2.96	1.0	6.0

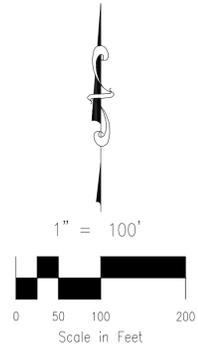
DESIGN POINT SUMMARY

DESIGN POINT	Q ₅	Q ₁₀₀	BASIN
1	0.1	0.5	A
2	0.4	2.6	B
3	2.0	12.9	C
4	0.3	1.5	D
5	0.4	2.5	E
6	1.2	4.6	F
7	3.8	28.0	G
8	0.6	4.1	H
9	1.4	10.3	I
10	6.3	43.1	DP7, DP8, DP9, J
11	6.7	45.2	DP10, K

CROSS SECTION SUMMARY

SECTION	Q ₁₀₀ (CFS)	V ₁₀₀ (FPS)	D ₁₀₀ (INCHES)
A	11.0	3.2	5.0
B	43.0	4.3	8.0
C	43.0	4.0	8.4
D	45.2	3.5	7.3

Unresolved. Provide a summary table for existing and developed conditions. Per the existing conditions narrative these design points are from the existing conditions although this is a proposed drainage map.



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212 N. WAHSATCH AVE., STE 305
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

CIRCLE A SUBDIVISION FILING NO. 1
PROPOSED DRAINAGE MAP

PROJECT NO. 17-110A FILE: \dwg\Eng Exhibits\Proposed Drainage Map.dwg

DESIGNED BY: DM SCALE: DATE: 05-19-2021
DRAWN BY: GW HORIZ: 1"=100'
CHECKED BY: DM VERT: N/A SHEET 1 OF 1 FDM01

File: c:\700724-goshawk\17110 Goshawk\17110 Exhibits\Proposed Drainage Map.dwg Plotstamp: 5/25/2021 8:17 AM