

DELMAR FARMS DRAINAGE REPORT

JULY 2024

Prepared For
MIMA CAPITAL, LLC.

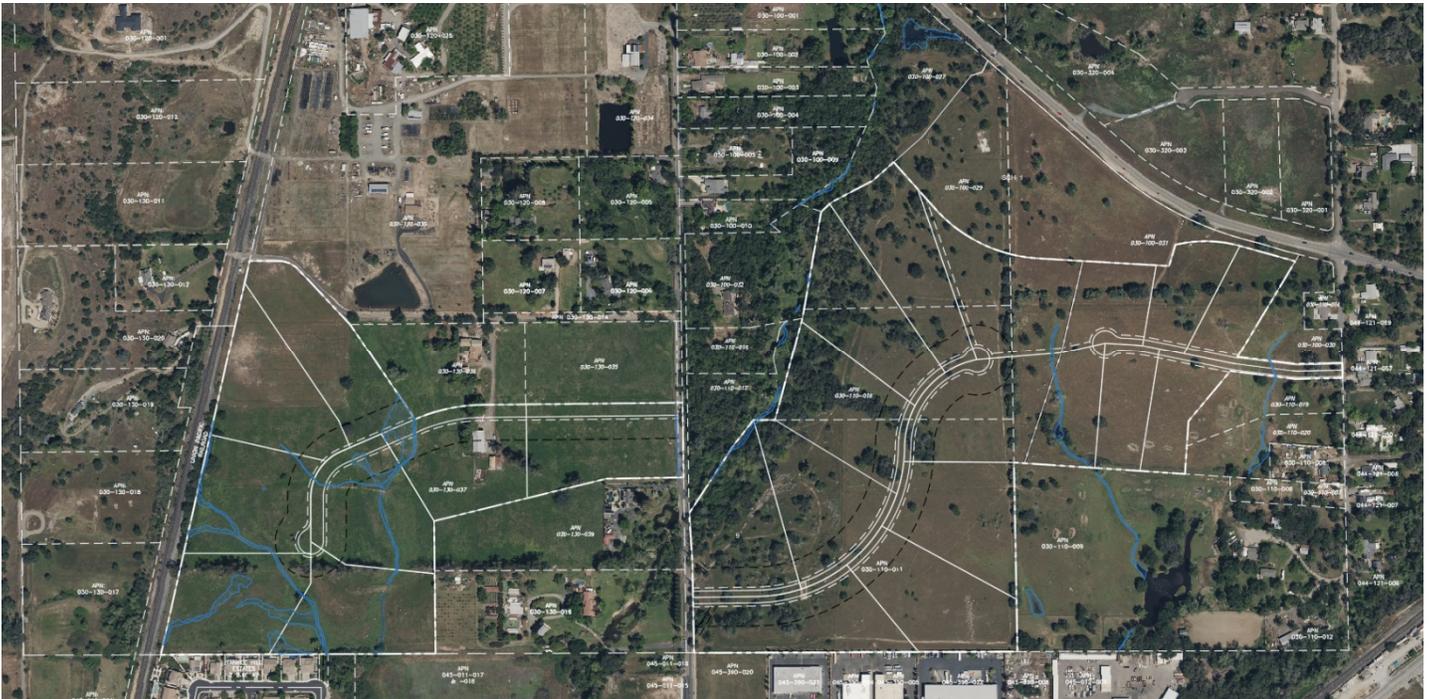


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INTRODUCTION

Project Description

The proposed “Delmar Farms” (Project) includes a total of approximately 2.95-acres of new impervious surface, located at Delmar Ave west of Sierra College Blvd. and north of the City of Rocklin. The project proposes on-site improvements which include paved private roads with access from Delmar Ave and Bankhead Rd. The project will provide roadside ditches, culvers, and water quality basins.

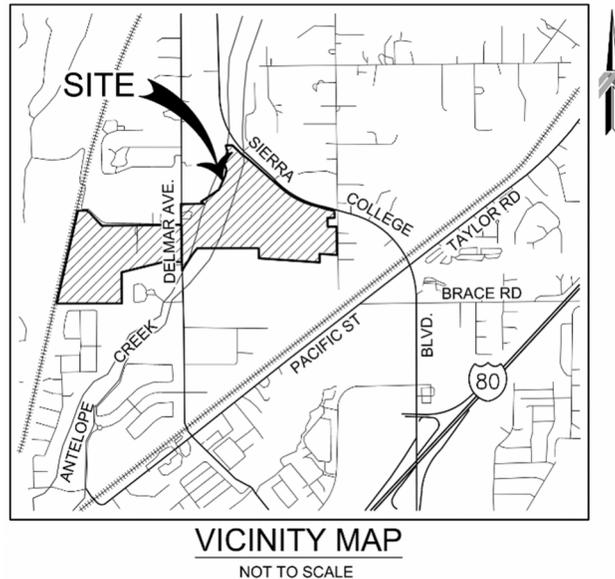


Figure 1: Project Vicinity Map

Scope of the Report

This report provides analysis, documents for the existing pre-developed watershed characteristics, and determines the required drainage facilities that are necessary to maintain the historical water pattern prior to construction. The report covers the Storm Drainage design for the improvements within the project limits.

Soil Information

The soil type classification for each drainage subshed was determined by using the USDA Soil Conservation Service which classes the soils as andregg coarse sandy loam and xerotherants. The sheds are specifically classified to be Type B soils. Youngdahl (Youngdahl Consulting Group, Inc.) has prepared a geotechnical engineering report, dated October 2018, for the project entitled “Geotechnical Engineering Study for Green Business Park Loomis”. The report identifies the subsurface conditions as a thin veneer of light brown to dark brown silty sands overlying quartz diorite bedrock. Groundwater seepage was observed in two test pit locations at varying depths and there is evidence of past seepage. Seepage may be encountered in excavations which reveal the soil/weather rock transition, particularly during or after the rainy season. Soil information and classification from USDA is provided in Exhibit E.

EXISTING CONDITIONS



Figure 2: Pre-Development Land Photo, Along Delmar Ave

As shown in Figure 2 above, most of the site is currently undeveloped agricultural land. General slopes range from 2-9%.

DESIGN CRITERIA

Most of the design criteria listed below are also found in the Placer County Flood Control and Water Conservation District Stormwater Management Manual (SWMM).

- **Roadside ditches and Frontage roads are sized for ultimate development according to Placer County drainage formulas as follows:**

$$\text{Sheet flow:} \quad t_r = \frac{.355(nL)^6}{S^3}$$

$$\text{Channel flow:} \quad t_r = \frac{.00735Ln^{75}(1+Z^2)^{.25}}{S^{.375}(A_cZ)^{.25}}$$

$$\text{Peak Discharge:} \quad Q = qA - A_p F_i$$

WATER QUALITY

Permanent water quality measures are implemented at various locations throughout the site. This project will capture and discharge flow from sheds 1-9, as seen on Drainage Map #3 Post-Development Shed Map, into water quality basins. Treated runoff exits the basins and continues to flow along historical routes. Treated water quality volume was determined using the West Placer Stormwater Quality Manual specified calculations. Treated water quality flow was determined using Exhibit D Form 3-5.

For maintenance, all water quality basins and roadside ditches will be biannually cleaned and maintained, typically in July and September. A maintenance program will be funded by the property owners.

REFERENCES

1. NPDES CA S000002, SWRCB Water Quality Order No. 2009-0009 DWQ, as amended by 20102014-DWQ and 2012-006-DWQ, Construction General Permit (permit to be obtained for the Project).
2. NPDES General Permit No. CA S000004, SWRCB Water Quality Order No. 2013-00001 DWQ, WDRs for MS4s
3. Placer County Storm Water Management Plan 2004, or latest update.
4. Placer County Storm Water Management Manual and Land Development Manual.
5. Soil survey of Placer County, California Western Part, USDA, Soil Conservation Service, University of California Agricultural Experiment Station
6. West Placer County Storm Water Quality Design Manual and Template.
7. CASQA Stormwater BMP Handbook New Development and Redevelopment, Section 5.
8. Youngdahl Consulting Group, Inc. "Geotechnical Engineering Study for Green Business Park Loomis", October 2018.

EXHIBIT A

Drainage Peak Flow Calculations

Table 1
Pre-Development Peak Flow

Watershed Data							Time of Concentration										Peak Flow						
Refer to drainage map and soil type							Overland Flow				Channel Flow						Fig 5-3A,C P.C. SWMM						
BASIN	Elev.	Total Area (ac.)	Perv. Area	Soil Type	Infiltration Rate (in/hr)	F ₁ ¹	Length ft.	Slope ft/ft	N	t _r ² min.	Area (ac.)	Length ft.	Slope ft/ft	n	Z	t _r ³ min.	Total Time (min.)	Q ₁₀	Q ₁₀₀	Q ₁₀ ⁴ cfs	Q ₁₀₀ ⁴ cfs		
AREA DISCHARGING TO AREA 1																							
1	330	14.65	13.92	B	0.22	0.37	400	0.2	0.11	10.00	14.65	1530	0.0280	0.025	20	2.92	12.92	1.866	3.380	22.19	44.37		
2	330	33.1	31.45	B	0.22	0.37	400	0.2	0.11	10.00	33.1	1530	0.0280	0.025	20	2.38	12.38	1.913	3.464	51.67	103.02		
3	330	6.5	6.18	B	0.22	0.37	380	0.028	0.4	10.00	6.5	712	0.0340	0.025	20	1.55	11.55	1.975	3.576	10.55	20.96		
4	320	7.02	6.67	B	0.22	0.37	342	0.05	0.4	10.00	7.02	963	0.0330	0.025	20	2.08	12.08	1.936	3.506	11.12	22.14		
5	305	11.47	10.90	B	0.22	0.37	314	0.048	0.4	10.00	11.47	941	0.0220	0.025	20	2.09	12.09	1.936	3.506	18.16	36.17		
6	290	11.72	11.13	B	0.22	0.37	311	0.06	0.4	10.00	11.72	1709	0.0200	0.025	20	3.92	13.92	1.788	3.240	16.81	33.83		
1>6	290	84.46	80.24	B	0.22	0.37												AREA 1 TOTAL FLOW	13.92	1.788	3.240	121.15	243.78
AREA DISCHARGING TO AREA 2																							
7	320	23.45	22.28	B	0.22	0.37	369	0.036	0.4	10.00	23.45	1238	0.0280	0.025	20	2.10	12.10	1.928	3.492	36.96	73.63		
																		AREA 2 TOTAL FLOW				36.96	73.63
AREA DISCHARGING TO AREA 3																							
18	325	4.41	4.19	B	0.22	0.37	271	0.038	0.4	10.00	4.41	767	0.0420	0.025	20	1.70	11.70	1.967	3.562	7.12	14.16		
19	325	10.27	9.76	B	0.22	0.37	400	0.032	0.4	10.00	10.27	815	0.0390	0.025	20	1.50	11.50	1.975	3.576	16.67	33.11		
18>19	290	14.68	13.95	B	0.22	0.37												AREA 3 TOTAL FLOW	11.70	1.967	3.562	23.69	47.10
AREA DISCHARGING TO AREA 4																							
15	325	10.14	9.63	B	0.22	0.37	385	0.061	0.4	10.00	10.14	930	0.0450	0.025	20	1.63	11.63	1.967	3.562	16.38	32.55		
16	325	5.83	5.54	B	0.22	0.37	360	0.026	0.4	10.00	5.83	588	0.0440	0.025	20	1.19	11.19	2.006	3.632	9.65	19.12		
17	325	5.34	5.07	B	0.22	0.37	185	0.016	0.4	10.00	5.34	994	0.0290	0.025	20	2.41	12.41	1.905	3.450	8.29	16.54		
18>19	290	21.31	20.24	B	0.22	0.37												AREA 4 TOTAL FLOW	12.41	1.905	3.450	33.06	65.98
AREA DISCHARGING TO AREA 5																							
21	325	21.56	20.48	B	0.22	0.37	400	0.028	0.4	10.00	21.56	1614	0.0110	0.025	20	3.97	13.97	1.788	3.240	30.96	62.27		
22	320	12.38	11.76	B	0.22	0.37	528	0.015	0.4	10.00	12.38	645	0.0140	0.025	20	1.67	11.67	1.967	3.562	20.00	39.74		
18>19	290	33.94	32.24	B	0.22	0.37												AREA 5 TOTAL FLOW	13.97	1.788	3.240	48.68	97.96
REMAINING AREAS																							
8	295	11.02	10.47	B	0.22	0.37	384	0.038	0.4	10.00	11.02	640	0.0440	0.025	20	1.11	11.11	2.006	3.632	18.22	36.13		
9	305	5.15	4.89	B	0.22	0.37	423	0.03	0.4	10.00	5.15	279	0.0380	0.025	20	0.62	10.62	2.045	3.702	8.72	17.25		
10	300	4.77	4.53	B	0.22	0.37	363	0.042	0.4	10.00	4.77	1126	0.0130	0.025	20	3.80	13.80	1.804	3.268	6.92	13.90		
11	295	6.53	6.20	B	0.22	0.37	353	0.12	0.4	10.00	6.53	1046	0.0100	0.025	20	3.60	13.60	1.819	3.296	9.57	19.22		
12	325	6.75	6.41	B	0.22	0.37	397	0.039	0.4	10.00	6.75	841	0.0660	0.025	20	1.41	11.41	1.983	3.590	11.01	21.86		
13	330	4.82	4.58	B	0.22	0.37	192	0.003	0.4	10.00	4.82	594	0.0110	0.025	20	2.13	12.13	1.928	3.492	7.60	15.14		
14	325	4.78	4.54	B	0.22	0.37	316	0.061	0.4	10.00	4.78	687	0.0570	0.025	20	1.33	11.33	1.991	3.604	7.83	15.55		
20	325	8.08	7.68	B	0.22	0.37	381	0.021	0.4	10.00	8.08	465	0.0080	0.025	20	1.65	11.65	1.967	3.562	13.05	25.94		
23	320	8.06	7.66	B	0.22	0.37	475	0.027	0.4	10.00	8.06	780	0.0010	0.025	20	6.04	16.04	1.600	2.911	10.06	20.62		

¹ SWMM Equation 5-5, Infiltration Factor
² SWMM Equation 5-3, Overland Flow Response Time
³ SWMM Equation 5-4, Collector Flow Response Time
⁴ SWMM Equation 5-6, Adjustment for Infiltration Peak Flow

Table 3

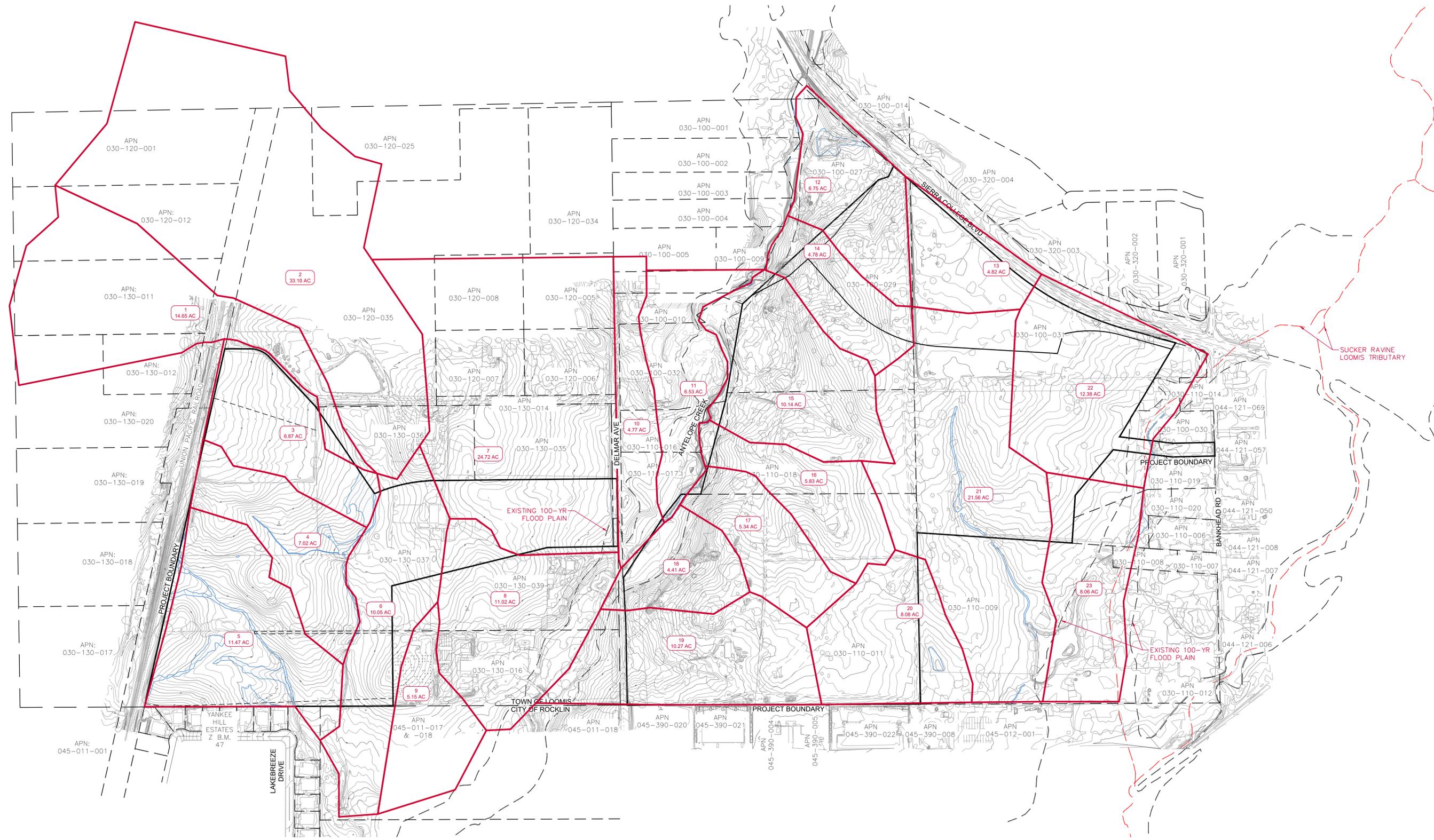
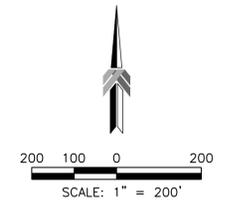
Pre-Development to Post-Development Comparison Table

PRE-DEVELOPMENT					POST-DEVELOPMENT				
Discharge Location	Shed Numbers	Area - ac.	Q10	Q100	Discharge Location	Shed Numbers	Area - ac.	Q10	Q100
PT. 1	1>6	84.46	121.1	243.8	PT. 1	1>2	78.84	101.6	207.2
PT. 2	7	23.45	37.0	73.6	PT. 2	OS2, 3, D1>D3	25.93	33.7	68.8
PT. 3	18>19	14.68	23.7	47.1	PT. 3	4>5	13.91	17.6	36.1
PT. 4	15>17	21.31	33.1	66.0	PT. 4	6>7	25.98	33.0	67.4
PT. 5	21>22	33.94	48.7	98.0	PT. 5	8>9	33.18	41.5	85.3
TOTAL (1-5)		177.84	263.54	528.46	TOTAL (1-5)		177.84	227.41	464.72

EXHIBIT B
Drainage Maps

LEGEND

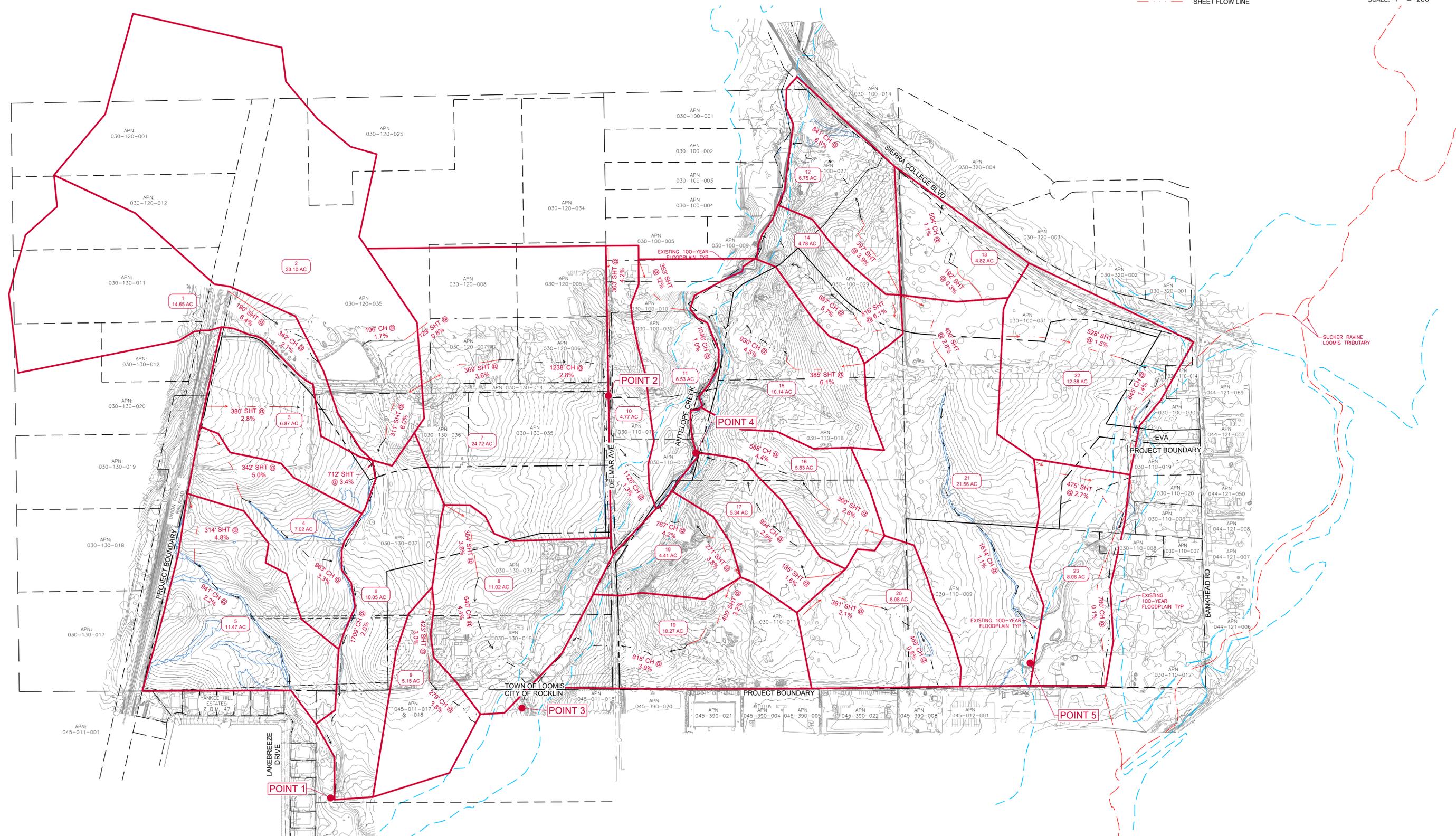
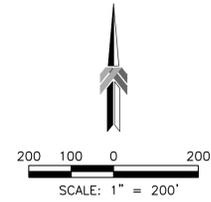
- ## SHED DESIGNATION
- FLOW DIRECTION
- 100 YEAR EXISTING FLOODPLAIN LIMIT
- 100 YEAR EXISTING FEMA FLOODPLAIN LIMIT
- CHANNEL FLOW LINE
- SHEET FLOW LINE



**DELMAR FARMS
DRAINAGE MAP #1 - ANTELOPE TRIBUTARY SHED MAP**
PLACER COUNTY, CALIFORNIA
JULY 2024

LEGEND

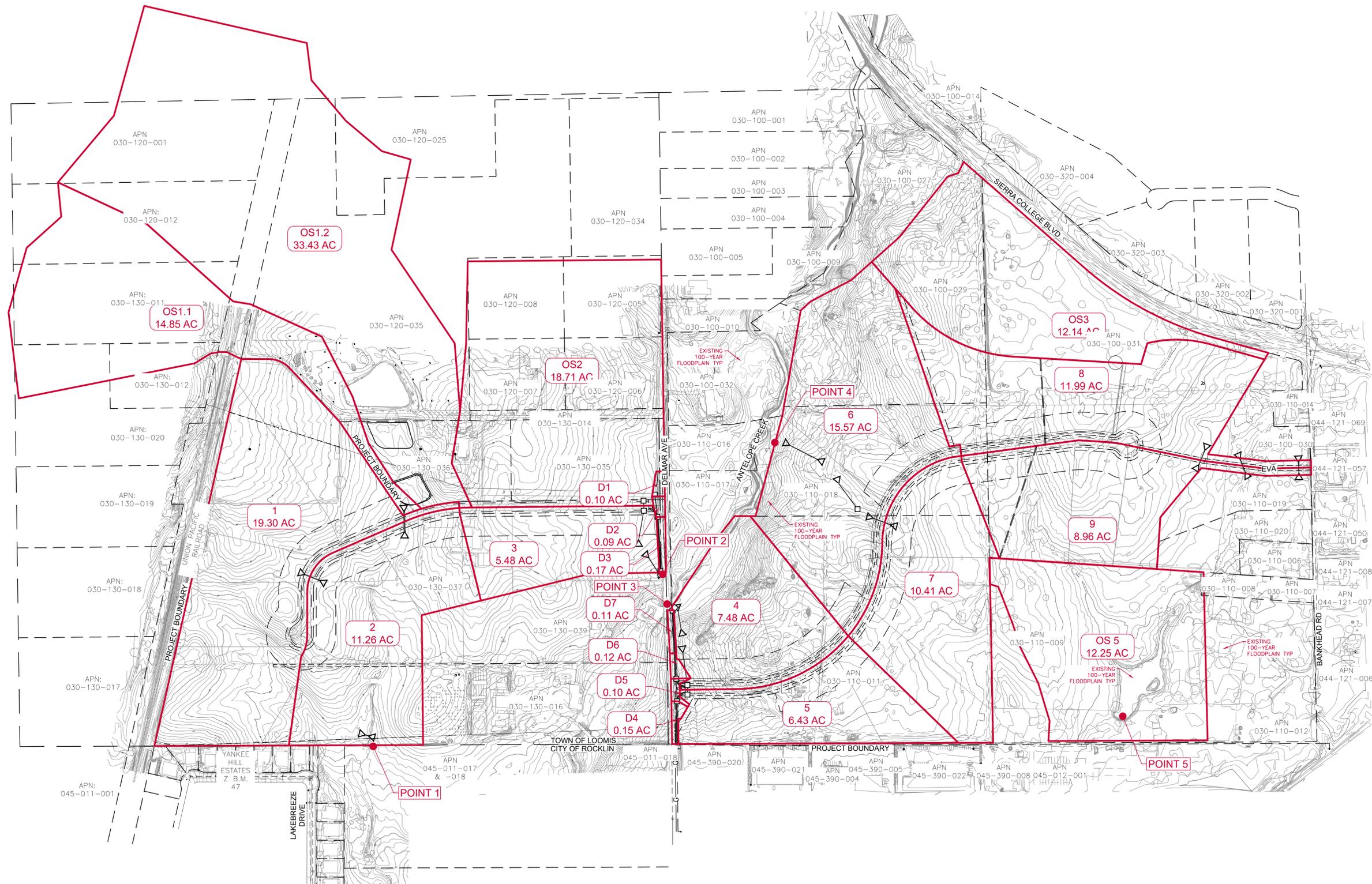
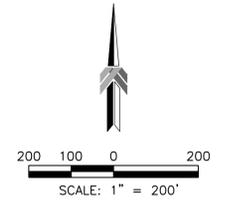
- ## SHED DESIGNATION
- FLOW DIRECTION
- 100 YEAR EXISTING FLOODPLAIN LIMIT
- 100 YEAR EXISTING FEMA FLOODPLAIN LIMIT
- CHANNEL FLOW LINE
- SHEET FLOW LINE



DELMAR FARMS
DRAINAGE MAP #2 - PRE-DEVELOPMENT SHED MAP
 PLACER COUNTY, CALIFORNIA
 JULY 2024

LEGEND

- ## SHED DESIGNATION
- FLOW DIRECTION
- 100 YEAR EXISTING FLOODPLAIN LIMIT
- 100 YEAR EXISTING FEMA FLOODPLAIN LIMIT
- CHANNEL FLOW LINE
- SHEET FLOW LINE



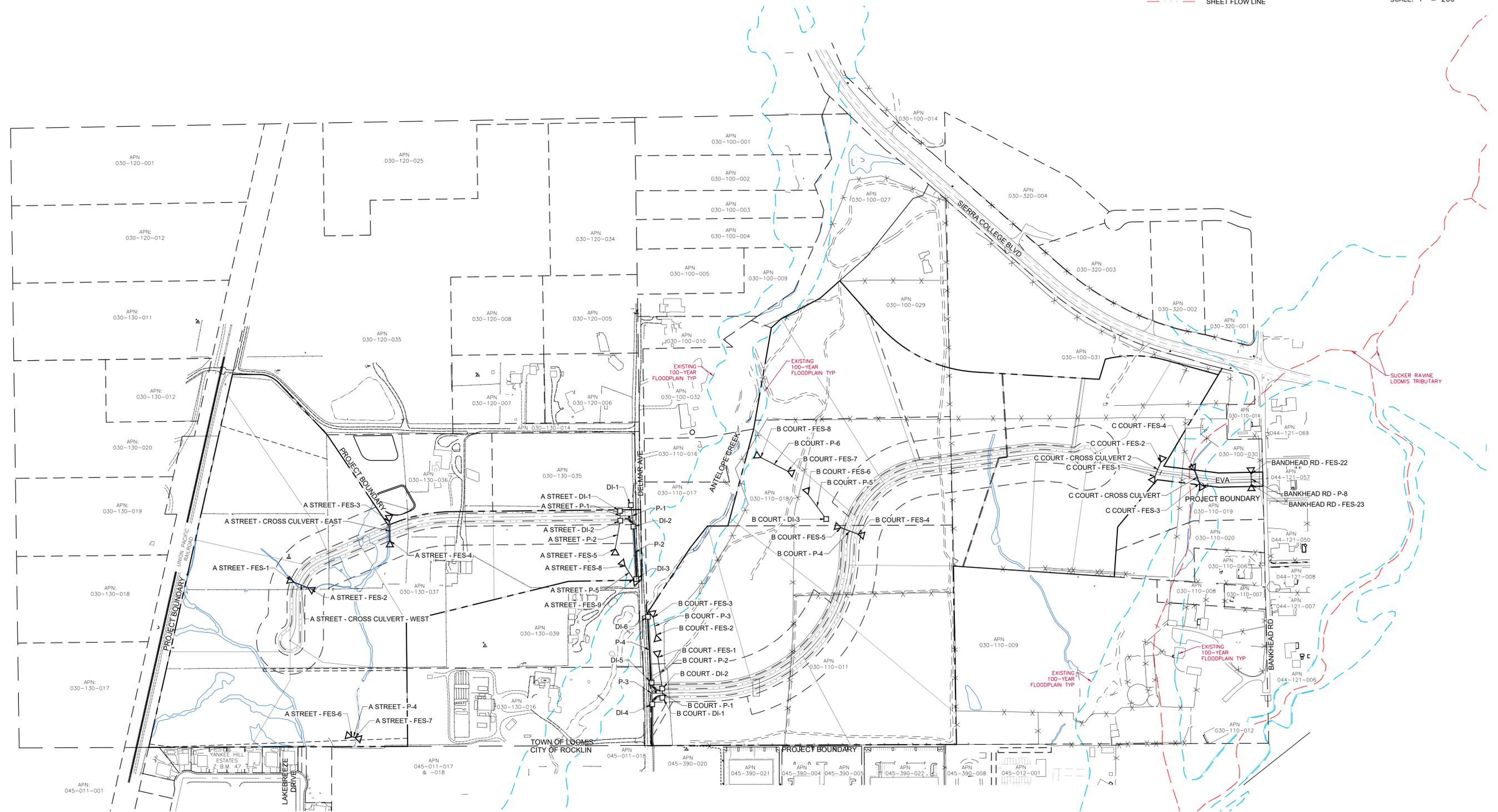
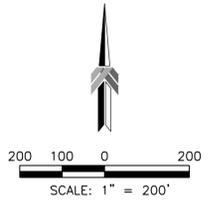
DELMAR FARMS
DRAINAGE MAP #3 - POST-DEVELOPMENT SHED MAP
 PLACER COUNTY, CALIFORNIA
 JULY 2024



200 Auburn Folsom Road, Ste. 201 Auburn, California 95603
 T: (530) 272-8328 E: info@king-engineering-inc.com

LEGEND

- ## SHED DESIGNATION
- FLOW DIRECTION
- 100 YEAR EXISTING FLOODPLAIN LIMIT
- 100 YEAR EXISTING FEMA FLOODPLAIN LIMIT
- CHANNEL FLOW LINE
- SHEET FLOW LINE



DELMAR FARMS
DRAINAGE MAP #4 - PROJECT INDEX MAP
 PLACER COUNTY, CALIFORNIA
 JULY 2024



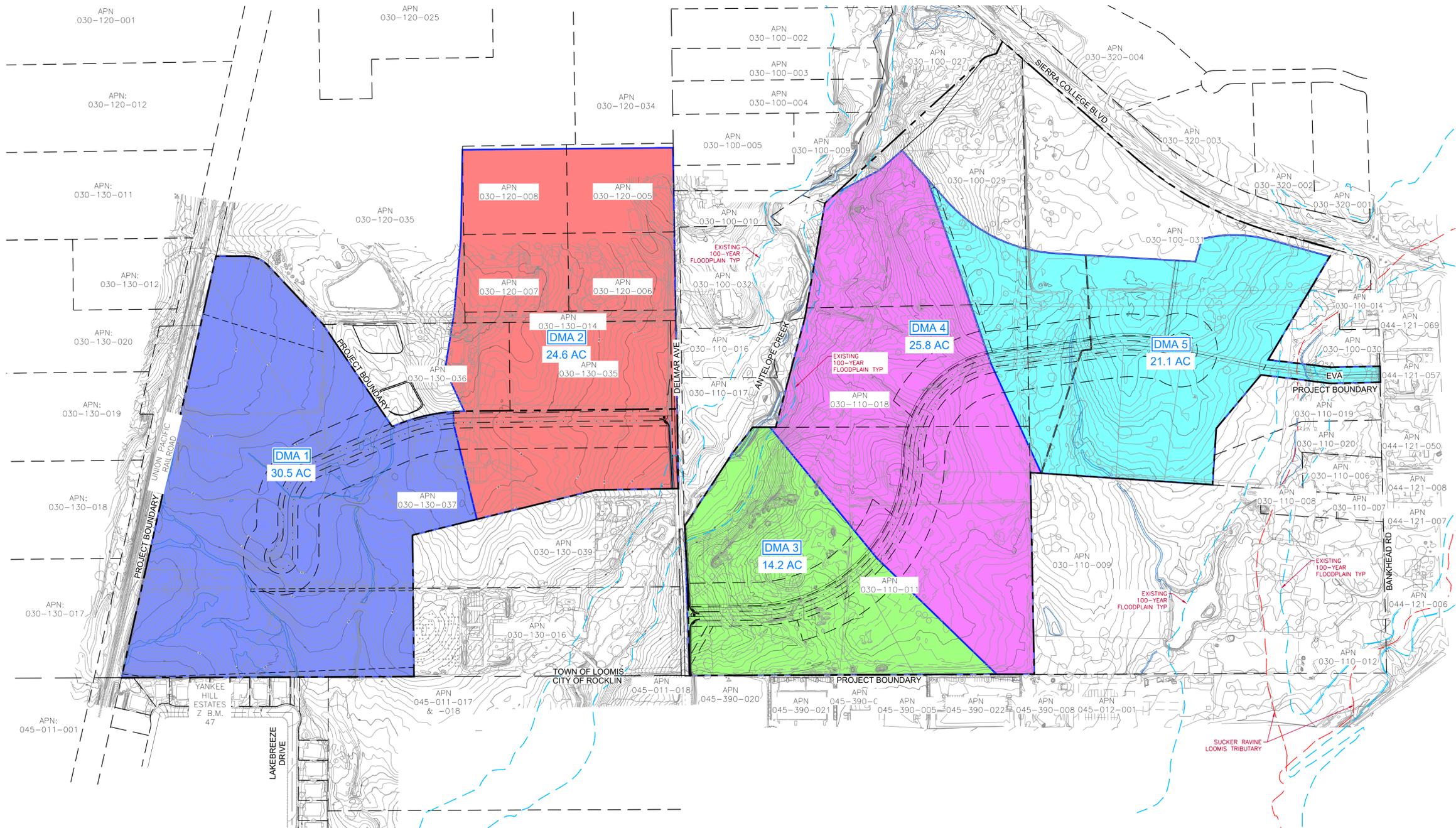
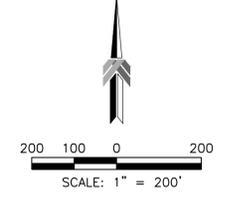
200 Auburn Folsom Road, Ste. 201 Auburn, California 95603
 T: (530) 272-8328 E: info@king-engineering-inc.com

CONTAMINATED SOIL INFORMATION:
 CALIFORNIA ENVIROSTOR WEBSITE LISTS NO SITES OR FACILITIES UNDER CLEANUP OR INVESTIGATION FOR THIS PROPERTY.

LID SITE ASSESSMENT	
SOILS	1. Andregg coarse sandy loam [Hydrologic Soil Group B]-Use 0.22 in./hr. Infil. Rate
	2. Xerofluvents [Hydrologic Soil Group B]-Use 0.22 in./hr Infil. Rate Within these soils, locate most of the water quality/infiltration BMPs
SLOPES	Slopes are generally 2% to 20% across the site with flat slopes.
GEOLOGY	Impervious layers and groundwater at proposed BMPs are sufficiently deep so the BMPs should infiltrate storm water into the more permeable soils effectively.
VEGETATION	Vegetation consists mainly of planted crops.

LEGEND

- ## SHED DESIGNATION
- FLOW DIRECTION
- 100 YEAR EXISTING FLOODPLAIN LIMIT
- 100 YEAR EXISTING FEMA FLOODPLAIN LIMIT
- CHANNEL FLOW LINE
- SHEET FLOW LINE



DELMAR FARMS
DRAINAGE MAP #5 - SITE ASSESSMENT & DRAINAGE MANAGEMENT SHED MAP
 PLACER COUNTY, CALIFORNIA
 JULY 2024

EXHIBIT C
Cross Culvert Reports

Culvert Report

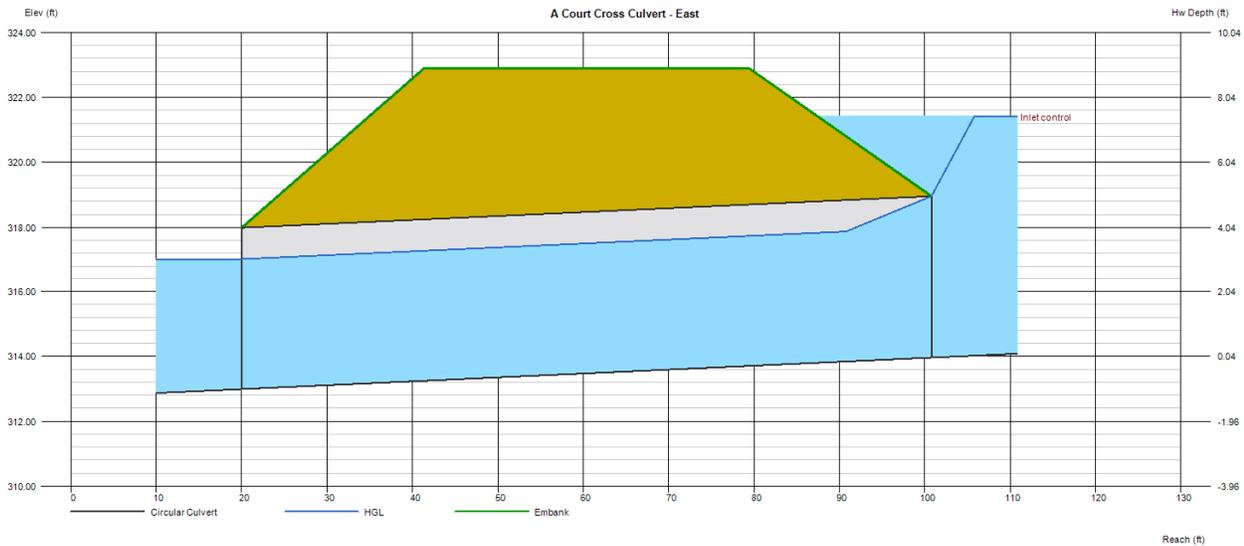
A Street Cross Culvert - East

Invert Elev Dn (ft)	= 312.99
Pipe Length (ft)	= 80.78
Slope (%)	= 1.20
Invert Elev Up (ft)	= 313.96
Rise (in)	= 60.0
Shape	= Circular
Span (in)	= 60.0
No. Barrels	= 1
n-Value	= 0.015
Culvert Type	= Circular Concrete
Culvert Entrance	= Square edge w/headwall (C)
Coeff. K,M,c,Y,k	= 0.0098, 2, 0.0398, 0.67, 0.5

Embankment	
Top Elevation (ft)	= 322.90
Top Width (ft)	= 38.00
Crest Width (ft)	= 0.00

Calculations	
Qmin (cfs)	= 200.00
Qmax (cfs)	= 200.00
Tailwater Elev (ft)	= Normal

Highlighted	
Qtotal (cfs)	= 200.00
Qpipe (cfs)	= 200.00
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 11.78
Veloc Up (ft/s)	= 11.78
HGL Dn (ft)	= 317.02
HGL Up (ft)	= 317.99
Hw Elev (ft)	= 321.41
Hw/D (ft)	= 1.49
Flow Regime	= Inlet Control



Culvert Report

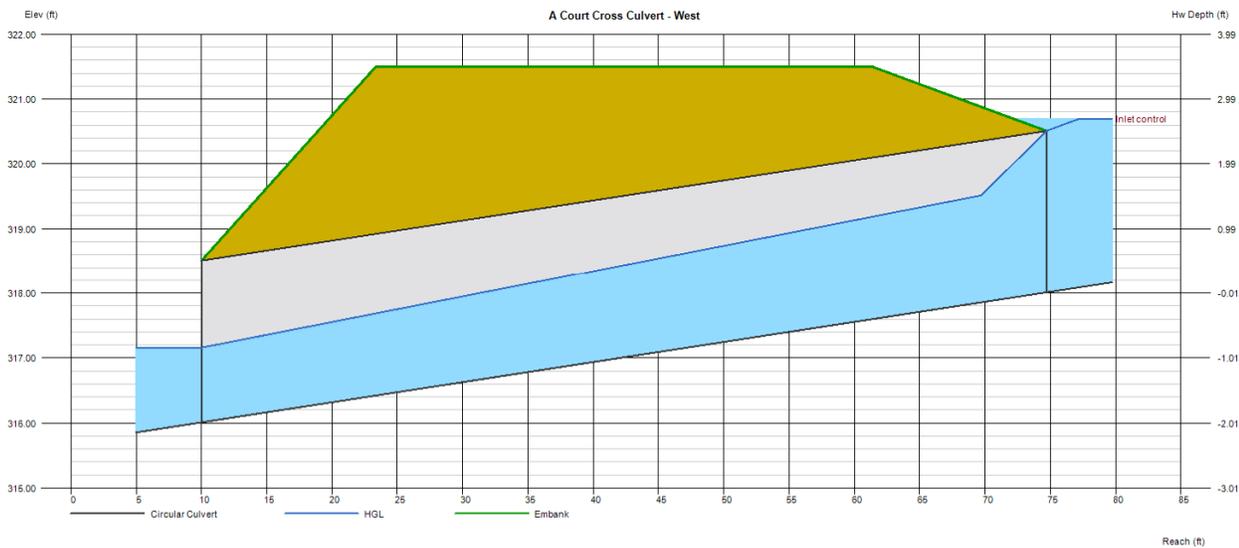
A Street Cross Culvert - West

Invert Elev Dn (ft)	= 316.01
Pipe Length (ft)	= 64.70
Slope (%)	= 3.09
Invert Elev Up (ft)	= 318.01
Rise (in)	= 30.0
Shape	= Circular
Span (in)	= 30.0
No. Barrels	= 2
n-Value	= 0.015
Culvert Type	= Circular Concrete
Culvert Entrance	= Square edge w/headwall (C)
Coeff. K,M,c,Y,k	= 0.0098, 2, 0.0398, 0.67, 0.5

Embankment	
Top Elevation (ft)	= 321.50
Top Width (ft)	= 38.00
Crest Width (ft)	= 0.00

Calculations	
Qmin (cfs)	= 50.06
Qmax (cfs)	= 50.06
Tailwater Elev (ft)	= Normal

Highlighted	
Qtotal (cfs)	= 50.06
Qpipe (cfs)	= 50.06
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 11.36
Veloc Up (ft/s)	= 7.03
HGL Dn (ft)	= 317.16
HGL Up (ft)	= 319.71
Hw Elev (ft)	= 320.70
Hw/D (ft)	= 1.07
Flow Regime	= Inlet Control



Culvert Report

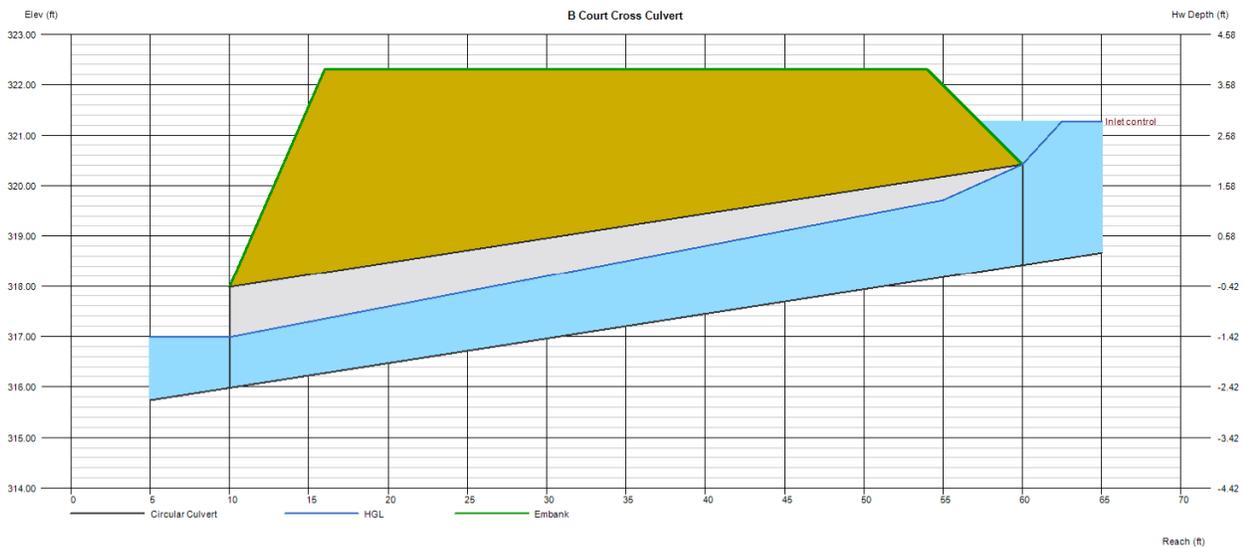
B Street Cross Culvert

Invert Elev Dn (ft)	=	315.98
Pipe Length (ft)	=	50.00
Slope (%)	=	4.88
Invert Elev Up (ft)	=	318.42
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.015
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment	
Top Elevation (ft)	= 322.30
Top Width (ft)	= 38.00
Crest Width (ft)	= 0.00

Calculations	
Qmin (cfs)	= 19.69
Qmax (cfs)	= 19.69
Tailwater Elev (ft)	= Normal

Highlighted	
Qtotal (cfs)	= 19.69
Qpipe (cfs)	= 19.69
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 12.47
Veloc Up (ft/s)	= 7.34
HGL Dn (ft)	= 316.98
HGL Up (ft)	= 320.01
Hw Elev (ft)	= 321.27
Hw/D (ft)	= 1.43
Flow Regime	= Inlet Control



Culvert Report

C Street Cross Culvert

Invert Elev Dn (ft)	=	316.32
Pipe Length (ft)	=	56.61
Slope (%)	=	1.20
Invert Elev Up (ft)	=	317.00
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.015
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment	
Top Elevation (ft)	= 321.20
Top Width (ft)	= 38.00
Crest Width (ft)	= 38.00

Calculations	
Qmin (cfs)	= 23.50
Qmax (cfs)	= 23.50
Tailwater Elev (ft)	= Normal

Highlighted	
Qtotal (cfs)	= 23.50
Qpipe (cfs)	= 23.50
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 8.18
Veloc Up (ft/s)	= 6.84
HGL Dn (ft)	= 317.74
HGL Up (ft)	= 318.65
Hw Elev (ft)	= 319.59
Hw/D (ft)	= 1.03
Flow Regime	= Inlet Control

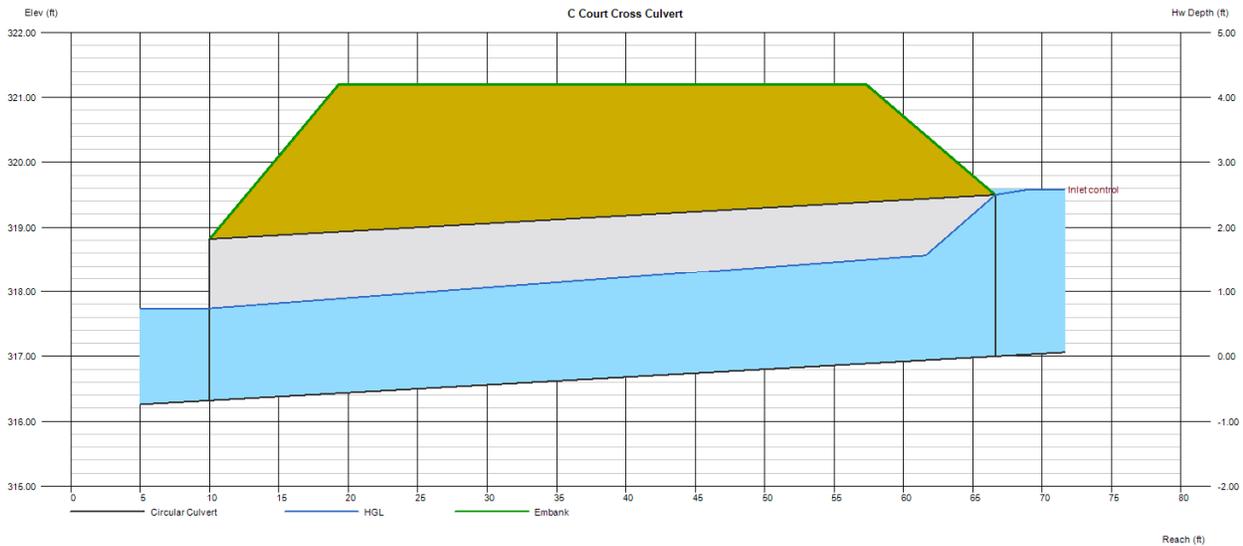


EXHIBIT D

Post-Construction Storm Water Quality Plan Workbook

Post-Construction Storm Water Quality Plan

For:

**Delmar Farms
Within MS4 in Placer County, CA**

Prepared for:

**Evan Mackenzie
Engineering Manager
Mima Capital, LLC
1025 Creekside Ridge Drive, Suite 200
Roseville, CA 95678
(916) 315-8877**

Prepared by:

**King Engineering, Inc.
200 Auburn Folsom Road
Auburn, CA 95603
(530) 272-8328**

Preparation Date: 7/19/2024

PLACER COUNTY Approval Date: _____

Section 1 General Project Information

The undersigned owner of the subject property, is responsible for the implementation of the provisions of this Storm Water Quality Plan (SWQP), including ongoing operations and maintenance (O&M), consistent with the requirements of the West Placer Storm Water Quality Design Manual and the State of California Phase II Small MS4 General Permit (Order No: 2013-0001-DWQ). If the undersigned transfers its interest in the property, its successors-in-interest shall bear the aforementioned responsibility to implement the SWQP.

For all Regulated Projects (As identified in Form 1-2 below), the undersigned owner hereby grants access to all representatives of the Jurisdictional Agency for the sole purpose of performing O&M inspections of the installed treatment system(s) and hydromodification control(s) if any.

A copy of the final signed and fully approved SWQP shall be available on the subject site for the duration of construction and then stored with the project approval documentation and improvement plans in perpetuity.

Form 1-1 Project Identification and Owner's Certification		
Project Site Address:	Delmar Ave	
Owner Name:	Evan Mackenzie	
Title	Engineering Manager	
Company	Mima Capital, LLC	
Address	1025 Creekside Ridge Drive, Suite 200	
City, State, Zip Code	Roseville, CA 95678	
Email	evanm@bem.com	
Telephone #	(916) 315-8877	
Signature	Date	
Engineer:*	Russell King	PE Stamp* (Required for all Regulated Projects)
Title	Principal Engineer	
Company	King Engineering, Inc.	
Address	200 Auburn Folsom Road	
City, State, Zip Code	Auburn, CA 95603	
Email	russell.king@king-engineering-inc.com	
Telephone #	(530) 272-8328	
Signature		
Brief Description of Project: (Attach additional sheets as necessary)	24 lot subdivision at Delmar Farms	

* Not required for Small Projects as determined in Form 1-2 below. Project owners are responsible for ensuring that all storm water facilities are designed by an appropriately licensed and qualified professional.

Form 1-2 Project Category	
Development Category (Select all that apply)	
¹ Small Project – All projects, except LUPs, that create and/or replace between 2,500-5,000 ft ² of impervious surface or detached single family homes that create and/or replace 2,500 ft ² or more of impervious surface and are not part of a larger plan of development.	-
² Enter total new and/or replaced impervious surface (ft ²)	
³ Regulated Project – All projects that create and/or replace 5,000 ft ² or more of impervious surface.	-
⁴ Regulated Redevelopment Project with equal to, or greater than 50 percent increase in impervious area	
⁵ Regulated Redevelopment Project with less than 50 percent increase in impervious area	
⁶ Enter total pre-project impervious surface (ft ²)	
⁷ Enter total new and/or replaced impervious surface (ft ²)	
⁸ Regulated Road or linear underground/overhead project (LUP) creating 5,000 ft ² or more of newly constructed contiguous impervious surface.	-
⁹ Enter total new and/or replaced impervious surface (ft ²)	
¹⁰ Regulated Hydromodification Management Project – Regulated projects that create and/or replace 1 acre or more of impervious surface. A project that does not increase impervious surface area over the pre-project condition is not a hydromodification management project.	Yes
¹¹ Enter total new and/or replaced impervious surface (ft ²)	128,304

Section 3 Regulated Projects

Section 3 forms are to be completed for all Regulated Projects.

Form 3-1 Site Location and Hydrologic Features

Site coordinates: <i>Take GPS measurement at approximate center of site</i>	¹ Latitude 38.81096	² Longitude -121.21890	³ Elevation (ft. above sea level) 312	⁴ 85th Percentile, 24 Hour Design Storm Depth (in): 0.9
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⁵ Receiving waters <i>Name of stream, lake or other downstream waterbody to which the site runoff eventually drains</i>	Antelope Creek
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⁶ 303(d) listed pollutants of concern <i>Refer to State Water Resources Control Board website www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired</i>	
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⁷ Is Project going to be phased? <i>If yes, ensure that the SWQP evaluates each phase with distinct DMAs, requiring LID BMPs to address runoff at time of completion.</i>	Yes
---	-----

⁸ Use this form to show a conceptual schematic depicting DMAs and conveyance features connecting DMAs to the site outlet(s). An example is provided below that can be modified for the proposed project or a drawing clearly showing DMAs and flow routing may be attached.

Example only
Modify for project specific SWQP
Use separate sheet if necessary

Refer to Drainage Map #7 (DMA)

Form 3-2 Site Assessment and Layout Documentation

	Has this Item been considered in the Site Layout and depicted in the Site Plan?	
	Yes	Not Applicable (Include brief explanation)
Define the development envelope and protected areas, identifying areas that are most suitable for development and areas to be landscaped, or left undisturbed, and used for infiltration.	X	Reference Site Plan for infiltration basins and landscaped spaces to provide
Concentrate development on portions of the site with less permeable soils and preserve areas that can promote infiltration.		N/A
Limit overall impervious coverage of the site with paving and roofs.		N/A
Set back development from creeks, wetlands, and riparian habitats.	X	Reference Site Plan for setbacks and protected regions
Preserve significant trees.	X	Reference Site Plan for protected trees
Conform site layout along natural landforms.	X	Site layout conforms to existing tributary flow paths and flood limits
Avoid excessive grading and disturbance of vegetation and soils.		N/A
Replicate the site's natural drainage patterns.	X	Site layout conforms to existing tributary flow paths and flood paths
Detain and retain runoff throughout the site.	X	Infiltration basins are incorporated to capture runoff throughout the site

Attach a Site Plan that incorporates the applicable considerations above. Ensure that the following items are included in the Site Plan:

Site Boundary
 Soil types and areal extents, test pit and infiltration test locations
 Topographic data with 1 ft. contours
 Existing natural hydrologic features (depressions, watercourses, wetlands, riparian corridors)
 Environmentally sensitive areas and areas to be preserved.
 Proposed locations and footprints of improvements creating new, or replaced, impervious surfaces
 Potential pollutant sources and locations
 Entire site divided into separate DMAs with unique identifiers
 Existing and proposed site drainage network with flow directions and site run-on and discharge locations
 Proposed design features and surface treatments used to minimize imperviousness and reduce runoff
 Proposed locations and footprints of treatment and hydromodification management facilities
 Design features for managing authorized non-stormwater discharges
 Areas of soil and/or groundwater contamination
 Existing utilities and easements
 Maintenance areas

Form 3-3 Source Control Measures			
Potential Pollutant Generating Activity or Source	Check One		Describe the source control measures to be implemented for each potential pollutant generating activity or source present on the project as listed in Appendix C and in the CASQA Fact Sheets. Include any special features, materials, or methods of construction that will be used.
	Present	Not Applicable	
Accidental spills or leaks	<input checked="" type="checkbox"/>	<input type="checkbox"/>	measures per SC-11 fact sheet
Interior floor drains	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Parking/storage areas and maintenance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	measure per SC-21, SC-22, SC-32 and SC-43 fact sheets
Indoor and structural pest control	<input checked="" type="checkbox"/>	<input type="checkbox"/>	measures done mainly by licensed pest control companies per SC-34, SC-61, SC-60 fact sheets
Pools, spas, ponds, decorative fountains, and other water features	<input type="checkbox"/>	<input checked="" type="checkbox"/>	measures per SC-72 fact sheet
Landscape/outdoor pesticide use	<input checked="" type="checkbox"/>	<input type="checkbox"/>	measures per SC-41, SC-60, SC-73 and SC-75 fact sheets
Restaurants, grocery stores, and other food service operations	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Refuse areas	<input checked="" type="checkbox"/>	<input type="checkbox"/>	homewoners to take measures per SC-34, SC-60
Industrial Processes	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Outdoor storage of equipment or materials	<input type="checkbox"/>	<input checked="" type="checkbox"/>	measures per SC-32, SC-41, SC-43 fact sheets
Vehicle and equipment cleaning	<input checked="" type="checkbox"/>	<input type="checkbox"/>	measures per SC-21 fact sheet
Vehicle and equipment repair and maintenance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	measures per SC-22, SC-32 fact sheets
Fuel dispensing areas	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Loading docks	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Fire sprinkler test water	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Drain or wash water from boiler drain lines, condensate drain lines, rooftop equipment, drainage sumps, and other sources	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Unauthorized non-storm water discharges	<input checked="" type="checkbox"/>	<input type="checkbox"/>	measures per SC-10 fact sheet
Building and grounds maintenance	<input checked="" type="checkbox"/>	<input type="checkbox"/>	measures per SC-4, SC-43 fact sheets

The source control measures identified in this table shall be designed consistent with recommendations from the CASQA Stormwater BMP Handbook for New Development and Redevelopment¹, or from another equivalent manual.

^[1] California Stormwater BMP Handbook New Development and Redevelopment. California Stormwater Quality Association (CASQA). January 2003.

Form 3-4 Runoff Reduction Calculator for Site Design Measures on Regulated Projects									
		¹ DMA ID No.	1	2	3	4			
Site Design Measure	Runoff Reduction Parameters		Runoff Reduction (ft ³)						
² Adjacent/On-Site Stream Setbacks and Buffers	A_{imp} (ft ²)	<i>impervious drainage area</i>							
	V_{85} (in)	<i>runoff volume from 85th percentile, 24-hour storm</i>	0.8	0.8	0.8	0.8			
³ Soil Quality Improvement and Maintenance	A_{pond} (ft ²)	<i>ponding area</i>							
	D_{pond} (ft)	<i>ponding depth</i>							
	A_{sa} (ft ²)	<i>soil amendment area</i>	0	0	0	0			
	D_{sa} (ft)	<i>depth of amended soil</i>							
⁴ Tree Planting and Preservation	n	<i>porosity of amended soil</i>							
	n_e	<i>number of new evergreen trees</i>							
	n_d	<i>number of new deciduous trees</i>							
	A_{tc} (ft ²)	<i>canopy area of existing trees to remain on the property</i>	0	0	0	0			
⁵ Rooftop and Impervious Area Disconnection	V_{85} (in)	<i>runoff volume from 85th percentile, 24-hour storm</i>	0.8	0.8	0.8	0.8			
	A_{imp} (ft ²)	<i>impervious drainage area</i>	8400	1200	4800	4800			
⁶ Porous Pavement	V_{85} (in)	<i>runoff volume from 85th percentile, 24-hour storm</i>	0.8	0.8	0.8	0.8			
	A_{res} (ft ²)	<i>area of gravel storage layer</i>							
	D_{res} (ft)	<i>depth of gravel storage layer</i>	0	0	0	0			
	n_{agg}	<i>porosity of aggregate</i>							
⁷ Vegetated Swales	C	<i>efficiency factor</i>							
	A_{imp} (ft ²)	<i>impervious drainage area</i>							
⁸ Rain Barrels and Cisterns	V_{85} (in)	<i>runoff volume from 85th percentile, 24-hour storm</i>	0.8	0.8	0.8	0.8			
	N	<i>number of rain barrels and/or cisterns</i>	0	0	0	0			
	V_a (ft ³)	<i>volume of each rain barrel and/or cistern</i>							
⁹ Do all Site Design Measures meet the design requirements outlined in the Fact Sheets?				Yes	X	No			
¹⁰ Total Volume Reduction (ft ³)			567	81	324	324			
¹¹ Effective Treated Impervious Area (ft ²)			8400	1200	4800	4800			

Form 3-4 Runoff Reduction Calculator for Site Design Measures on Regulated Projects

DMA ID No.	5	6	7	8	9	10	11	12
Runoff Reduction Parameters	Runoff Reduction (ft ³)							
<i>impervious drainage area</i>								
<i>runoff volume from 85th percentile, 24-hour storm</i>	0.8	0	0.8	0	0.8	0	0.8	0
<i>ponding area</i>								
<i>ponding depth</i>								
<i>soil amendment area</i>		0		0		0		0
<i>depth of amended soil</i>								
<i>porosity of amended soil</i>								
<i>number of new evergreen trees</i>								
<i>number of new deciduous trees</i>								
<i>canopy area of existing trees to remain on the property</i>		0	0	0	0	0	0	0
<i>runoff volume from 85th percentile, 24-hour storm</i>	0.8	0	0.8	0	0.8	0	0.8	0
<i>impervious drainage area</i>	4800							
<i>runoff volume from 85th percentile, 24-hour storm</i>	0.8	324	0.8	0	0.8	0	0.8	0
<i>area of gravel storage layer</i>								
<i>depth of gravel storage layer</i>		0		0		0		0
<i>porosity of aggregate</i>								
<i>efficiency factor</i>								
<i>impervious drainage area</i>								
<i>runoff volume from 85th percentile, 24-hour storm</i>	0.8	0	0.8	0	0.8	0	0.8	0
<i>number of rain barrels and/or cisterns</i>								
<i>volume of each rain barrel and/or cistern</i>		0		0		0		0
Total Volume Reduction		324		0		0		0
Effective Treated Impervious Area		4800		0		0		0

Form 3-5 Computation of Water Quality Design Criteria for Stormwater Treatment and Baseline Hydromodification Measures

DMA ID No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
¹ Total impervious area requiring treatment	66429	53523	30901	56219	46018																	
² Impervious area untreated by Site Design Measures (ft ²) <i>Item 1 – Form 3-4 Item 11</i>	58029	52323	26101	51419	41218	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
³ Additional pervious area draining to BMP (ft ²)	1262151	1016941	587120	1068153	874351																	
⁴ Composite DMA Runoff Coefficient (Rc) <i>Enter area weighted composite runoff coefficient representing entire DMA</i>	0.27	0.27	0.27	0.27	0.27																	
⁵ Water Quality Volume (WQV) (ft ³) <i>WQV = 1/12 * [Item 2 + Item 3] * Item 4] * Unit WQV</i>	19308	15638	8968	16374	13390	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
⁶ Water Quality Flow (WQF) (cfs) <i>WQF = 1/43,200 * [0.2 * (Item 2 + Item 3) * Item 4]</i>	1.650	1.337	0.767	1.399	1.144	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

^{5,6} Values will equal zero if all impervious area has been treated by Site Design Measures.

DMA ID No.	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
¹ Total impervious area requiring treatment																						
² Impervious area untreated by Site Design Measures (ft ²) <i>Item 1 – Form 3-4 Item 11</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
³ Additional pervious area draining to BMP (ft ²)																						
⁴ Composite DMA Runoff Coefficient (Rc) <i>Enter area weighted composite runoff coefficient representing entire DMA</i>																						
⁵ Water Quality Volume (WQV) (ft ³) <i>WQV = 1/12 * [Item 2 + Item 3] * Item 4] * Unit WQV</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
⁶ Water Quality Flow (WQF) (cfs) <i>WQF = 1/43,200 * [0.2 * (Item 2 + Item 3) * Item 4]</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

^{5,6} Values will equal zero if all impervious area has been treated by Site Design Measures.

Delmar Farms

Composite DMA Runoff Coefficient (Rc) Sample Calculation

Runoff Coefficient

$$C = \frac{\sum C \times A}{\sum A}$$

DMA 1

Imp. Area = 66429.00 ac
 Perv. Area = 1262151.00 ac
 TOTAL = 1328580.0 ac

C (road) = 0.7
 C (res) = 0.25

DMA 2

Imp. Area = 53523.23 ac
 Perv. Area = 1016941.41 ac
 TOTAL = 1070464.6 ac

C (road) = 0.7
 C (res) = 0.25

C = 0.27 ft³	C = 0.27 ft³
--------------------------------	--------------------------------

DMA 3

Imp. Area = 30901.04 ac
 Perv. Area = 587119.80 ac
 TOTAL = 618020.8 ac

C (road) = 0.7
 C (res) = 0.25

DMA 4

Imp. Area = 56218.56 ac
 Perv. Area = 1068152.56 ac
 TOTAL = 1124371.1 ac

C (road) = 0.7
 C (res) = 0.25

DMA 5

Imp. Area = 46018.46 ac
 Perv. Area = 874350.69 ac
 TOTAL = 920369.1 ac

C (road) = 0.7
 C (res) = 0.25

C = 0.27 ft³	C = 0.27 ft³	C = 0.27 ft³
--------------------------------	--------------------------------	--------------------------------

Form 3-6 Volume-Based Infiltrating Bioretention Measures

¹ DMA ID No. <i>If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.</i>	1	2	3	4
² WQV (ft ³) <i>Item 5 in Form 3-5</i> <i>If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.</i>	19308	15638	8968	16374
³ Surface Loading Rate <i>Maximum 5.0 in/hr</i>	5	5	5	5
⁴ BMP Surface Area (ft ²) <i>Top of BMP</i>	11567	10050	5250	6600
⁵ Infiltration rate of underlying soils (in/hr)	0.22	0.22	0.22	0.22
⁶ Maximum ponding depth (ft) <i>BMP specific, see BMP design details</i>	0.5	0.5	0.5	0.5
⁷ Ponding Depth (ft) <i>$d_{BMP} = \text{Minimum of } (1/12 * \text{Item 5} * 48 \text{ hrs}) \text{ or Item 6}$</i>	0.5	0.5	0.5	0.5
⁸ Infiltrating surface area, SA_{BMP} (ft ²) <i>Bottom of BMP</i>	11567	10050	5250	6600
⁹ Planting media depth, d_{media} (ft)	1.5	1.5	1.5	1.5
¹⁰ Planting media porosity	0.55	0.55	0.55	0.55
¹¹ Gravel depth, d_{media} (ft) <i>Only included in certain BMP types</i>	1.0	1.0	1.0	3.0
¹² Gravel porosity	0.40	0.40	0.40	0.40
¹³ Retention Volume (ft ³) <i>$V_{retention} = \text{Item 8} * [\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (1.5 * (\text{Item 5} / 12))]$</i>	20,271.2	17,612.6	9,200.6	16,846.5
¹⁴ Untreated Volume (ft ³) <i>$V_{untreated} = \text{Item 2} - \text{Item 13}$</i> <i>If greater than zero, adjust BMP sizing variables and re-compute retention volume</i>	0	0	0	0
¹⁵ Treated Flow Rate (ft ³ /s) <i>$Q_{treated} = 1/43,200 * (\text{Item 3} * \text{Item 4})$</i>	1.3388	1.1632	0.6076	0.7639
¹⁶ Total Treated Flow Rate for Project (ft ³ /s) <i>$Q_{total} = \text{Sum of Item 15 for all DMAs}$</i>	4.5361			
¹⁷ Is WQV for each DMA treated on-site? <i>Check Yes if Item 14 equals 0 for all DMAs</i>	Yes	YES	No	

Form 3-6 Volume-Based Infiltrating Bioretention Measures

¹ DMA ID No. <i>If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.</i>	5			
WQV (ft ³) <i>Item 5 in Form 3-5</i> <i>If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.</i>	13390			
³ Surface Loading Rate <i>Maximum 5.0 in/hr</i>	5			
⁴ BMP Surface Area (ft ²) <i>Top of BMP</i>	5725			
⁵ Infiltration rate of underlying soils (in/hr)	0.22			
⁶ Maximum ponding depth (ft) <i>BMP specific, see BMP design details</i>	0.5			
⁷ Ponding Depth (ft) <i>d_{BMP} = Minimum of (1/12 * Item 5 * 48 hrs) or Item 6</i>	0.5	-	-	-
⁸ Infiltrating surface area, SA _{BMP} (ft ²) <i>Bottom of BMP</i>	5725			
⁹ Planting media depth, d _{media} (ft)	1.5			
¹⁰ Planting media porosity	0.55			
¹¹ Gravel depth, d _{media} (ft) <i>Only included in certain BMP types</i>	3.0			
¹² Gravel porosity	0.40			
¹³ Retention Volume (ft ³) <i>V_{retention} = Item 8 * [Item 7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5 * (Item 5 / 12))]</i>	14,613.1	-	-	-
¹⁴ Untreated Volume (ft ³) <i>V_{untreated} = Item 2 - Item 13</i> <i>If greater than zero, adjust BMP sizing variables and re-compute retention volume</i>	0	0	0	0
¹⁵ Treated Flow Rate (ft ³ /s) <i>Q_{treated} = 1/43,200*(Item 3 * Item 4)</i>	0.6626	0.0000	0.0000	0.0000

Section 4 Regulated Hydromodification Management Projects

Form 4-1 Peak Runoff Response Time

(Complete Section 4 forms for Regulated Hydromodification Projects only)

Determine total runoff response time for pre- and post-construction conditions at each project outlet.

Variables	Pre-construction DMAs to Project Outlet				Post-construction DMAs to Project Outlet			
	1	2	3	4	1	2	3	4
¹ Length of longest overland flow path <i>Not to exceed 100 ft</i>	100	100	100	100	100	100	100	100
² Slope of overland flow path (ft/ft)	0.0280	0.0360	0.0320	0.0160	0.0300	0.0450	0.0200	0.0200
³ Manning's roughness coefficient for overland flow surface <i>See Table 5-5 of the Placer County SWMM</i>	0.1100	0.4000	0.4000	0.4000	0.1100	0.1100	0.1100	0.1100
⁴ Overland flow response time (min) $(0.355 * (\text{Item 1} * \text{Item 3})^{0.6}) / (\text{Item 2}^{0.3})$	4.37	8.80	9.12	11.23	4.28	3.79	4.84	4.84
⁵ Hydrologic Soil Group <i>Refer to Section 3.1.1. or NRCS Web Soil Survey</i>	B	B	B	B	B	B	B	B
⁶ Current Land Cover Type(s) <i>Select from categories shown in Table 5-3 of the SWMM</i>	GRASS	GRASS	GRASS	GRASS	UC-R	UC-R	UC-R	UC-R
⁷ Pervious Area Condition: <i>Based on the extent of vegetated cover Good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating</i>	GOOD	GOOD	FAIR	FAIR	GOOD	GOOD	GOOD	GOOD
⁸ Infiltration Rate (in/hr) <i>Refer to Table 5-3 of the SWMM using Items 3, 4, and 5 above or obtain site specific field measurements (See Section 3.1.1)</i>	0.09	0.09	0.07	0.07	0.25	0.25	0.25	0.25
⁹ Length of collector flow (ft)	712	1,238	815	994	718	844	700	873
¹⁰ Cross-sectional area of collector flow facility (ft ²)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
¹¹ Wetted perimeter of collector flow facility (ft)	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
¹² Manning's roughness of collector flow facility	0.060	0.060	0.060	0.060	0.015	0.015	0.015	0.015
¹³ Slope of collector flow facility (ft/ft)	0.0340	0.0280	0.0390	0.0290	0.0200	0.0450	0.0170	0.0170
¹⁴ Channel flow velocity (ft/sec) $V = (1.49 / \text{Item 12}) * (\text{Item 10} / \text{Item 11})^{0.67} * (\text{Item 13})^{0.5}$	3.49	3.17	3.74	3.23	10.72	16.08	9.88	9.88
¹⁵ Collector flow facility response time (min) $T_c = \text{Item 9} / (\text{Item 14} * 60)$	3.40	6.51	3.63	5.13	1.12	0.87	1.18	1.47
¹⁶ Total runoff response time or T_t (min) $T_t = \text{Item 4} + \text{Item 15}$	7.77	15.31	12.75	16.36	5.40	4.67	6.02	6.31

Section 4 Regulated Hydromodification Management Projects

Form 4-1 Peak Runoff Response Time

Determine total runoff response time for pre- and post-construction conditions at each project outlet.

Variables	Pre-construction DMAs to Project Outlet				Post-construction DMAs to Project Outlet			
	5	6	7	8	5	6	7	8
¹ Length of longest overland flow path <i>Not to exceed 100 ft</i>	100				100			
² Slope of overland flow path (ft/ft)	0.0100				0.0200			
³ Manning's roughness coefficient for overland flow surface <i>See Table 5-5 of the Placer County SWMM</i>	0.4000				0.1100			
⁴ Overland flow response time (min) $(0.336 * (\text{Item 1} * \text{Item 3})^{0.6}) / (\text{Item 2}^{0.3})$	12.93	0.00	0.00	0.00	4.84	0.00	0.00	0.00
⁵ Hydrologic Soil Group <i>Refer to Section 3.1.1. or NRCS Web Soil Survey</i>	B				B			
⁶ Current Land Cover Type(s) <i>Select from categories shown in Table 5-3 of the SWMM</i>	GRASS				UC-R			
⁷ Pervious Area Condition: <i>Based on the extent of vegetated cover Good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating</i>	FAIR				GOOD			
⁸ Infiltration Rate (in/hr) <i>Refer to Table 5-3 of the SWMM using Items 3, 4, and 5 above or obtain site specific field measurements (See Section 3.1.1)</i>	0.07				0.25			
⁹ Length of collector flow (ft)	1,614				910			
¹⁰ Cross-sectional area of collector flow facility (ft ²)	2.00				2.00			
¹¹ Wetted perimeter of collector flow facility (ft)	3.00				3.00			
¹² Manning's roughness of collector flow facility	0.060				0.015			
¹³ Slope of collector flow facility (ft/ft)	0.0110				0.0170			
¹⁴ Channel flow velocity (ft/sec) $V = (1.49 / \text{Item 12}) * (\text{Item 10} / \text{Item 11})^{0.67} * (\text{Item 13})^{0.5}$	1.99	0.00	0.00	0.00	9.88	0.00	0.00	0.00
¹⁵ Collector flow facility response time (min) $T_c = \text{Item 9} / (\text{Item 14} * 60)$	13.53	0.00	0.00	0.00	1.53	0.00	0.00	0.00
¹⁶ Total runoff response time or T_t (min) $T_t = \text{Item 4} + \text{Item 15}$	26.46	0.00	0.00	0.00	6.37	0.00	0.00	0.00

Form 4-2 Hydromodification Target for Peak Runoff

Variables	Pre-construction DMAs to Project Outlet				Post-construction DMAs to Project Outlet			
	1	2	3	4	1	2	3	4
¹ Drainage Area (ft ²) <i>Sum of all outlet level DMAs should equal total project area.</i>	1,328,580	1,070,465	618,021	1,124,371	1,328,580	1,070,465	618,021	1,124,371
² Impervious Area (ft ²) <i>Sum of all outlet level DMAs should equal total project impervious area.</i>	0	0	0	0	66,429	53,523	30,901	56,219
³ Rainfall depth for 2yr storm with duration equal to response time (in) <i>See Placer County SWMM Table 5-A-1 for elevation of site and duration equal to response time</i>	0.19	0.23	0.23	0.23	0.13	0.13	0.13	0.13
⁴ Unit peak runoff (cfs/acre) <i>q = 60/Form 4-1 Item 16 * Item 3</i>	1.47	0.90	1.08	0.84	1.44	1.67	1.30	1.24
⁵ Infiltration factor (cfs/acre) <i>F_i = Form 4-1 Item 8 * (1 + 1 / (1.3 + 0.0005 * Form 3-1 Item 3))</i>	0.15	0.15	0.12	0.12	0.42	0.42	0.42	0.42
⁶ Peak runoff from DMAs (cfs) <i>Q_p = Item 1 * Item 4 - Item 5 * (Item 1 - Item 2)</i>	40.45	18.58	13.80	18.88	32.09	31.47	12.81	21.74
⁷ Total Pre-Project Peak Runoff (ft ³ /s) <i>Q_{total} = Sum of Item 6 for all Pre-construction DMAs</i>	104.65							
⁸ Is the total post-project peak runoff equal to or less than the total pre-project peak runoff? <i>Yes, if Item 7 is greater than or equal to the sum of the Total Treated Flow Rates from Form 3-6 Item 16 and 3-7 Item 14.</i>	YES							

Form 4-2 Hydromodification Target for Peak Runoff

Variables	Pre-construction DMAs to Project Outlet				Post-construction DMAs to Project Outlet			
	5	6	7	8	5	6	7	8
¹ Drainage Area (ft ²) <i>Sum of all outlet level DMAs should equal total project area.</i>	920,369				920,369			
² Impervious Area (ft ²) <i>Sum of all outlet level DMAs should equal total project impervious area.</i>	0				46,018			
³ Rainfall depth for 2yr storm with duration equal to response time (in) <i>See Placer County SWMM Table 5-A-1 for elevation of site and duration equal to response time</i>	0.32				0.13			
⁴ Unit peak runoff (cfs/acre) <i>q = 60/Form 4-1 Item 16 * Item 3</i>	0.73	-	-	-	1.22	-	-	-
⁵ Infiltration factor (cfs/acre) <i>F_i = Form 4-1 Item 8 * (1 + 1 / (1.3 + 0.0005 * Form 3-1 Item 3))</i>	0.12	-	-	-	0.42	-	-	-
⁶ Peak runoff from DMAs (cfs) <i>Q_p = Item 1 * Item 4 - Item 5 * (Item 1 - Item 2)</i>	12.94	-	-	-	17.54	-	-	-

Form 4-3 Detention Volumes for Hydromodification Management

	Post-construction DMAs to Project Outlet			
	1	2	3	4
¹ Land cover and hydrologic condition <i>See NRCD TR-55 Manual Table 2-2 for types</i>	RES	RES	RES	RES
² Hydrologic Soil Group <i>Refer to Section 3.1.1. or NRCS Web Soil Survey</i>	B	B	B	B
³ Drainage Area (A) (ft ²)	1,328,580	1,070,465	618,021	1,124,371
⁴ Curve Number (CN) <i>Use Items 1 and 2 to select curve number from NRCS TR-55 Manual Table 2-2</i>	65	65	65	65
⁵ Post-development soil storage capacity, S (in): $S = (1000 / \text{Item 4}) - 10$	5.4	5.4	5.4	5.4
⁶ Precipitation for 2-yr, 24-hr storm (in) <i>See Placer County SWMM Table 5-A-1 for elevation of site and 24-hr duration depths</i>	1.90	1.90	1.90	1.90
⁷ Post-developed runoff volume for 2-yr – 24-hour storm, V_{runoff} (ft ³): $V_{\text{runoff}} = \text{Item 3} * (1 / 12) * [(\text{Item 6} - 0.2 * \text{Item 5})^2 / (\text{Item 6} + 0.8 * \text{Item 5})]$	12,083	9,735	5,620	10,225
⁸ Attenuation Factor, $q_{\text{out/in}}$ (ratio of target outflow rate to peak inflow rate): $q_{\text{out/in}} = \text{Form 4-2 Item 6 Pre-Construction} / \text{Form 4-2 Item 6 Post-Construction}$	1.26	0.59	1.08	0.87
⁹ Equalization Factor, V_s/V_r (ratio of storage capacity to runoff volume) <i>V_s/V_r obtained using Item 8 and nomograph in Figure 6-1 of NRCS TR-55 Manual for Rainfall Type IA</i>	0.14	0.16	0.14	0.14
¹⁰ Runoff detention capacity to achieve hydromodification management criteria (ft ³) $D_{\text{hydromod}} = \text{Item 7} * \text{Item 9}$	1631	1538	759	1380
¹¹ Site Design Measure (SDM) Volume (ft ³): <i>Sum of Item 10 in Form 3-4 for all SDMs in this DMA.</i>				
¹² Bioretention Volume (ft ³): <i>Sum of Item 13 in Form 3-6 for all bioretention measures in this DMA.</i>	20271	17613	9201	16847
¹³ Flow-Through Detention Volume (ft ³): <i>Sum of Item 10 in Form 3-7 for all flow-through facilities in this DMA.</i>				
¹⁴ Supplemental Detention Volume (ft ³):				
¹⁵ Combined Detention Volume in this DMA (ft ³): <i>Sum of Items 11 through 14</i>	20,271	17,613	9,201	16,847
¹⁶ Is detention capacity to achieve hydromodification management criteria achieved at all project outlets? <i>Yes, if Item 10 is less than or equal to Item 15 for each DMA. If not provide additional storage capacity with appropriate flow controls at the discharge.</i>	Yes	X	No	

Form 4-3 Detention Volumes for Hydromodification Management

	Post-construction DMAs to Project Outlet			
	5	6	7	8
¹ Land cover and hydrologic condition <i>See NRCD TR-55 Manual Table 2-2 for types</i>	RES			
² Hydrologic Soil Group <i>Refer to Section 3.1.1. or NRCS Web Soil Survey</i>	B	-	-	-
³ Drainage Area (A) (ft ²)	920,369	-	-	-
⁴ Curve Number (CN) <i>Use Items 1 and 2 to select curve number from NRCS TR-55 Manual Table 2-2</i>	65			
⁵ Post-development soil storage capacity, S (in): $S = (1000 / \text{Item 4}) - 10$	5.4	#DIV/0!	#DIV/0!	#DIV/0!
⁶ Precipitation for 2-yr, 24-hr storm (in) <i>See Placer County SWMM Table 5-A-1 for elevation of site and 24-hr duration depths</i>	1.90			
⁷ Post-developed runoff volume for 2-yr – 24-hour storm, V_{runoff} (ft ³): $V_{\text{runoff}} = \text{Item 3} * (1 / 12) * [(\text{Item 6} - 0.2 * \text{Item 5})^2 / (\text{Item 6} + 0.8 * \text{Item 5})]$	8,370	#DIV/0!	#DIV/0!	#DIV/0!
⁸ Attenuation Factor, $q_{\text{out/in}}$ (ratio of target outflow rate to peak inflow rate): $q_{\text{out/in}} = \text{Form 4-2 Item 6 Pre-Construction} / \text{Form 4-2 Item 6 Post-Construction}$	0.74	#DIV/0!	#DIV/0!	#DIV/0!
⁹ Equalization Factor, V_s/V_r (ratio of storage capacity to runoff volume) <i>V_s/V_r obtained using Item 8 and nomograph in Figure 6-1 of NRCS TR-55 Manual for Rainfall Type IA</i>	0.14			
¹⁰ Runoff detention capacity to achieve hydromodification management criteria (ft ³) $D_{\text{hydromod}} = \text{Item 7} * \text{Item 9}$	1130	#DIV/0!	#DIV/0!	#DIV/0!
¹¹ Site Design Measure (SDM) Volume (ft ³): <i>Sum of Item 10 in Form 3-4 for all SDMs in this DMA.</i>				
¹² Bioretention Volume (ft ³): <i>Sum of Item 12 in Form 3-8 for all bioretention measures in this DMA.</i>	14613			
¹³ Flow-Through Detention Volume (ft ³): <i>Sum of Item 10 in Form 3-7 for all flow-through facilities in this DMA.</i>				
¹⁴ Supplemental Detention Volume (ft ³):				
¹⁵ Combined Detention Volume in this DMA (ft ³): <i>Sum of Items 11 through 14</i>	14,613	-	-	-

Form 5-1 BMP Inspection and Maintenance

BMP	Inspection Point and Frequency	Maintenance Activity Required
Basin (Infiltration Basins)	Inlet/Outlet	Repair Erosion
	Entire Basin	Remove Debris and Trash as needed

Form 6-1 Post-Construction Stormwater BMPs

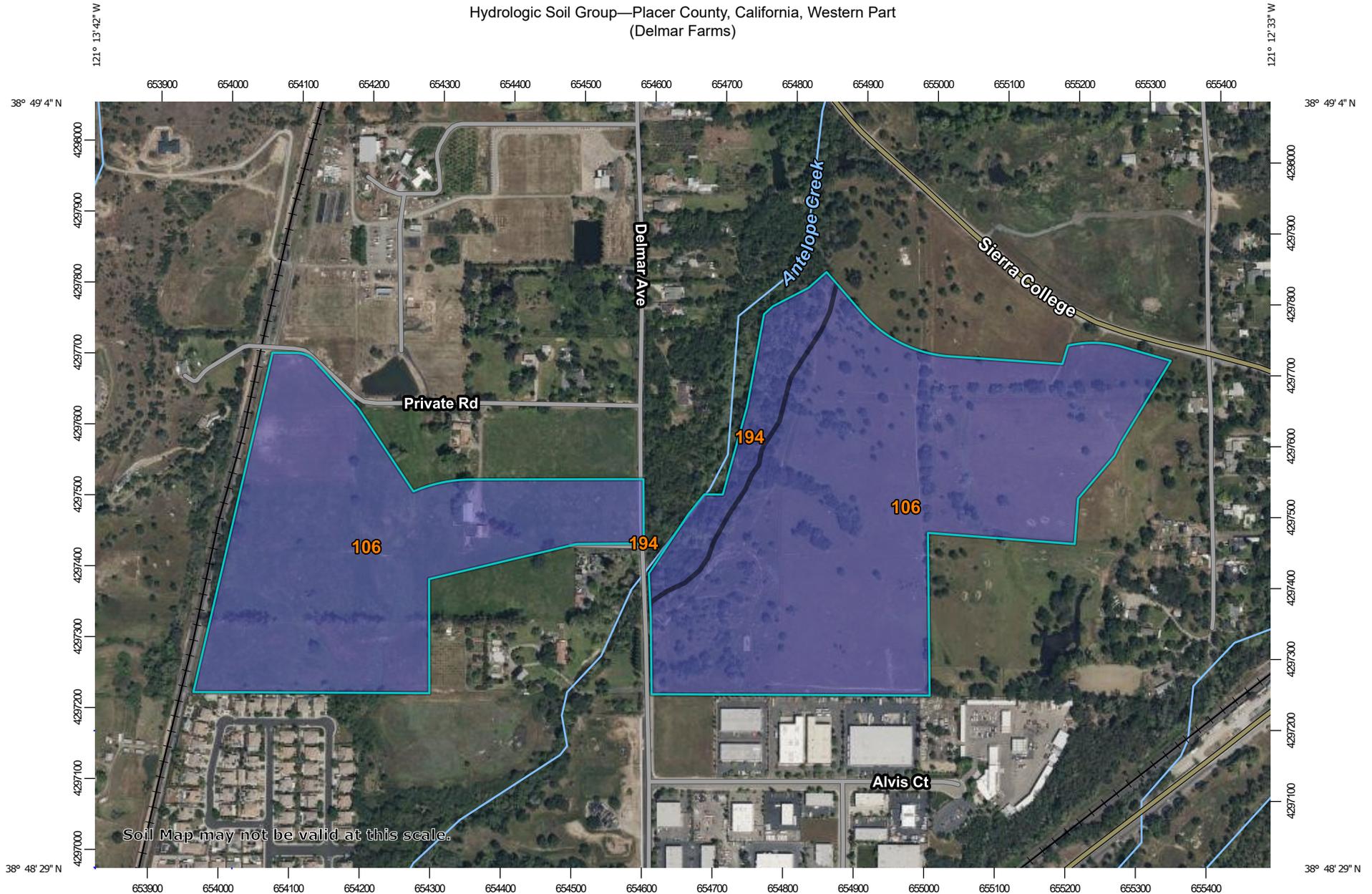
Following is a summary of all BMPs included in the Project design. This checklist must be included on the cover sheet of the Improvement Plans for all Regulated Projects.

	BMP	Plan Sheet Number(s)
Structural Source Controls (list BMPs)		
Site Design Measures	Stream Setbacks and Buffers	
	Soil Quality Improvement and Maintenance	
	Tree Planting and Preservation	
	Rooftop and Impervious Area Disconnection	
	Porous Pavement	
	Vegetated Swales	
Stormwater Treatment and Baseline Hydromodification Measures	Bioretention with Infiltration	
	Flow-Through Planters, Tree Box Filters and Media Filters	
Hydromodification Management Measures	Supplemental Detention	

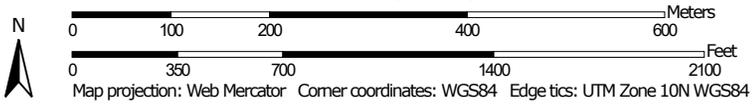
EXHIBIT E

Web Soil Survey Data

Hydrologic Soil Group—Placer County, California, Western Part
(Delmar Farms)



Map Scale: 1:7,610 if printed on A landscape (11" x 8.5") sheet.



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: Placer County, California, Western Part
 Survey Area Data: Version 15, Aug 31, 2023

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

Date(s) aerial images were photographed: Apr 23, 2022—Apr 24, 2022

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
106	Andregg coarse sandy loam, 2 to 9 percent slopes	B	91.0	93.6%
194	Xerofluvents, frequently flooded	B	6.2	6.4%
Totals for Area of Interest			97.3	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

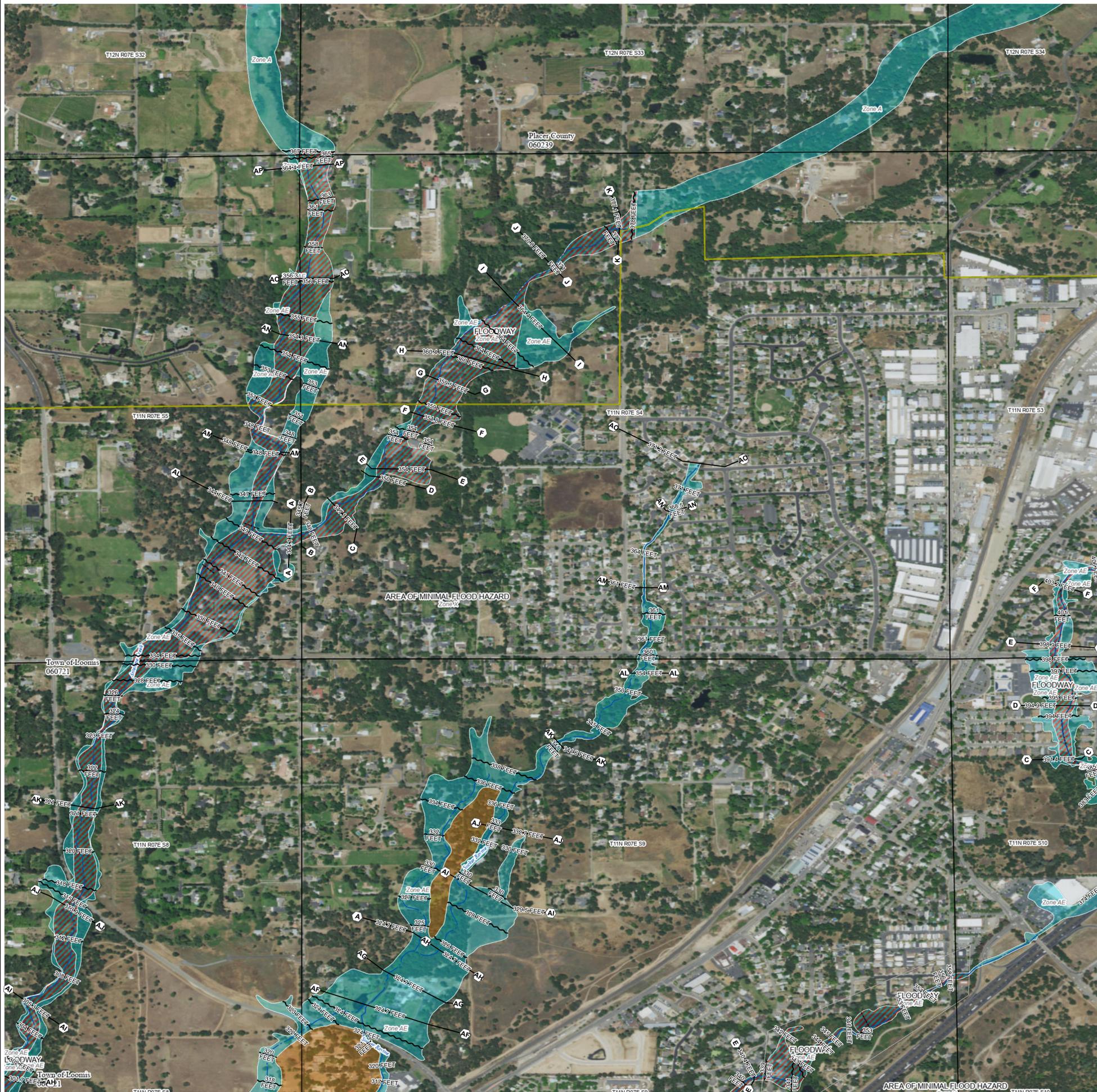
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

EXHIBIT F
FEMA FIRM Panel



FLOOD HAZARD INFORMATION

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

	Without Base Flood Elevation (BFE) Zone A, V, A99
	With BFE or Depth Zone AE, AO, AH, VE, AR
	Regulatory Floodway
	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee See Notes Zone X
	Area with Flood Risk due to Levee Zone D
	NO SCREEN Area of Minimal Flood Hazard Zone X
	Effective LOMRs
	Area of Undetermined Flood Hazard Zone D
	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
	20.2 Cross Sections with 1% Annual Chance
	17.5 Cross Sections with 1% Annual Chance
	Water Surface Elevation
	Coastal Transect
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-6227) or visit the FEMA Flood Map Service Center website at <https://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

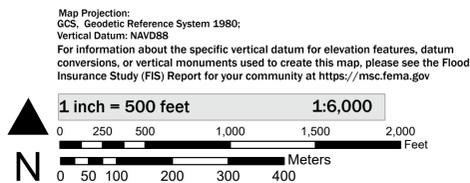
For community and countywide map dates, refer to the Flood Insurance Study Report for this jurisdiction. To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Basemap information shown on this FIRM was provided in digital format by the United States Geological Survey (USGS). The basemap shown is the USGS National Map: Orthoimagery. Last refreshed October, 2020.

This map was exported from FEMA's National Flood Hazard Layer (NFHL) on 12/14/2023 10:05 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. For additional information, please see the Flood Hazard Mapping Updates Overview Fact Sheet at <https://www.fema.gov/media-library/assets/documents/118418>

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. 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.

SCALE



NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

PANEL 954 OF 1060

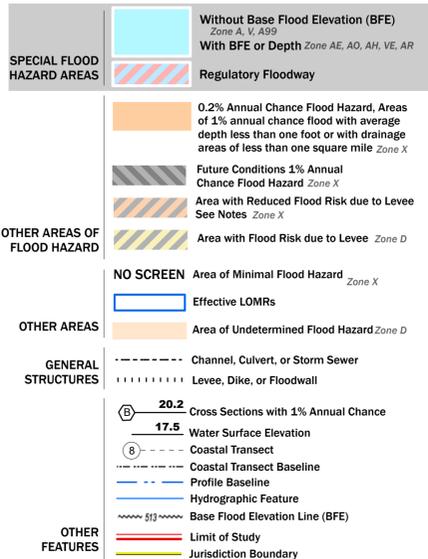
COMMUNITY	NUMBER	PANEL
TOWN OF LOOMIS	060721	0954
PLACER COUNTY	060239	0954





FLOOD HAZARD INFORMATION

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



NOTES TO USERS

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Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to the Flood Insurance Study Report for this jurisdiction.

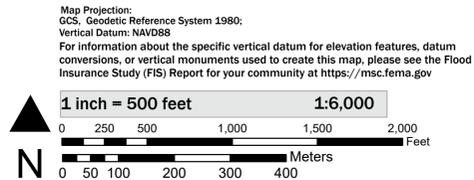
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Basemap information shown on this FIRM was provided in digital format by the United States Geological Survey (USGS). The basemap shown is the USGS National Map: Orthoimagery. Last refreshed October, 2020.

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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. 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.

SCALE



NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

PANEL 962 OF 1060

Panel Contains:

COMMUNITY	NUMBER	PANEL
TOWN OF LOOMIS	060721	0962
PLACER COUNTY	060239	0962
CITY OF ROCKLIN	060242	0962

