Appendix I

Preliminary Drainage Study

LAUGENOUR AND MEIKLE
CIVIL ENGINEERING · LAND SURVEYING · PLANNING

MEMORANDUM

TO: SHELBY MAPLES
ASSOCIATE PLANNER
PLANNING DEPARTMENT
CITY OF ROSEVILLE

FROM: BRIAN DELEMOS, P.E., CA C66421
LAUGENOUR AND MEIKLE

DATE: January 24, 2023

SUBJECT: PRELIMINARY DRAINAGE STUDY FOR ROSEVILLE INDUSTRIAL PROJECT, PHILLIP ROAD, ROSEVILLE, CALIFORNIA (Planning Application 21-0193)

INTRODUCTION:

This memorandum (Memo) was prepared for the proposed Roseville Industrial Park Project (Project) along Phillip Road on the west side of the city, as shown on **Exhibit 1, Vicinity Map**. **Exhibit 2, Project Overview Map**, shows the proposed site plan for the Project, which includes several industrial buildings over approximately 160 acres of onsite improvements. Roadway improvements are also proposed for Phillip Road on the west and south sides of the Project. On the south side of the Project, Phillip Road will be replaced by Blue Oaks Boulevard.

This Memo presents a summary of an analysis of the Project drainage design. The analysis was prepared in support of an application for a tentative subdivision map and associated conditions of approval, so it is abbreviated and preliminary in nature. The topics discussed in the following sections include:

- Planning Area
- Existing Drainage Conditions
- Proposed Drainage Conditions
- Onsite Drainage Design
- Public Roadway Drainage Design
- Onsite Peak Flow Mitigation
- Offsite Volumetric Mitigation
- Post-Construction Stormwater Quality Design
- Floodplain Evaluation
- Conclusions

PLANNING AREA:

The Project is in the Infill planning area Reasons Farms. There is no specific plan for the Project, and there is no drainage master plan. The planned land use is Public/Quasi Public. The extension of Blue Oaks Boulevard into the Project Area (approximately 2,800 feet) will drain through the Project site to the Pleasant Grove Creek Bypass Channel.

EXISTING DRAINAGE CONDITIONS:

As shown on **Exhibit 3, Project Location within the Pleasant Grove Creek Watershed**, the Project site is wholly contained within the Pleasant Grove Creek watershed, which is located within the larger Natomas Cross Canal watershed of northwestern Placer County and southeastern Sutter County. The Pleasant Grove Creek watershed drains to the Pleasant Grove Canal, to the Natomas Cross Canal, and then to the Sacramento River. Pleasant Grove Creek crosses through the middle of the Project. As shown on **Exhibit 4**, **Location of the Project in the FEMA Floodplain**, the creek is covered by Zone AE on the currently effective Flood Insurance Rate Map (FIRM) panel 06061C0920H, dated November 23, 2020. The Zone AE is also designated as a Regulatory Floodway within the Project area. A small area of the northeast corner of the Project lies within a FEMA Zone A of a small creek.

Exhibit 5A, Drainage Map, Existing Conditions, shows the existing drainage conditions over the extents of the Project property. Pleasant Grove Creek and the Pleasant Grove Creek Bypass Channel flow across the across the Project. As indicated by the topography on **Exhibit 5A**, the Project area, on both sides of the creek/bypass channel, drains towards the creek/bypass channel. Also indicated by the topography on **Exhibit 5A**, there is negligible local runon of runoff from adjacent areas onto the Project property (besides the creek/bypass channel crossing the Project).

These drainage patterns of essentially no local runon to the Project are consistent with the overall watershed map shown on **Exhibit 3, Project Location within the Pleasant Grove Creek Watershed**. On **Exhibit3**, the Project boundaries coincide with the edges of the model sub-watershed boundaries prepared by others, except on the west side of the Project, where land generally slopes to the west, away from the Project. Also, as shown on **Exhibit 5B, Hydrology Model Sheds and Topography**, the hydrology model sub-shed boundaries and the topographic contours indicate that local runoff adjacent to the Project generally flows away from the Project (besides the creek/bypass channel crossing the Project).

PROPOSED DRAINAGE CONDITIONS:

Exhibit 6, Drainage Map, Proposed Conditions, shows the site plan and associated general drainage conditions for the Project. On the Project property, the imperviousness will increase significantly with several industrial buildings and paved parking lots. Runoff will generally drain towards the creek. Roof and paving runoff will be disconnected, that is, will drain overland to bioretention facilities for water quality treatment and hydromodification control (described further below). After treatment, an onsite storm drain system will convey runoff to the creek.

Onsite storage for runoff mitigation for more extreme events (up to a 100-year storm event) is not proposed for the Project. Onsite storage would actually increase peak flows in Pleasant Grove Creek due to peak flow timing issues in the creek's watershed, as discussed further below. Volumetric runoff effects are proposed to be addressed offsite by purchasing retention credits in the future Al Johnson Wildlife Area, as discussed further below.

The Project also includes offsite improvements to Phillip Road/Blue Oaks Boulevard. Same as for onsite, runoff will also be routed overland to bioretention facilities for water quality treatment and hydromodification control (described further below). After treatment, on the west side of the Project, runoff from Phillip Road will be collected by a proposed storm drain system and drain to the creek.

On the south side of the Project, runoff from the Blue Oaks Boulevard portion of the Project will also be routed overland to bioretention facilities for water quality treatment and hydromodification control (described further below). After treatment, a proposed storm drain system in the right of way will drain runoff primarily from the west to the east, and will be routed to a proposed storm drain system that will cross the Project site to the creek bypass channel at the eastern side of the Project site. An easement will be provided to the city where these storm drains cross the Project site. The design of these proposed facilities is discussed below.

As discussed for existing drainage conditions above, there is negligible local runon of runoff from adjacent areas onto the Project property (besides the creek/bypass channel crossing the Project).

ONSITE DRAINAGE DESIGN:

The onsite drainage system of the Project will be designed in accordance with the latest version of the City of Roseville Design Standards, Section 10, Drainage, and the Placer County Flood Control and Water Conservation District's (PCFCD) "Stormwater Management Manual" (SWMM). The onsite storm drains will be designed for the 10-year storm event, and the overland releases will be designed for the 100-year storm event. The SWMM allows for the "Unit Peak Discharge" method, which provides a rapid evaluation of the peak flow rate from small watersheds (less than 200 acres)—see **Exhibit 6**, sheets 1 and 2. On each side of the creek, the Project watershed is less than 200 acres; so the Unit Peak Discharge method will be used for onsite design. Design of the onsite storm drains will be deferred until the building-permit phase of the Project.

The overland releases are shown on **Exhibit 6, Drainage Map, Proposed Conditions**. Preliminary design calculations for the overland releases are shown in the table in **Attachment 1, Overland Release Calculations**. The calculation methods used are as footnoted in the table. The estimated overland release water surface elevations are shown in the table, and are also shown on **Exhibit 6, Drainage Map, Proposed Conditions**. Comparing the overland release water surface elevations to other key elevations shown on **Exhibit 6, Drainage Map, Proposed Conditions**, the overland release preliminary design appears to be adequate.

ONSITE PEAK FLOW MITIGATION:

A preliminary analysis was conducted to estimate the effects on peak discharges resulting from the Project. The hydrology model (HEC-HMS, version 3.2) for the master drainage plan of the Creekview development, just upstream of the Project on Pleasant Grove Creek, was provided by Civil Engineering Solutions Inc. (personal comm. with Thomas Plummer, PE). As shown in **Exhibit 5B, Hydrology Model Sheds and Topography**, the Project falls within model subbasin PL10E. Modifications were made to this model subbasin for existing conditions and for proposed conditions to reflect the Project. Subbasin PL10E was split into three subbasins, PL10EN, PL10ES, and PL10E1, as shown on **Exhibit 5, Drainage Map, Existing Conditions**, and **Exhibit 6B**, **Drainage Map, Proposed Conditions, for the Watershed Model**, to represent existing and proposed conditions for the north and south parts of the Project, and the offsite portion of the original PL10E. A model was created for three conditions: (1) existing, (2) proposed with no onsite storage, and (3) proposed with onsite detention storage. The onsite detention storage was modeled conceptually. The changes in the model input are indicated in **Attachment 1A, HEC-HMS Model Changes**. The original and modified models are submitted electronically with this Memo.

A summary of model results, peak discharges from the Project and in the creek, are listed below. The summary of discharges from the Project increase under project conditions if no onsite detention storage is provided. However, with onsite detention storage designed to mitigate the 100-year peak discharges from the Project, peak flows in the creek would increase more than without onsite detention storage, due to peak flow timing issues in the creek's watershed. So, it is proposed that no onsite detention storage for runoff mitigation for more extreme events (up to a 100-year storm event) be provided onsite—a smaller amount of onsite storage will be provided for hydromodification mitigation, based on a 2-year

storm event. The summary also shows that the change in peak flow in the creek would range from approximately 0.1% (with no onsite detention storage) to 0.5% (with onsite storage). These small increases in peak flow would likely result in negligible changes in the calculated 100-year flood elevation.

Summary of Model Results, Peak Discharges

Storm Event	Condition	Peak Flow, cfs[a]		
		North	South	Pleasant Grove Creek
100-yr, 24-hr	Existing[b]	18	51	5,237
	Proposed without Onsite Mitigation[c]	28	70	5,241
	Proposed with Onsite Mitigation[d]	15	46	5,261
	Change without Onsite Mitigation[e]	+10	+19	+4
	Change with Onsite Mitigation[e]	-3	-5	+24

(a) Based on the HEC-HMS model from master plan for nearby Creekview development.
(b) HEC-HMS model "PGCity_100Y24_PL5F_Alt9_RIPE.hms". Outlet (model element): North (PL10EN), South (PL10ES), Pleasant Grove Creek (YPLTE1).
(c) HEC-HMS model "PGCity_100Y24_PL5F_Alt9_RIPU.hms". Outlet (model element): North (PL10EN), South (PL10ES), Pleasant Grove Creek (YPLTE1).
(d) HEC-HMS model "PGCity_100Y24_PL5F_Alt9_RIPM.hms". Outlet (model element): North (UPL10EN-S), South (UPL10ES-S outflow), Pleasant Grove Creek (YPLTE1).
(e) Relative to existing conditions.

OFFSITE VOLUMETRIC MITIGATION:

In addition to potential impacts on peak flood flows within the Pleasant Grove Creek watershed, the Project will result in increased runoff volumes (even if onsite detention storage is provided with the Project). To address these effects, the Project will propose to purchase retention credits in the future Al Johnson Wildlife Area Project being implemented by the city of Roseville (offsite from the Project). The estimated runoff volume needed for mitigation is summarized below. The preliminary estimates of the volume increases were developed with the hydrology model discussed above, but using a 100-year, 8-day storm event (also provided by Civil Engineering Solutions Inc.).

Summary of Model Results, Runoff Volumes

Storm Event	Condition	Volume, acre-feet[a]		
		North Outlet	South Outlet	Total
100-yr, 8-day	Existing[b]	20	53	73
	Proposed[c]	39	101	140
	Increase	19	48	67

(a) Based on the HEC-HMS model from master plan for nearby Creekview development.
(b) HEC-HMS model "PGCity_Post_RIP_E.hms". Outlet (model element): North (PL10EN), South (PL10ES).
(c) HEC-HMS model "PGCity_Post_RIP_U.hms". Outlet (model element): North (PL10EN), South (PL10ES).

PUBLIC ROADWAY DRAINGE DESIGN:

The roadway drainage system improvements associated with the Project will be designed, as with the onsite system, in accordance with City Design Standards and with the SWMM. The roadway storm drains will be designed for the 10-year storm event, and the overland releases will be designed for the 100-year storm event. The two main roadway watersheds are less than 200 acres; so the Unit Peak Discharge method will be used for the drainage system design. Design of the roadway storm drains will be deferred until the building-permit phase of the Project.

The overland releases are shown on **Exhibit 6, Drainage Map, Proposed Conditions**. Preliminary design calculations for the overland releases are shown in the table in **Attachment 1B, Overland Release Calculations**. The calculation methods used are as footnoted in the table. The estimated overland release water surface elevations are shown in the table, and are also shown on **Exhibit 6, Drainage Map, Proposed Conditions**. Comparing the overland release water surface elevations to other key elevations shown on **Exhibit 6, Drainage Map**, the overland release preliminary design appears to be adequate.

The proposed drainage system for Blue Oaks Boulevard will drain to the east side of the Project site, and will be routed to a proposed storm drain system that will cross the Project site to the creek. An easement will be provided to the city where these storm drains cross the Project site. Design of the public storm drains will be deferred until the building-permit phase of the Project.

POST-CONSTRUCTION STORMWATER QUALITY DESIGN:

Post-construction stormwater management is intended to treat the urban runoff generated on a developed site in perpetuity. The BMP techniques used within the site will reduce and/or eliminate the pollutants from the urban stormwater runoff and prevent the contamination of receiving waters. The BMPs will be designed in conformance with the City Improvement Standards, the City's Stormwater Quality Design Manual, the Placer County Flood Control Agency's Stormwater Management Manual, and the City's

Overarching Management Plan.

Post construction stormwater treatment is composed of three general elements: source control, runoff reduction and treatment of runoff. All three elements will be used at the Project site. LID BMPs are the main tool the Project will employ for runoff reduction. As shown on the preliminary improvement plans for the Project in **Attachment 2, Stormwater Control Plan**, virtually all runoff at the Project site will be routed overland to bioretention facilities, which will serve as treatment control BMPs. Vegetation and a special soil mix will help process and remove pollutants before discharge from the Project site. Storage space within the bioretention facilities will help to mitigate potential hydromodification, such as erosion and sedimentation, impacts to downstream streams. Stormwater-quality-control-plan worksheets are included in **Attachment 3, Post-Construction-Storm-Water-Plan Worksheets**, and the sheds used for hydromodification calculations are included in **Attachment 4, Stormwater-Control-Plan-Hydromodification Shed Exhibits.** One set of calculation worksheets is included for each of the two outfalls analyzed. The first outfall analyzed was a conceptual combination of Outfalls 1A, 1B, and 1C, which drain the south area directly to the Pleasant Grove Creek Bypass Channel. These outfalls were analyzed as one outfall so that proposed conditions could be compared to existing conditions. For this submittal, the DMAs for Blue Oaks Boulevard were redirected to Outfall 1C, from what was previously designated as Outfall 2. The second outfall analyzed for hydromodification was the outfall for the north side of the Project, which is denoted as Outfall 3.

FLOODPLAIN EVALUATION:

The increase in impervious surfaces proposed for the Project will increase runoff discharged to the Pleasant Grove Creek, and the floodplain conditions of the creek may be impacted. If impacts are expected, mitigation, such as onsite detention storage, would be required. However, the preliminary watershed modeling discussed above indicates that onsite detention would not likely not be needed due to differences in the timing of peak flows from various parts of the Pleasant Grove Creek watershed. So, it is proposed that onsite detention storage will not be necessary for the Project. This finding will be verified with more detailed modeling during the building-permit phase of the Project. Existing watershed models modified as needed to evaluate floodplain conditions resulting from the Project. These models will also be used to design the proposed bridge for the Project, and to minimize its impacts.

The floodplain-conditions evaluation will also include potential impacts to the base flood elevations (BFE) due to the slight increases in peak flows discussed above, and due to the proposed fill within the FEMA special flood hazard area. Fill is proposed for the FEMA Zone AE just south of the Pleasant Grove Creek Bypass Channel (see **Exhibit 4**). A FEMA Letter of Map Revision (LOMR) will be prepared prior to building occupancy. In addition to potential impacts of peak flood flows within the Pleasant Grove Creek watershed, the Project will result in increased runoff volumes to downstream water bodies. To address these impacts, the Project will contribute toward the construction costs of the Pleasant Grove Retention Basin project through payment of the Pleasant Grove Watershed Mitigation Fee.

CONCLUSIONS:

The existing and proposed drainage conditions for the Project were reviewed and evaluated. This preliminary analysis appears to indicate that the conceptual drainage design concepts are adequate to meet design requirements without significant changes to the Project, and to identify further drainage design/analysis for inclusion in the City's conditions of approval document for the Project.

If you have any questions, please feel free to call me at (530) 662-1755, or e-mail me at bdelemos@lmce.net.

Enclosures

EXHIBITS

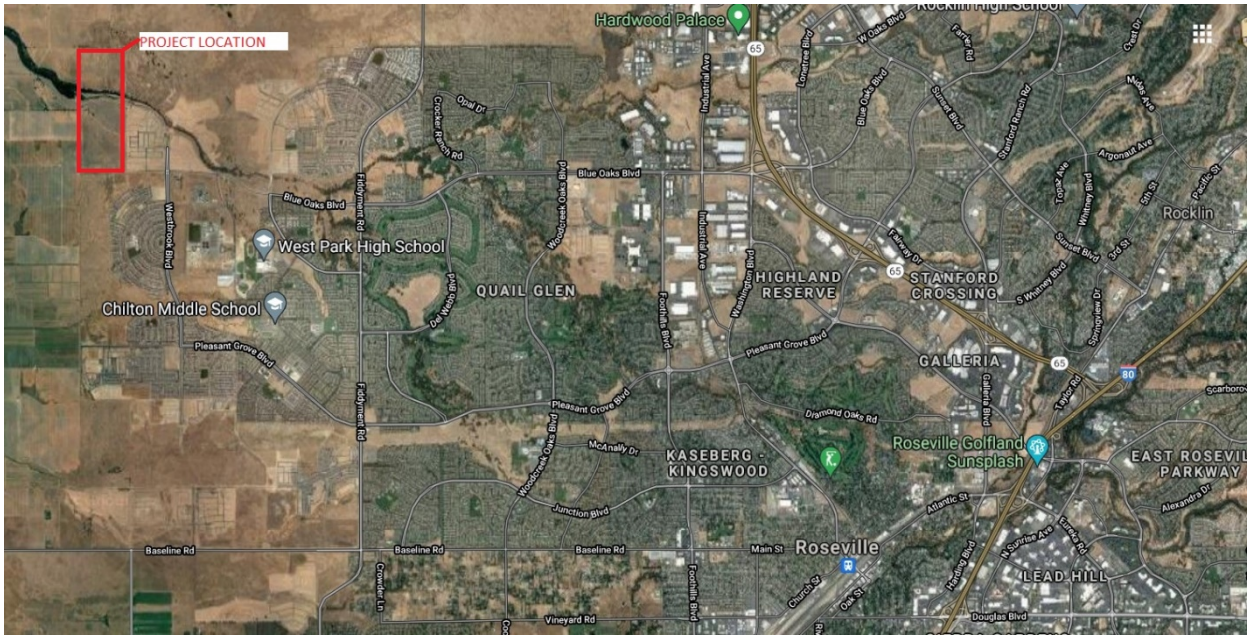
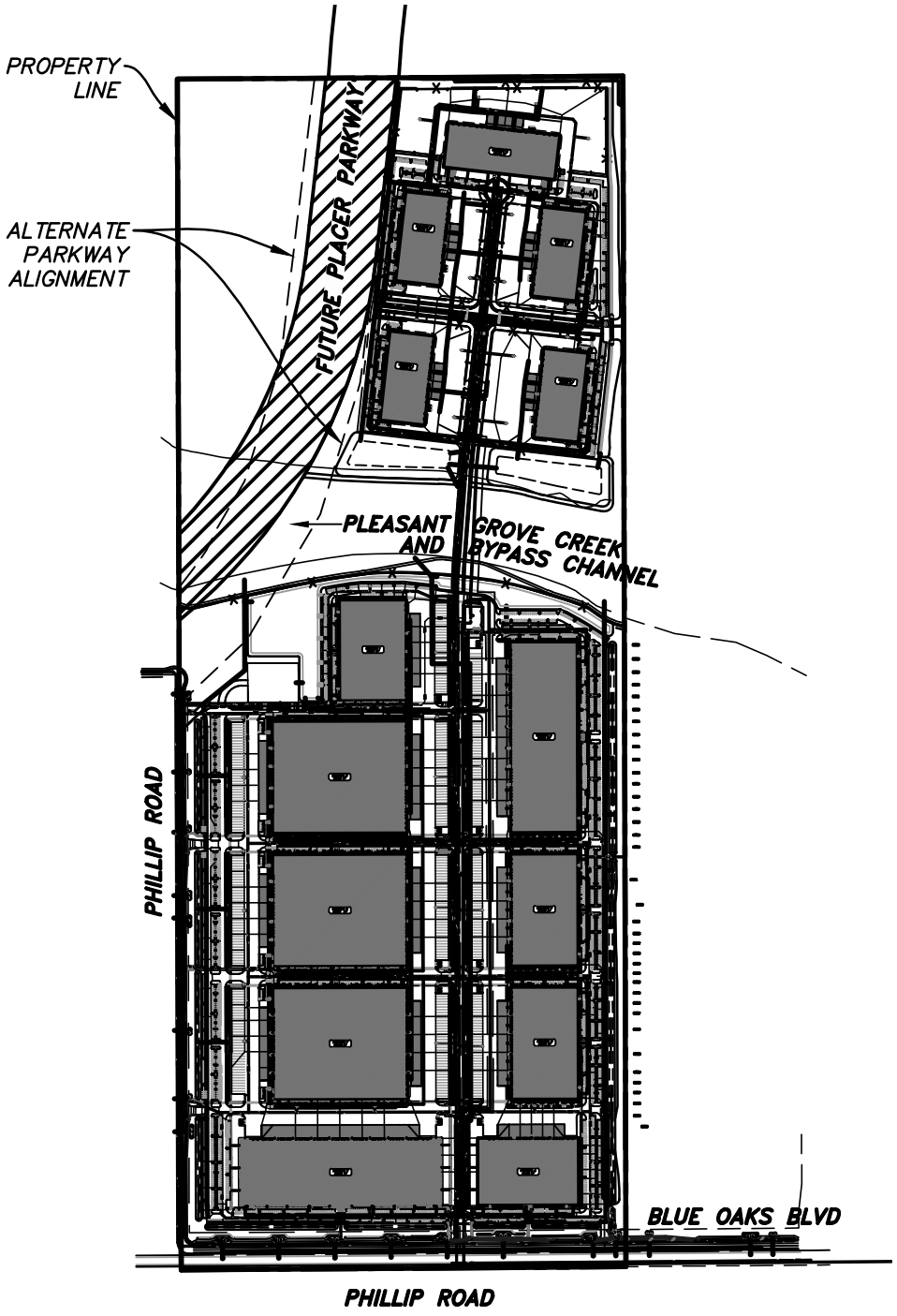


Exhibit 1 – Vicinity Map



REGISTERED PROFESSIONAL ENGINEER
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0 400 800 1600

SCALE: 1"=800'

EXHIBIT 2
PROJECT OVERVIEW MAP
FOR
ROSEVILLE INDUSTRIAL PARK
PHILLIP ROAD,
CITY OF ROSEVILLE, CALIFORNIA
SHEET 1 OF 1 DECEMBER 17, 2021

LM LAUGENOUR AND MEIKLE
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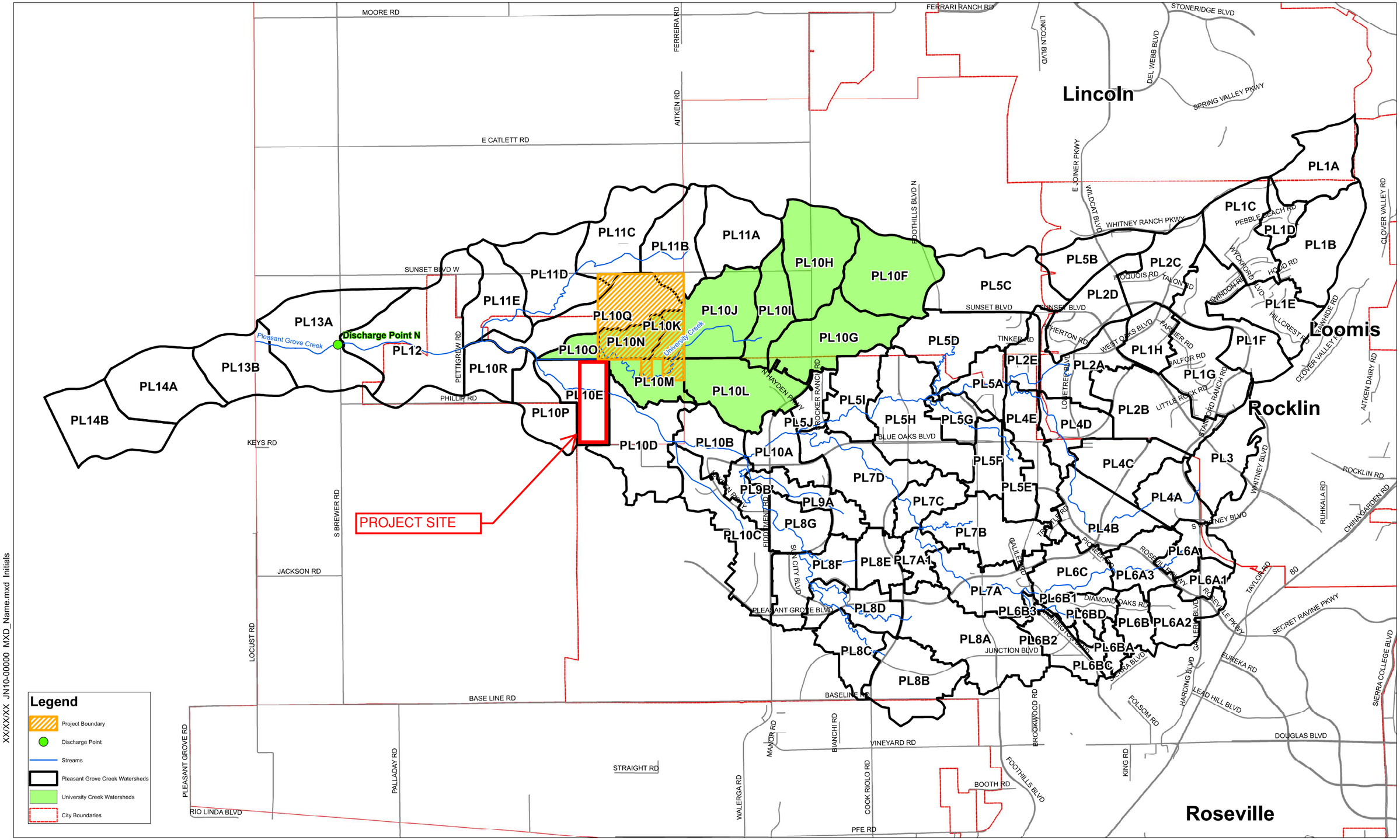

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Kimley»Horn

AMORUSO RANCH SPECIFIC PLAN MASTER DRAINAGE PLAN

Pleasant Grove Creek Watershed

EXHIBIT 3 - PROJECT LOCATION WITHIN THE PLEASANT GROVE CREEK WATERSHED

Exhibit 1

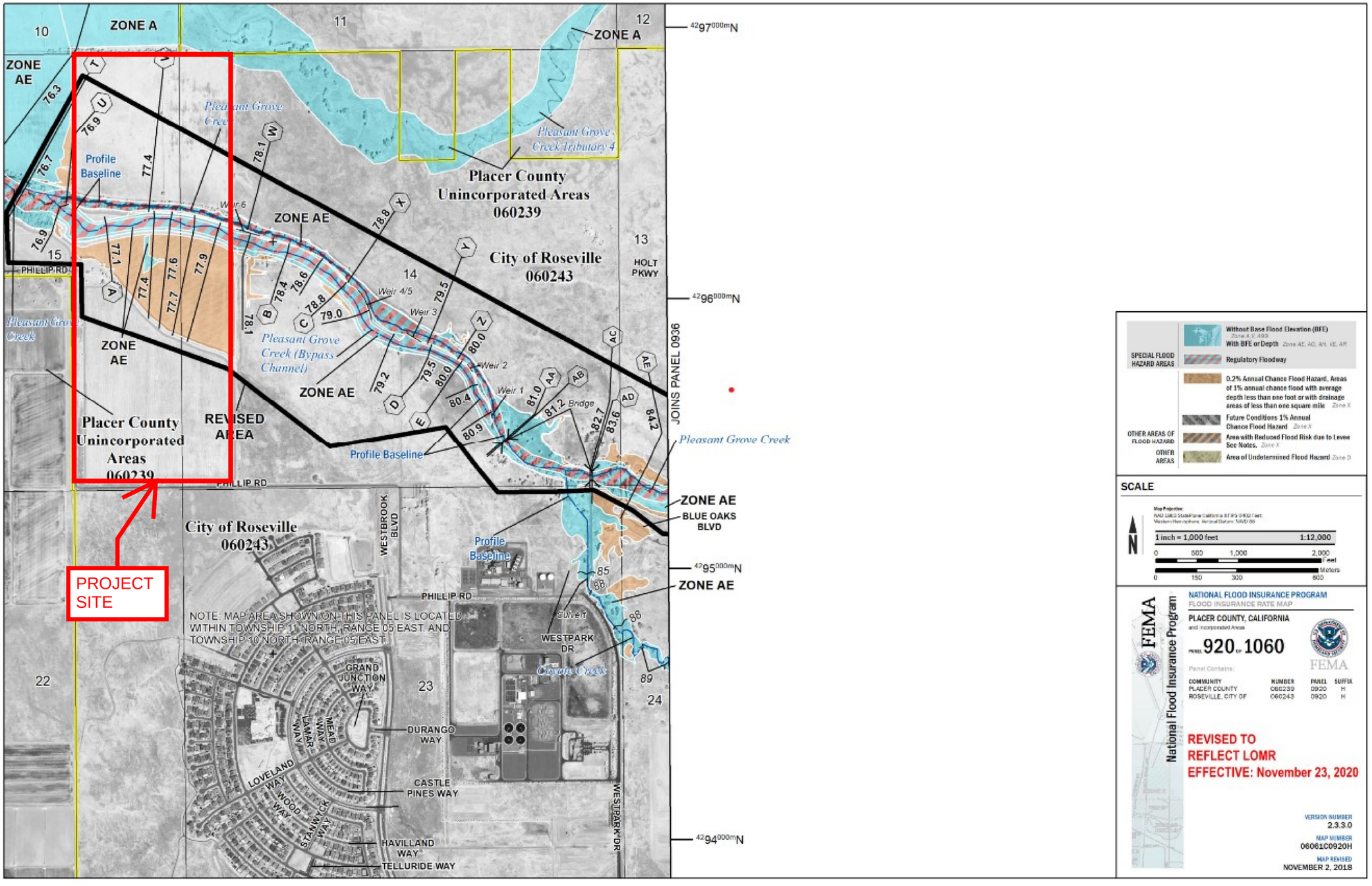


EXHIBIT 4 - LOCATION OF THE PROJECT IN THE FEMA FLOODPLAIN

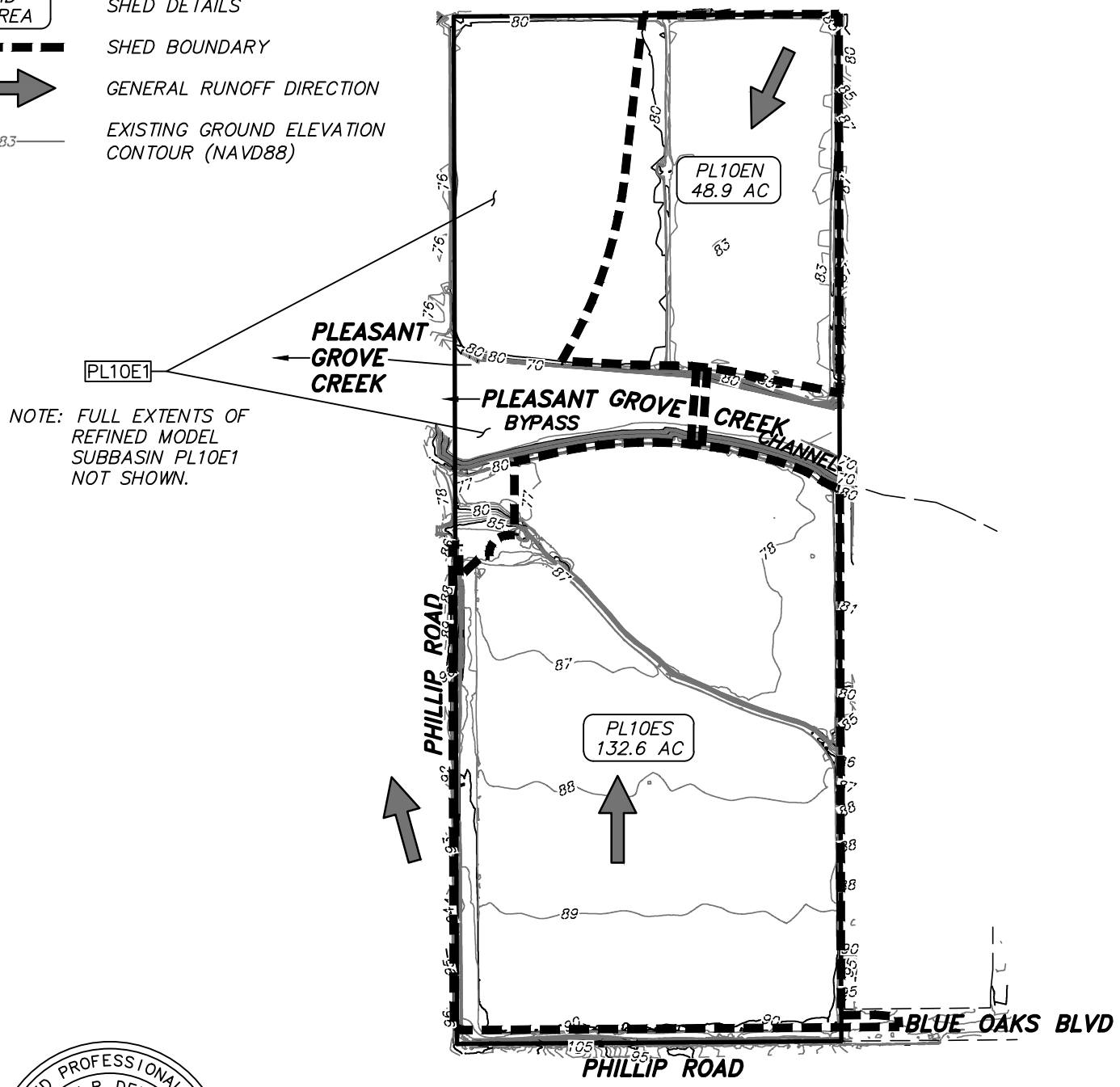
LEGEND

ID AREA — SHED DETAILS

SHED BOUNDARY

GENERAL RUNOFF DIRECTION

83 — EXISTING GROUND ELEVATION CONTOUR (NAVD88)



NOTE: FULL EXTENTS OF REFINED MODEL SUBBASIN PL10E1 NOT SHOWN.

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SCALE: 1"=800'

EXHIBIT 5A
DRAINAGE MAP
EXISTING CONDITIONS
FOR
ROSEVILLE INDUSTRIAL PARK
PHILLIP ROAD,
CITY OF ROSEVILLE, CALIFORNIA
SHEET 1 OF 1 DECEMBER 7, 2022

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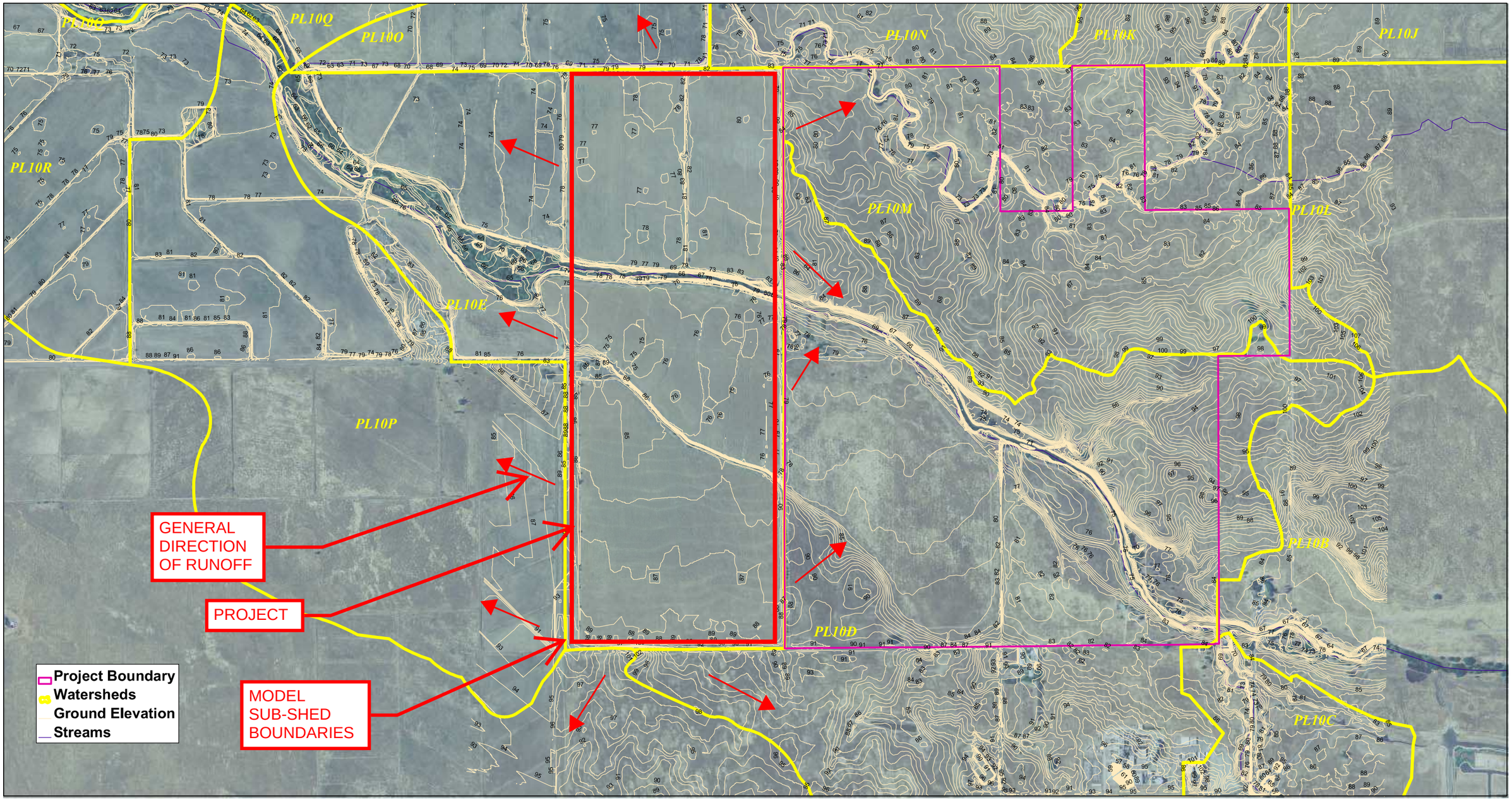
CREEKVIEW SPECIFIC PLAN



CIVIL ENGINEERING SOLUTIONS, INC.

PRE-PROJECT WATERSHEDS

0 400 800 1,600 Feet

CREEKVIEW SPECIFIC PLAN
MASTER DRAINAGE STUDY
AUGUST 2010

SH-1A

EXHIBIT 5B - HYDROLOGY MODEL SHEDS AND TOPOGRAPHY

SEE SHEET 2

PLEASANT GROVE CREEK

RELEASE 01B WSEL 79.5

RELEASE 01A WSEL 83.3

RELEASE 05 WSEL 85.1

BUILDING I 86.10 FF

BUILDING D 85.90 FF

BUILDING H 86.50 FF

PR15 19.54 AC

PR10 101.9 AC

BUILDING G 86.95 FF

BUILDING C 86.35 FF

PH10 1.97 AC

PHILLIP ROAD

BUILDING F 87.40 FF

BUILDING B 86.80 FF

BUILDING E 92.55 FF

BUILDING A 91.95 FF

BLUE OAKS BOULEVARD

PHILLIP ROAD

B010 2.27 AC

SEE SHEET 2

LEGEND

- ID AREA — SHED DETAILS
- SHED BOUNDARY
- OVERLAND RELEASE
- 84.9 TC — FINISHED TOP OF CURB ELEVATION (NAVD 88)
- 92.5 — FINISHED GRADE ELEVATION CONTOURS (NAVD 88)
- 89 — EXISTING GROUND ELEVATION CONTOURS (NAVD 88)
- 30.0 — FEMA BASE FLOOD ELEVATIONS (NAVD 88)

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0 125 250 500
SCALE: 1"=250'

EXHIBIT 6
DRAINAGE MAP
PROPOSED CONDITIONS
FOR
ROSEVILLE INDUSTRIAL PARK
PHILLIP ROAD,
CITY OF ROSEVILLE, CALIFORNIA
SHEET 1 OF 2 AUGUST 4, 2022

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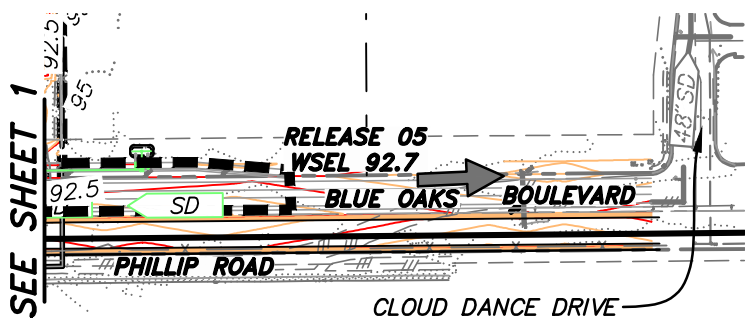

LEGEND

- ID / AREA — SHED DETAILS
- SHED BOUNDARY
- OVERLAND RELEASE
- 84.9 TC — FINISHED TOP OF CURB ELEVATION (NAVD 88)
- 92.5 — FINISHED GRADE ELEVATION CONTOURS (NAVD 88)
- 89 — EXISTING GROUND ELEVATION CONTOURS (NAVD 88)
- 30.0 — FEMA BASE FLOOD ELEVATIONS (NAVD 88)

0 125 250 500

SCALE: 1"=250'

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EXHIBIT 6
DRAINAGE MAP
PROPOSED CONDITIONS

FOR

ROSEVILLE INDUSTRIAL PARK

PHILLIP ROAD,
CITY OF ROSEVILLE, CALIFORNIA
SHEET 2 OF 2 MARCH 23, 2022

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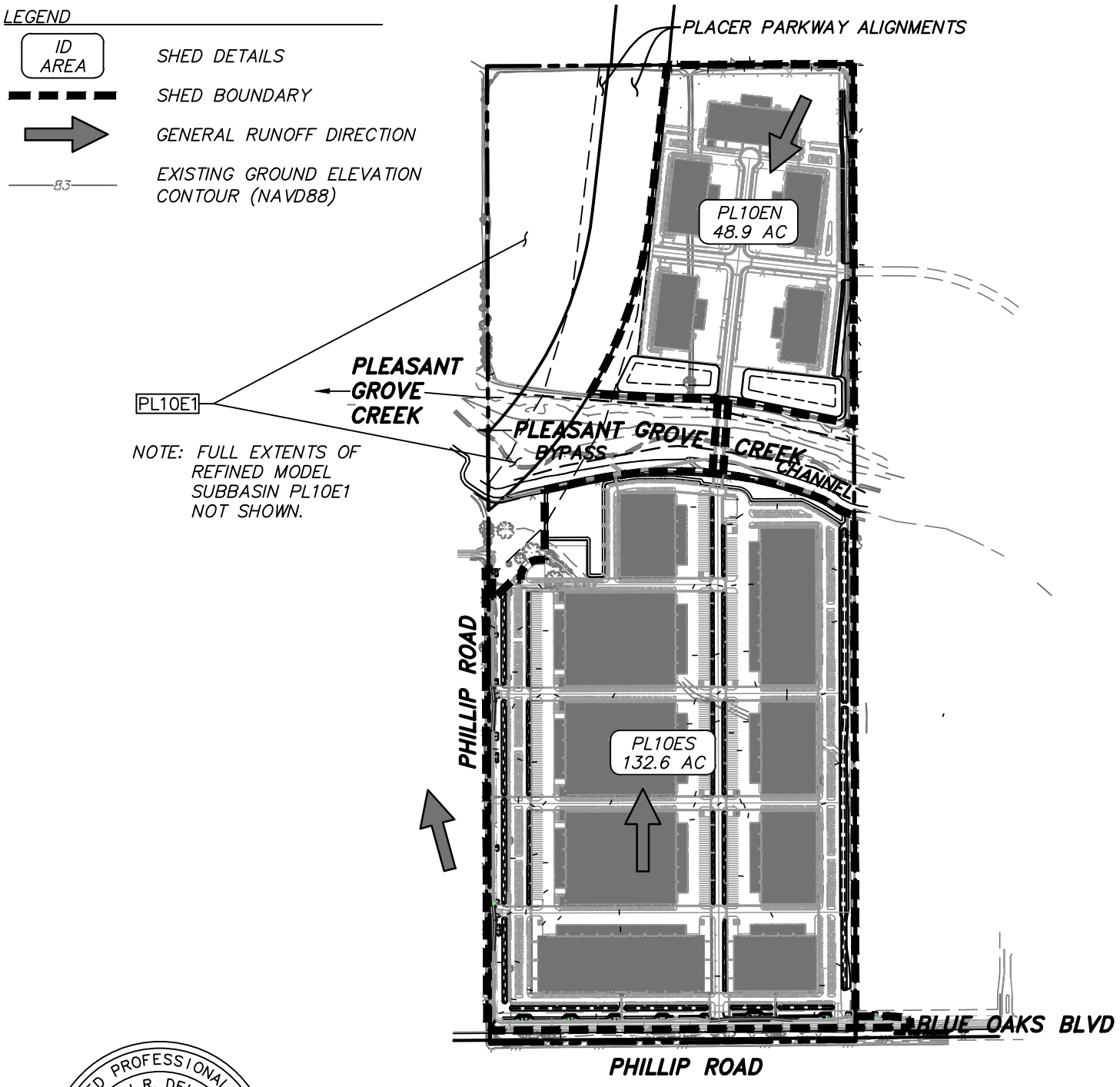

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SCALE: 1"=800'

EXHIBIT 6B
DRAINAGE MAP
PROPOSED CONDITIONS
FOR
WATERSHED MODEL
FOR
ROSEVILLE INDUSTRIAL PARK
PHILLIP ROAD,
CITY OF ROSEVILLE, CALIFORNIA
SHEET 1 OF 1 DECEMBER 7, 2022

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ATTACHMENT 1A
HEC-HMS MODEL CHANGES

PROJECT: Placer Commercial Center
PROJECT #: 2168-4
LOCATION: Placer County, CA
FILE:

2-Dec-22
BRD
PF

AUGENOUR AND MEIKL
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Purpose: Calculate/list hydrologic model input changes made to the Creekview master plan hydrology model.

Table 1 - Hydrologic Input Data[a]

				Losses 1				Plane 1[c]					Channel Flow[c]						Collector[c]					
Condition	Shed	A, acres	A, sq mi	% Imperv.	Initial Infiltration[b1]	Pervious Cover Type	Constant Rate Infiltration, in./hr[b2]	Ave L, ft	Ave. Slope, ft/f	Cover	n[d]	Area, %	L, ft	n[d]	S, ft/ft	Shape	Z, ft/ft[e]	Width/Diam, ft	Ave L, ft	Ave. Slope, ft/f	n[d]	Ave Area, sq mi	Shape	Ave. Diam. ft
Existing																								
	PL10E	354.69	0.55420	2.0	0.1		0.09	350	0.001		0.40	100	5500	0.08	0.001	Trap	5	2						
Existing - Refined																								
	PL10E1	173.19	0.27061	2.0	0.1		0.09	350	0.001		0.40	100	3500	0.08	0.001	Trap	5	2						
	PL10EN	48.90	0.07641	2.0	0.1		0.09	350	0.001		0.40	100	5500	0.08	0.001	Trap	5	2						
	PL10ES	132.60	0.20719	2.0	0.1		0.09	350	0.001		0.40	100	5500	0.08	0.001	Trap	5	2						
Proposed																								
	PL10E1	173.19	0.27061	2.0	0.1		0.09	350	0.001		0.40	100	3500	0.08	0.001	Trap	5	2						
	PL10EN	48.90	0.07641	89.5	0.1	Commercial Landscaping	0.12	300	0.001		0.11	100	5500	0.08	0.001	Trap	5	2	1800	0.0025	0.015	0.0382	Circular	2.5
	PL10ES	132.60	0.20719	84.1	0.1	Commercial Landscaping	0.12	300	0.001		0.11	100	5500	0.08	0.001	Trap	5	2	2600	0.0025	0.015	0.1036	Circular	3.5

(a) Based on Stormwater Management Manual (SWMM, 1996), Placer County Flood Control and Water Conservation District
(b1) Based on Roseville City model for Pleasant Grove Creek watershed developed for the Creekview development drainage master plan.
(b2) Based on Table 5-3 of SWMM.
(c) Parameters chosen for elements are typical of the watershed and do not necessarily represent specific, physical elements. Representation of some short routing segments were neglected.
(d) N-values for shallow overland sheet flow are based on Table 5-5 of SWMM. Others values are typical of pipe, channel, or gutter flow.
(e) For "channel" elements, shallow overland flow represented as triangular ditch with flatter side slopes.

ATTACHMENT 1B
OVERLAND RELEASE CALCULATIONS

OVERLAND RELEASE CALCULATION TABLE

PROJECT: ROSEVILLE INDUSTRIAL PARK
PROJECT #: 4042-60-2
LOCATION: Roseville, CA

DATE: 4-Aug-22
CALC BY: BRD
CHECKED BY: PF
SHEETS: 1

LAUGENOUR AND MEIKLE
CIVIL ENGINEERS
608 COURT STREET
WOODLAND, CA 95695

Purpose: Estimate overland release water surface elevations.

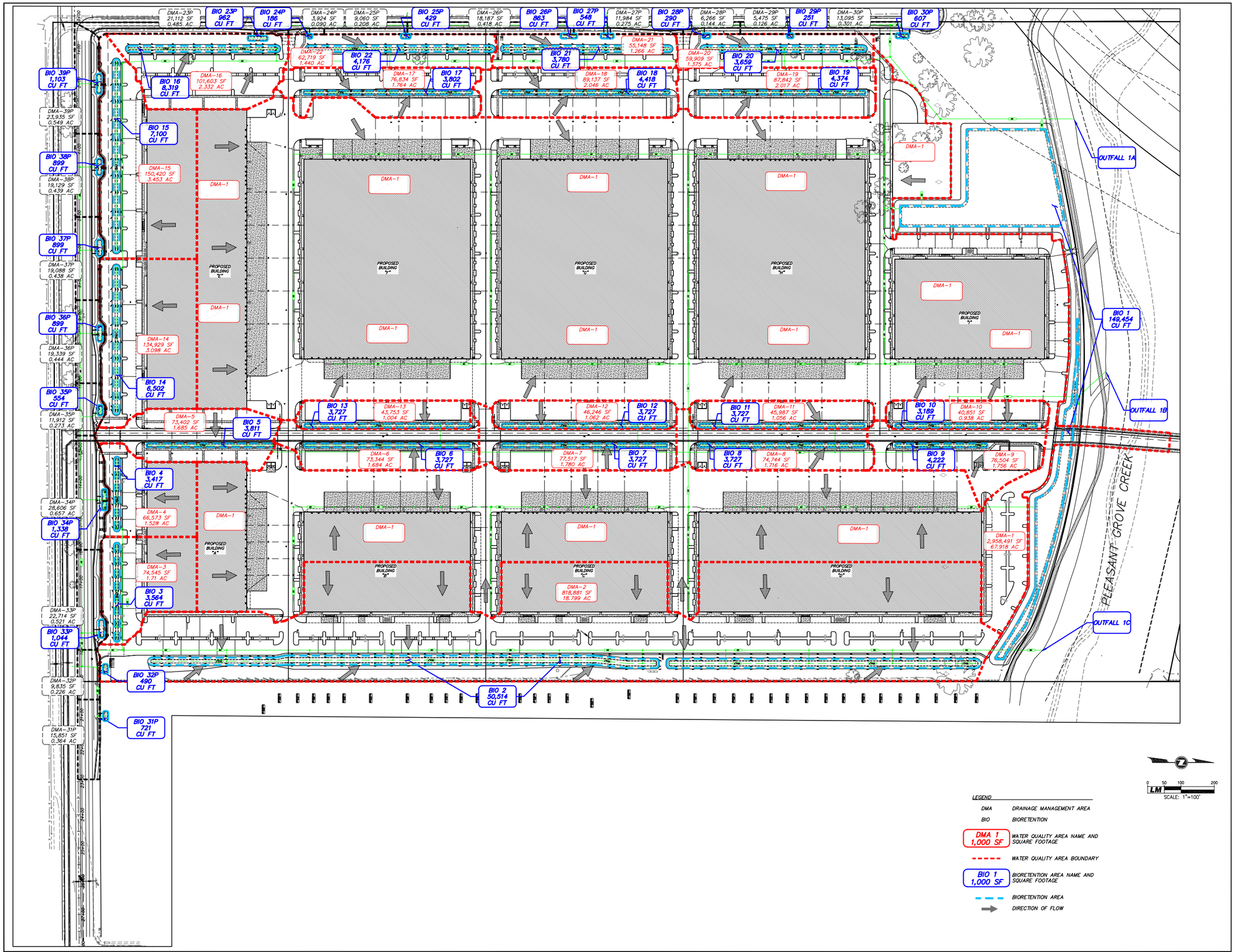
DESIGN RECURRENCE INTERVAL, YEARS **100**

OVERLAND RELEASE CALCULATIONS

		DESIGN FLOW[a]																		HYDRAULICS[k]				
						OVERLAND FLOW[b]					SHALLOW CONCENTRATED FLOW[f]				TOTAL	UNIT PEAK RUNOFF[i]								
PIPELINE/NODES		LOCAL SHED	TRIBUTARY SHEDS	LOCAL AREA	SUM A	N[c], O.L.	L[d]	S[d]	RECUCT. FACT.[e]	Tro[d]	S[f]	V[f]	L[g]	$T_{shallow}$[g]	Tr[h]	C0	C1	Q_U[i]	Qpeak[j]	Weir Length[l]	Weir Coef.[m]	H[n]	Weir Crest Elevation	WSEL[o]
FROM	TO			(Ac.)	(Ac.)		(ft)	(ft/ft)		(min.)	(ft/ft)	(ft/s)	(ft)	(min.)				(cfs/acre)	(cfs)	(ft)		(ft)	(ft)	in.
	RELEASE01A	PR10		101.9	101.9	0.150	60	0.100	0.7	1.9	0.005	1.4	2,500	29.8	31.7	28.48	-0.87	1.4	143.7	440	3.30	0.21	83.1	83.31
	RELEASE01B	PR15		19.5	19.5	0.150	70	0.100	0.7	2.0	0.005	1.4	2,500	29.8	31.8	28.48	-0.87	1.4	27.4	52	3.30	0.29	79.2	79.49
	RELEASE02A	(PR20)/2		19	19.0	0.150	30	0.100	0.7	1.2	0.005	1.4	1,400	16.7	17.9	9.28	-0.87	0.8	14.3	540	3.30	0.04	82.2	82.24
	RELEASE02B	(PR20)/2		19	19.0	0.150	30	0.100	0.7	1.2	0.005	1.4	1,400	16.7	17.9	9.28	-0.87	0.8	14.3	440	3.30	0.05	82.4	82.45
	RELEASE03	PR20		37.2	37.2	0.150	30	0.100	0.7	1.2	0.005	1.4	1,400	16.7	17.9	9.28	-0.87	0.8	28.0	100	2.60	0.23	80.0	80.23
	RELEASE04	PH10		1.97	2.0	0.150	10	0.100	0.7	0.6	0.005	1.4	2,500	29.8	30.4	28.48	-0.87	1.5	2.9	70	2.60	0.06	85.0	85.06
	RELEASE05	BO10		2.27	2.3	0.150	10	0.100	0.7	0.6	0.005	1.4	2,700	32.1	32.7	28.48	-0.87	1.4	3.1	40	2.60	0.10	92.6	92.70

(a) Based on Unit Peak Discharge Method, Sectioin 10-9 of City of Roseville Design Standards (Design Standards), Section 10, Drainage .
(b) Accounts for runoff across landscaping.
(c) Manning's roughness coefficient, Table 10-2 of the Design Standards. Short grass assumed.
(d) Tro = ((0.355 (N x L)^0.6) / (S^0.3)) x Reduction Factor. Equation 10-2 of the Design Standards. Tro = overland response time. N = Mannings coefficient. L = flow length. Maximum Tro = 10 minutes for industrial land uses.
(e) Reduction Factor = 1.0 , 0.9, and 0.7 for 10-year, 25-year, and 100-year storms, respectively.
(f) V = 20.3282(S)^0.5, where V = average velocity (ft/s) for paved shallow flow, and S = slope of hydraulic grade line (water course slope, ft/ft). Equation 43 of Hydrologic Modeling System HEC-HMS, Technical Reference Manual, 2000.
(g) Tshallow = L/V x unit conversion. Tshallow = Response Time of Shallow Concentrated Flow. L = Flow Length. V = Average Velocity.
(h) Tr = Tro + Tshallow. Tr = Total response time.
(i) Qu = C0 x Tr^C1. Qu = Peak Unadjusted Unit Discharge. C0 and C1 = Coefficients from Table 10-4 of the Design Standards.
(j) Qpeak = A x Qu. Qpeak = Peak Flow. Infiltration was negelected.
(k) Overland release modeled as a weir.
(l) L = Length of Weir Crest.
(m) Weir Coefficient was assumed for a rectangular sharp-crested weir.
(n) H = Upstream Energy Head above the weir crest. Basic weir equation (Q = C L H^3/2) was solved for H.
(o) WSEL = Water Surface Elevation at upstream end of overland release. Estimated as Weir Crest Elevation + H.

ATTACHMENT 2
STORMWATER CONTROL PLAN



ROSEVILLE INDUSTRIAL PARK

PHILLIP ROAD
ROSEVILLE, CA 95747

JOB NO. 4042-60-2
SCALE AS NOTED
DATE –
CHECKED BY PF
DRAWN BY PJ

C

STORMWATER CONTROL PLAN

C501

SHEET 28 OF 37

LEGEND

DMA	DRAINAGE MANAGEMENT AREA
BIO	BIORETENTION
DMA 1 1,000 SF	WATER QUALITY AREA NAME AND SQUARE FOOTAGE
	WATER QUALITY AREA BOUNDARY
BIO 1 1,000 SF	BIORETENTION AREA NAME AND SQUARE FOOTAGE
	BIORETENTION AREA
	DIRECTION OF FLOW

ROSEVILLE INDUSTRIAL PARK

PHILLIP ROAD
ROSEVILLE, CA 95747

JOB NO.	4042-60-2
SCALE	AS NOTED
DATE	
CHECKED BY	PF
DRAWN BY	PJ

C

STORMWATER CONTROL PLAN

C502

SHEET 29 OF 37

ATTACHMENT 3
POST-CONSTRUCTION STORM-WATER-QULITY-PLAN WORKSHEETS
-SOUTH AREA, OUTFALLS 1A/B/C
-NORTH AREA, OUTFALL 3

Post-Construction
Storm Water Quality Plan

For:

Roseville Industrial Park
NORTH AREA - OUTFALL 3

PL21-0193

Specify Lot Numbers if site is a portion of a Land Division (Subdivision or Parcel Map)

Prepared for:

Panattoni Development Company, Inc.
Insert Title
Panattoni Development Company, Inc.
8775 Folsom Boulevard, Suite 200
Sacramento, CA 95826
(916) 379-1106

Prepared by:

Laugenour and Meikle Civil Engineers
608 Court Street
Woodland, CA, 95695
(530) 662-1755

Preparation Date:_____December 2, 2022_____

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:	6832 Phillip Road, APN 017-101-008	
Owner Name:	Panattoni Development Company, Inc.	
Title	Insert Title	
Company	Panattoni Development Company, Inc.	
Address	8775 Folsom Boulevard, Suite 200	
City, State, Zip Code	Sacramento, CA 95826	
Email	Abbie Wertheim: AWertheim@panattoni.com	
Telephone #	(916) 379-1106	
Signature	Date	
Engineer:*	Brian Delemos	PE Stamp* (Required for all Regulated Projects)
Title	P.E, 66421	
Company	Laugenour and Meikle Civil Engineers	
Address	608 Court Street	
City, State, Zip Code	Woodland, CA, 95695	
Email	bdelemos@lmce.net	
Telephone #	(530) 662-1755	
Signature		
Brief Description of Project: (Attach additional sheets as necessary)	Industrial warehouses	

* 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.	X
[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.	X
[11]Enter total new and/or replaced impervious surface (ft^2)	

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: *Take GPS measurement at approximate center of site*	[1] Latitude	[2] Longitude	[3] Elevation (ft. above sea level)	[4] 85th Percentile, 24 Hour Design Storm Depth (in):
	38.80233	121.39682	85	0.9

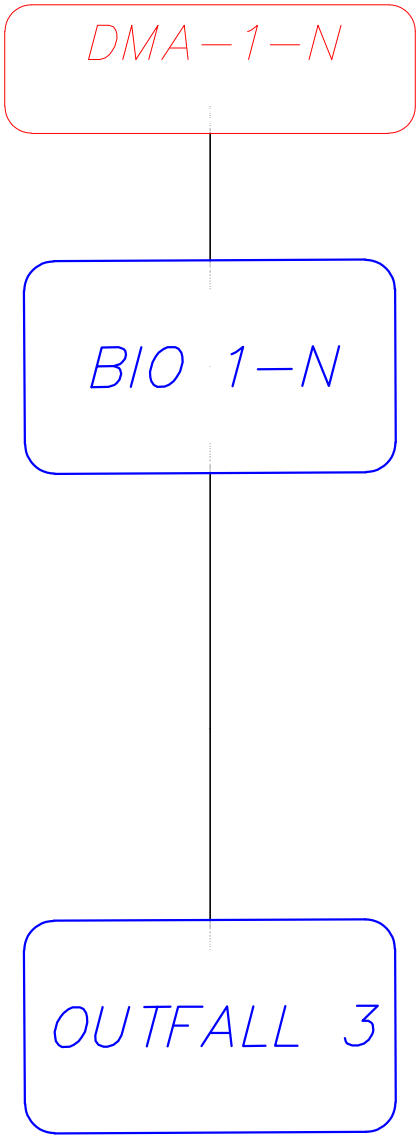
[5] Receiving waters *Name of stream, lake or other downstream waterbody to which the site runoff eventually drains*	Pleasant Grove Creek, Pleasant Grove Creek Bypass Channel
[6] 303(d) listed pollutants of concern *Refer to State Water Resources Control Board website* www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired	Bifenthrin; cypermethrin; pyrethroids
[7] Is Project going to be phased? *If yes, ensure that the SWQP evaluates each phase with distinct DMAs, requiring LID BMPs to address runoff at time of completion*	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

SEE ATTACHED

ROSEVILLE INDUSTRIAL PARK NORTH



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	
Concentrate development on portions of the site with less permeable soils and preserve areas that can promote infiltration.	X	
Limit overall impervious coverage of the site with paving and roofs.	X	
Set back development from creeks, wetlands, and riparian habitats.	X	
Preserve significant trees.	X	Relatively few trees onsite, but some will be preserved.
Conform site layout along natural landforms.	X	
Avoid excessive grading and disturbance of vegetation and soils.	X	
Replicate the site's natural drainage patterns.	X	
Detain and retain runoff throughout the site.	X	

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	☐	☐	To be determined during building-permit phase
Interior floor drains	☐	☐	To be determined during building-permit phase
Parking/storage areas and maintenance	☐	☐	To be determined during building-permit phase
Indoor and structural pest control	☐	☐	To be determined during building-permit phase
Pools, spas, ponds, decorative fountains, and other water features	☐	☐	To be determined during building-permit phase
Landscape/outdoor pesticide use	☐	☐	To be determined during building-permit phase
Restaurants, grocery stores, and other food service operations	☐	☐	To be determined during building-permit phase
Refuse areas	☐	☐	To be determined during building-permit phase
Industrial Processes	☐	☐	To be determined during building-permit phase
Outdoor storage of equipment or materials	☐	☐	To be determined during building-permit phase
Vehicle and equipment cleaning	☐	☐	To be determined during building-permit phase
Vehicle and equipment repair and maintenance	☐	☐	To be determined during building-permit phase
Fuel dispensing areas	☐	☐	To be determined during building-permit phase
Loading docks	☐	☐	To be determined during building-permit phase
Fire sprinkler test water	☐	☐	To be determined during building-permit phase
Drain or wash water from boiler drain lines, condensate drain lines, rooftop equipment, drainage sumps, and other sources	☐	☐	To be determined during building-permit phase
Unauthorized non-storm water discharges	☐	☐	To be determined during building-permit phase
Building and grounds maintenance	☐	☐	To be determined during building-permit phase

The source control measures identified in this table shall be designed consistent with recommendations from the CASQA Stormwater BMP Handbook for New Development and Redevelopment[1], 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)**		**Runoff Reduction (ft^3)**		**Runoff Reduction (ft^3)**		**Runoff Reduction (ft^3)**
[2] Adjacent/On-Site Stream Setbacks and Buffers	A_{imp} (ft^2)	*impervious drainage area*		0		0		0		0
	V_{85} (in)	*runoff volume from 85th percentile, 24-hour storm*	0.8		0.8		0.8		0.8	
[3] Soil Quality Improvement and Maintenance	A_{pond} (ft^2)	*ponding area*		0		0		0		0
	D_{pond} (ft)	*ponding depth*								
	A_{sa} (ft^2)	*soil amendment area*								
	D_{sa} (ft)	*depth of amended soil*								
	n	*porosity of amended soil*								
[4] Tree Planting and Preservation	n_e	*number of new evergreen trees*		0		0		0		0
	n_d	*number of new deciduous trees*								
	A_{tc} (ft^2)	*canopy area of existing trees to remain on the property*								
	V_{85} (in)	*runoff volume from 85th percentile, 24-hour storm*	0.8		0.8		0.8		0.8	
[5] Rooftop and Impervious Area Disconnection	A_{imp} (ft^2)	*impervious drainage area*		0		0		0		0
	V_{85} (in)	*runoff volume from 85th percentile, 24-hour storm*	0.8		0.8		0.8		0.8	
[6] Porous Pavement	A_{res} (ft^2)	*area of gravel storage layer*		0		0		0		0
	D_{res} (ft)	*depth of gravel storage layer*								
	n_{agg}	*porosity of aggregate*								
	C	*efficiency factor*								
[7] Vegetated Swales	A_{imp} (ft^2)	*impervious drainage area*		0		0		0		0
	V_{85} (in)	*runoff volume from 85th percentile, 24-hour storm*	0.8		0.8		0.8		0.8	
[8] Rain Barrels and Cisterns	N	*number of rain barrels and/or cisterns*		0		0		0		0
	V_a (ft^3)	*volume of each rain barrel and/or cistern*								
[9] Do all Site Design Measures meet the design requirements outlined in the Fact Sheets?					**Yes**	**N/A**	**No**			
[10] Total Volume Reduction (ft^3)			**0**		**0**		**0**		**0**	
[11] Effective Treated Impervious Area (ft^2)			**0**		**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
[1]Total impervious area requiring treatment	1,548,947																				
[2] Impervious area untreated by Site Design Measures (ft^2) *Item 1 – Form 3-4 Item 11*	1548947	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)	81524																				
[4] Composite DMA Runoff Coefficient (Rc) *Enter area weighted composite runoff coefficient representing entire DMA*	0.87																				
[5] Water Quality Volume (WQV) (ft^3) *WQV = 1/12 * [Item 2 + Item 3) *Item 4] * Unit WQV*	76836	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) *WQF = 1/43,200 * [0.2* (Item 2 + Item 3) * Item4]*	6.567	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.

DMA ID No.	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
[1]Total impervious area requiring treatment																					
[2] Impervious area untreated by Site Design Measures (ft^2) *Item 1 – Form 3-4 Item 11*	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) *Enter area weighted composite runoff coefficient representing entire DMA*																					
[5] Water Quality Volume (WQV) (ft^3) *WQV = 1/12 * [Item 2 + Item 3) *Item 4] * Unit WQV*	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) *WQF = 1/43,200 * [0.2* (Item 2 + Item 3) * Item4]*	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.

Form 3-6 Volume-Based Infiltrating Bioretention Measures				
[1]**DMA ID No.** *If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.*	**1-N**			
[2]WQV (ft^3) *Item 5 in Form 3-5* *If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.*	76836			
[3]Surface Loading Rate *Maximum 5.0 in/hr*	5			
[4]BMP Surface Area (ft^2) *Top of BMP*	86786			
[5]Infiltration rate of underlying soils (in/hr)	0.05			
[6]Maximum ponding depth (ft) *BMP specific, see BMP design details*	1.00			
[7]Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 5 * 48 hrs) or Item 6*	0.2	-	-	-
[8]Infiltrating surface area, SA_{BMP} (ft^2) *Bottom of BMP*	86786			
[9]Planting media depth, d_{media} (ft)	1.5			
[10]Planting media porosity	0.35			
[11]Gravel depth, d_{media} (ft) *Only included in certain BMP types*	1.00			
[12]Gravel porosity	0.35			
[13]Retention Volume (ft^3) $V_{retention}$ *= Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5* (Item 5 / 12))]*	93,837.4	-	-	-
[14]Untreated Volume (ft^3) $V_{untreated}$ *= Item 2 – Item 13* *If greater than zero, adjust BMP sizing variables and re-compute retention volume*	0	0	0	0
[15]Treated Flow Rate (ft^3/s) $Q_{treated}$ *= 1/43,200*(Item 3 * Item 4)*	10.0447	0.0000	0.0000	0.0000
[16]Total Treated Flow Rate for Project (ft^3/s) Q_{total} *= Sum of Item 15 for all DMAs*	10.0447			
[17]**Is WQV for each DMA treated on-site?** *Check Yes if Item 14 equals 0 for all DMAs*	**Yes**	**X**	**No**	

Form 3-7 Flow-Through Planters, Tree Box and Media Filters				
[1]**DMA ID No.** *If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.*				
[2]WQF (ft3/s) *Item 6 in Form 3-5* *If combining multiple DMAs from Form 3-5, enter the sum of their respective WQFs.*				
[3]Surface Loading Rate *Maximum 5.0 in/hr*				
[4]Maximum Ponding Depth (ft) *BMP Specific, see BMP design details*				
[5]Soil/Media Surface Area (ft^2) *Top of BMP*				
[6]Soil/Media Depth (ft)				
[7]Soil/Media porosity				
[8]Gravel Depth (ft)				
[9]Gravel porosity				
[10]Detention Volume (ft^3) *Vd = Item 5 * [Item4 + (Item 6 * Item 7) + (Item 8 * Item 9) + (3* (Item 3 / 12))]*	0	0	0	0
[11]Manufacturers' specified flow rate for proprietary devices (ft3/s) (attach a copy of the product specifications)				
[12] Treated Flow Rate (ft^3/s) $Q_{treated}$ *= 1/43,200*(Item 3 * Item 5) or Item 11*	0.0000	0.0000	0.0000	0.0000
[13]Untreated Flow Rate (ft^3/s) $Q_{untreated}$ *= Item 2 - Item 12* *If greater than zero, adjust BMP sizing variables and re-compute treated flow*	0.0000	0.0000	0.0000	0.0000
[14]Total Treated Flow Rate for Project (ft^3/s) Q_{total} *= Sum of Item 12 for all DMAs*				
[15] Is WQF for each DMA treated on-site? *Check Yes if Item 13 equals 0 for all DMAs.*	**Yes**		**No**	

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 *Not to exceed 100 ft*	100				100			
[2]Slope of overland flow path (ft/ft)	0.0013				0.0050			
[3]Manning's roughness coefficient for overland flow surface *See Table 5-5 of the Placer County SWMM*	0.2400				0.1100			
[4]Overland flow response time (min) (0.355*(Item 1*Item 3)$^{0.6}$)/(Item 2$^{0.3}$)	17.41	0.00	0.00	0.00	7.33	0.00	0.00	0.00
[5]Hydrologic Soil Group *Refer to Section 3.1.1. or NRCS Web Soil Survey*	D				D			
[6]Current Land Cover Type(s) *Select from categories shown in Table 5-3 of the SWMM*	Small Grain				Comm. Landsc.			
[7]Pervious Area Condition: *Based on the extent of vegetated cover Good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating*	Good				Good			
[8]Infiltration Rate (in/hr) *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)*	0.05				0.05			
[9]Length of collector flow (ft)	1,800				2,800			
[10]Cross-sectional area of collector flow facility (ft^2)	1				1.00			
[11]Wetted perimeter of collector flow facility (ft)	2				2.00			
[12]Manning's roughness of collector flow facility	0.150				0.015			
[13]Slope of collector flow facility (ft/ft)	0.0013				0.0025			
[14]Channel flow velocity (ft/sec) *V = (1.49 / Item 12) * (Item 10/Item 11) ^0.67 * (Item 13) ^0.5*	0.23	0.00	0.00	0.00	3.13	0.00	0.00	0.00
[15]Collector flow facility response time (min) *T_c = Item 9 /(Item 14 * 60)*	131.29	0.00	0.00	0.00	14.92	0.00	0.00	0.00
[16]Total runoff response time or T_t (min) *T_t = Item 4 + Item 15*	148.71	0.00	0.00	0.00	22.25	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			
	9	10	11	12	9	10	11	12
[1] Drainage Area (ft^2) *Sum of all outlet level DMAs should equal total project area.*								
[2] Impervious Area (ft^2) *Sum of all outlet level DMAs should equal total project impervious area.*								
[3] Rainfall depth for 2yr storm with duration equal to response time (in) *See Placer County SWMM Table 5-A-1 for elevation of site and duration equal to response time*								
[4] Unit peak runoff (cfs/acre) *q = 60/Form 4-1 Item 16 * Item 3*	-	-	-	-	-	-	-	-
[5] Infiltration factor (cfs/acre) *F_i = Form 4-1 Item 8 * (1 + 1 /(1.3 + 0.0005 * Form 3-1 Item 3))*	-	-	-	-	-	-	-	-
[6] Peak runoff from DMAs (cfs) *Q_p = Item 1 * Item 4 – Item 5 * (Item 1 - Item 2)*	-	-	-	-	-	-	-	-

Form 4-3 Detention Volumes for Hydromodification Management

	Post-construction DMAs to Project Outlet			
	1	**2**	**3**	**4**
[1] Land cover and hydrologic condition *See NRCD TR-55 Manual Table 2-2 for types*	Industrial			
[2] Hydrologic Soil Group *Refer to Section 3.1.1. or NRCS Web Soil Survey*	D	-	-	-
[3] Drainage Area (A) (ft^2)	1,630,471	-	-	-
[4] Curve Number (CN) *Use Items 1 and 2 to select curve number from NRCS TR-55 Manual Table 2-2*	93			
[5] Post-development soil storage capacity, S (in): *S = (1000 / Item 4) – 10*	0.8	#DIV/0!	#DIV/0!	#DIV/0!
[6] Precipitation for 2-yr, 24-hr storm (in) *See Placer County SWMM Table 5-A-1 for elevation of site and 24-hr duration depths*	1.90			
[7] Post-developed runoff volume for 2-yr – 24-hour storm, V_{runoff} (ft^3): *V_{runoff} = Item 3 * (1 / 12) * [(Item 6 – 0.2 * Item 5)^2 / (Item 6 + 0.8 * Item 5)]*	166,199	#DIV/0!	#DIV/0!	#DIV/0!
[8] Attenuation Factor, $q_{out/in}$ (ratio of target outflow rate to peak inflow rate): *$q_{out/in}$ = Form 4-2 Item 6 Pre-Construction / Form 4-2 Item 6 Post-Construction*	0.23	#DIV/0!	#DIV/0!	#DIV/0!
[9] Equalization Factor, Vs/Vr (ratio of storage capacity to runoff volume) *Vs/Vr obtained using Item 8 and nomograph in Figure 6-1 of NRCS TR-55 Manual for Rainfall Type IA*	0.35			
[10] Runoff detention capacity to achieve hydromodification management criteria (ft^3) *$D_{hydromod}$ = Item 7 * Item 9*	58170	#DIV/0!	#DIV/0!	#DIV/0!
[11] Site Design Measure (SDM) Volume (ft^3): *Sum of Item 10 in Form 3-4 for all SDMs in this DMA.*				
[12] Bioretention Volume (ft3): *Sum of Item 13 in Form 3-6 for all bioretention measures in this DMA.*	93837			
[13] Flow-Through Detention Volume (ft3): *Sum of Item 10 in Form 3-7 for all flow-through facilities in this DMA.*	0			
[14] Supplemental Detention Volume (ft^3):	0			
[15] Combined Detention Volume in this DMA (ft^3): *Sum of Items 11 through 14*	93,837	-	-	-
[16] Is detention capacity to achieve hydromodification management criteria achieved at all project outlets? *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.*	**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 *See NRCD TR-55 Manual Table 2-2 for types*				
[2] Hydrologic Soil Group *Refer to Section 3.1.1. or NRCS Web Soil Survey*	-	-	-	-
[3] Drainage Area (A) (ft^2)	-	-	-	-
[4] Curve Number (CN) *Use Items 1 and 2 to select curve number from NRCS TR-55 Manual Table 2-2*				
[5] Post-development soil storage capacity, S (in): *S = (1000 / Item 4) – 10*	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
[6] Precipitation for 2-yr, 24-hr storm (in) *See Placer County SWMM Table 5-A-1 for elevation of site and 24-hr duration depths*				
[7] Post-developed runoff volume for 2-yr – 24-hour storm, V_{runoff} (ft^3): *V_{runoff} = Item 3 * (1 / 12) * [(Item 6 – 0.2 * Item 5)^2 / (Item 6 + 0.8 * Item 5)]*	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
[8] Attenuation Factor, $q_{out/in}$ (ratio of target outflow rate to peak inflow rate): *$q_{out/in}$ = Form 4-2 Item 6 Pre-Construction / Form 4-2 Item 6 Post-Construction*	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
[9] Equalization Factor, Vs/Vr (ratio of storage capacity to runoff volume) *Vs/Vr obtained using Item 8 and nomograph in Figure 6-1 of NRCS TR-55 Manual for Rainfall Type IA*				
[10] Runoff detention capacity to achieve hydromodification management criteria (ft^3) *$D_{hydromod}$ = Item 7 * Item 9*	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
[11] Site Design Measure (SDM) Volume (ft^3): *Sum of Item 10 in Form 3-4 for all SDMs in this DMA.*				
[12] Bioretention Volume (ft3): *Sum of Item 12 in Form 3-8 for all bioretention measures in this DMA.*				
[13] Flow-Through Detention Volume (ft3): *Sum of Item 10 in Form 3-7 for all flow-through facilities in this DMA.*				
[14] Supplemental Detention Volume (ft^3):				
[15] Combined Detention Volume in this DMA (ft^3): *Sum of Items 11 through 14*	-	-	-	-

Form 4-3 Detention Volumes for Hydromodification Management

	Post-construction DMAs to Project Outlet			
	9	**10**	**11**	**12**
[1] Land cover and hydrologic condition *See NRCD TR-55 Manual Table 2-2 for types*				
[2] Hydrologic Soil Group *Refer to Section 3.1.1. or NRCS Web Soil Survey*	-	-	-	-
[3] Drainage Area (A) (ft^2)	-	-	-	-
[4] Curve Number (CN) *Use Items 1 and 2 to select curve number from NRCS TR-55 Manual Table 2-2*				
[5] Post-development soil storage capacity, S (in): *S = (1000 / Item 4) – 10*	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
[6] Precipitation for 2-yr, 24-hr storm (in) *See Placer County SWMM Table 5-A-1 for elevation of site and 24-hr duration depths*				
[7] Post-developed runoff volume for 2-yr – 24-hour storm, V_{runoff} (ft^3): *V_{runoff} = Item 3 * (1 / 12) * [(Item 6 – 0.2 * Item 5)^2 / (Item 6 + 0.8 * Item 5)]*	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
[8] Attenuation Factor, $q_{out/in}$ (ratio of target outflow rate to peak inflow rate): *$q_{out/in}$ = Form 4-2 Item 6 Pre-Construction / Form 4-2 Item 6 Post-Construction*	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
[9] Equalization Factor, Vs/Vr (ratio of storage capacity to runoff volume) *Vs/Vr obtained using Item 8 and nomograph in Figure 6-1 of NRCS TR-55 Manual for Rainfall Type IA*				
[10] Runoff detention capacity to achieve hydromodification management criteria (ft^3) *$D_{hydromod}$ = Item 7 * Item 9*	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
[11] Site Design Measure (SDM) Volume (ft^3): *Sum of Item 10 in Form 3-4 for all SDMs in this DMA.*				
[12] Bioretention Volume (ft3): *Sum of Item 12 in Form 3-8 for all bioretention measures in this DMA.*				
[13] Flow-Through Detention Volume (ft3): *Sum of Item 10 in Form 3-7 for all flow-through facilities in this DMA.*				
[14] Supplemental Detention Volume (ft^3):				
[15] Combined Detention Volume in this DMA (ft^3): *Sum of Items 11 through 14*	-	-	-	-

Form 5-1 BMP Inspection and Maintenance		
BMP	Inspection Point and Frequency	Maintenance Activity Required

Form 5-1 BMP Inspection and Maintenance		
BMP	**Inspection Point and Frequency**	**Maintenance Activity Required**

Form 5-1 BMP Inspection and Maintenance

BMP	Inspection Point and Frequency	Maintenance Activity Required

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	
	Rain Barrels and Cisterns	
Stormwater Treatment and Baseline Hydromodification Measures	Bioretention with Infiltration	
	Flow-Through Planters, Tree Box Filters and Media Filters	
Hydromodification Management Measures	Supplemental Detention	

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	
	Rain Barrels and Cisterns	
Stormwater Treatment and Baseline Hydromodification Measures	Bioretention with Infiltration	
	Flow-Through Planters, Tree Box Filters and Media Filters	
Hydromodification Management Measures	Supplemental Detention	

Post-Construction
Storm Water Quality Plan

For:

Roseville Industrial Park
SOUTH AREA - OUTFALLS 1A/1B/1C

PL21-0193

Specify Lot Numbers if site is a portion of a Land Division (Subdivision or Parcel Map)

Prepared for:

Panattoni Development Company, Inc.
Insert Title
Panattoni Development Company, Inc.
8775 Folsom Boulevard, Suite 200
Sacramento, CA 95826
(916) 379-1106

Prepared by:

Laugenour and Meikle Civil Engineers
608 Court Street
Woodland, CA, 95695
(530) 662-1755

Preparation Date:_____December 6, 2022_____

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:	6832 Phillip Road, APN 017-101-008	
Owner Name:	Panattoni Development Company, Inc.	
Title	Insert Title	
Company	Panattoni Development Company, Inc.	
Address	8775 Folsom Boulevard, Suite 200	
City, State, Zip Code	Sacramento, CA 95826	
Email	Abbie Wertheim: AWertheim@panattoni.com	
Telephone #	(916) 379-1106	
Signature	Date	
Engineer:*	Brian Delemos	PE Stamp* (Required for all Regulated Projects)
Title	P.E, 66421	
Company	Laugenour and Meikle Civil Engineers	
Address	608 Court Street	
City, State, Zip Code	Woodland, CA, 95695	
Email	bdelemos@lmce.net	
Telephone #	(530) 662-1755	
Signature		
Brief Description of Project: (Attach additional sheets as necessary)	Industrial warehouses	

* 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.	X
[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.	X
[11]Enter total new and/or replaced impervious surface (ft^2)	

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: *Take GPS measurement at approximate center of site*	[1] Latitude	[2] Longitude	[3] Elevation (ft. above sea level)	[4] 85th Percentile, 24 Hour Design Storm Depth (in):
	38.80233	121.39682	85	0.9

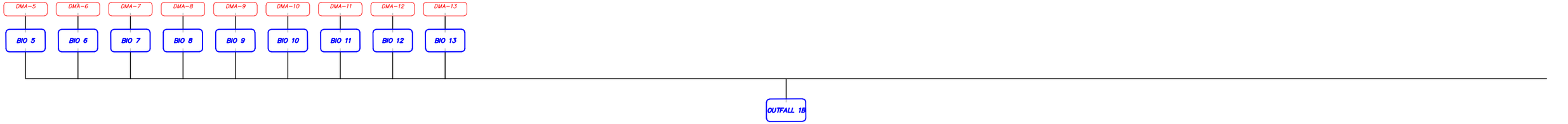
[5] Receiving waters *Name of stream, lake or other downstream waterbody to which the site runoff eventually drains*	Pleasant Grove Creek, Pleasant Grove Creek Bypass Channel
[6] 303(d) listed pollutants of concern *Refer to State Water Resources Control Board website* www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired	Bifenthrin; cypermethrin; pyrethroids
[7] Is Project going to be phased? *If yes, ensure that the SWQP evaluates each phase with distinct DMAs, requiring LID BMPs to address runoff at time of completion*	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

See attached

ROSEVILLE INDUSTRIAL PARK SOUTH



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	
Concentrate development on portions of the site with less permeable soils and preserve areas that can promote infiltration.	X	
Limit overall impervious coverage of the site with paving and roofs.	X	
Set back development from creeks, wetlands, and riparian habitats.	X	
Preserve significant trees.	X	Relatively few trees onsite, but some will be preserved.
Conform site layout along natural landforms.	X	
Avoid excessive grading and disturbance of vegetation and soils.	X	
Replicate the site's natural drainage patterns.	X	
Detain and retain runoff throughout the site.	X	

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	☐	☐	To be determined during building-permit phase
Interior floor drains	☐	☐	To be determined during building-permit phase
Parking/storage areas and maintenance	☐	☐	To be determined during building-permit phase
Indoor and structural pest control	☐	☐	To be determined during building-permit phase
Pools, spas, ponds, decorative fountains, and other water features	☐	☐	To be determined during building-permit phase
Landscape/outdoor pesticide use	☐	☐	To be determined during building-permit phase
Restaurants, grocery stores, and other food service operations	☐	☐	To be determined during building-permit phase
Refuse areas	☐	☐	To be determined during building-permit phase
Industrial Processes	☐	☐	To be determined during building-permit phase
Outdoor storage of equipment or materials	☐	☐	To be determined during building-permit phase
Vehicle and equipment cleaning	☐	☐	To be determined during building-permit phase
Vehicle and equipment repair and maintenance	☐	☐	To be determined during building-permit phase
Fuel dispensing areas	☐	☐	To be determined during building-permit phase
Loading docks	☐	☐	To be determined during building-permit phase
Fire sprinkler test water	☐	☐	To be determined during building-permit phase
Drain or wash water from boiler drain lines, condensate drain lines, rooftop equipment, drainage sumps, and other sources	☐	☐	To be determined during building-permit phase
Unauthorized non-storm water discharges	☐	☐	To be determined during building-permit phase
Building and grounds maintenance	☐	☐	To be determined during building-permit phase

The source control measures identified in this table shall be designed consistent with recommendations from the CASQA Stormwater BMP Handbook for New Development and Redevelopment[1], 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)**		**Runoff Reduction (ft^3)**		**Runoff Reduction (ft^3)**		**Runoff Reduction (ft^3)**
[2] Adjacent/On-Site Stream Setbacks and Buffers	A_{imp} (ft^2)	*impervious drainage area*		0		0		0		0
	V_{85} (in)	*runoff volume from 85th percentile, 24-hour storm*	0.8		0.8		0.8		0.8	
[3] Soil Quality Improvement and Maintenance	A_{pond} (ft^2)	*ponding area*		0		0		0		0
	D_{pond} (ft)	*ponding depth*								
	A_{sa} (ft^2)	*soil amendment area*								
	D_{sa} (ft)	*depth of amended soil*								
	n	*porosity of amended soil*								
[4] Tree Planting and Preservation	n_e	*number of new evergreen trees*		0		0		0		0
	n_d	*number of new deciduous trees*								
	A_{tc} (ft^2)	*canopy area of existing trees to remain on the property*								
	V_{85} (in)	*runoff volume from 85th percentile, 24-hour storm*	0.8		0.8		0.8		0.8	
[5] Rooftop and Impervious Area Disconnection	A_{imp} (ft^2)	*impervious drainage area*		0		0		0		0
	V_{85} (in)	*runoff volume from 85th percentile, 24-hour storm*	0.8		0.8		0.8		0.8	
[6] Porous Pavement	A_{res} (ft^2)	*area of gravel storage layer*		0		0		0		0
	D_{res} (ft)	*depth of gravel storage layer*								
	n_{agg}	*porosity of aggregate*								
	C	*efficiency factor*								
[7] Vegetated Swales	A_{imp} (ft^2)	*impervious drainage area*		0		0		0		0
	V_{85} (in)	*runoff volume from 85th percentile, 24-hour storm*	0.8		0.8		0.8		0.8	
[8] Rain Barrels and Cisterns	N	*number of rain barrels and/or cisterns*		0		0		0		0
	V_a (ft^3)	*volume of each rain barrel and/or cistern*								
[9] Do all Site Design Measures meet the design requirements outlined in the Fact Sheets?					**Yes**	**N/A**	**No**			
[10] Total Volume Reduction (ft^3)			**0**		**0**		**0**		**0**	
[11] Effective Treated Impervious Area (ft^2)			**0**		**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	2,810,566	573,217	55,909	46,601	40,371	62,342	65,889	63,532	65,028	34,723	39,089	39,309	37,190	94,450	105,294	71,122	65,309	75,766	74,666	26,959	24,817	28,224
[2] Impervious area untreated by Site Design Measures (ft^2) *Item 1 – Form 3-4 Item 11*	2810566	573217	55909	46601	40371	62342	65889	63532	65028	34723	39089	39309	37190	94450	105294	71122	65309	75766	74666	26959	24817	28224
[3]Additional pervious area draining to BMP (ft^2)	147925	245664	18636	19972	33031	11002	11628	11212	11476	6128	6898	6937	6563	40479	45126	30481	11525	13371	13176	32950	30331	34495
[4] Composite DMA Runoff Coefficient (Rc) *Enter area weighted composite runoff coefficient representing entire DMA*	0.87	0.72	0.75	0.72	0.63	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.72	0.72	0.72	0.81	0.81	0.81	0.57	0.57	0.57
[5] Water Quality Volume (WQV) (ft^3) *WQV = 1/12 * [Item 2 + Item 3) *Item 4] * Unit WQV*	139419	31936	3028	2596	2505	3218	3401	3279	3357	1792	2018	2029	1920	5262	5866	3963	3371	3911	3854	1850	1703	1936
[6] Water Quality Flow (WQF) (cfs) *WQF = 1/43,200 * [0.2* (Item 2 + Item 3) * Item4]*	11.916	2.730	0.259	0.222	0.214	0.275	0.291	0.280	0.287	0.153	0.172	0.173	0.164	0.450	0.501	0.339	0.288	0.334	0.329	0.158	0.146	0.166

[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	19,001	3,532	8,154	16,368	10,786	5,639	4,928	11,786	14,266	8,852	20,443	25,745	10,721	17,405	17,107	17,216	21,542					
[2] Impervious area untreated by Site Design Measures (ft^2) *Item 1 – Form 3-4 Item 11*	19001	3532	8154	16368	10786	5639	4928	11786	14266	8852	20443	25745	10721	17405	17107	17216	21542	0	0	0	0	0
[3]Additional pervious area draining to BMP (ft^2)	2,111	392	906	1,819	1,198	627	548	1,310	1,585	984	2,271	2,861	1,191	1,934	1,901	1,913	2,394					
[4] Composite DMA Runoff Coefficient (Rc) *Enter area weighted composite runoff coefficient representing entire DMA*	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84					
[5] Water Quality Volume (WQV) (ft^3) *WQV = 1/12 * [Item 2 + Item 3) *Item 4] * Unit WQV*	961	179	412	828	545	285	249	596	721	447	1033	1302	542	880	865	870	1089	0	0	0	0	0
[6] Water Quality Flow (WQF) (cfs) *WQF = 1/43,200 * [0.2* (Item 2 + Item 3) * Item4]*	0.082	0.015	0.035	0.071	0.047	0.024	0.021	0.051	0.062	0.038	0.088	0.111	0.046	0.075	0.074	0.074	0.093	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.

Form 3-6 Volume-Based Infiltrating Bioretention Measures				
[1]**DMA ID No.** *If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.*	**1**	**2**	**3**	**4**
[2]WQV (ft^3) *Item 5 in Form 3-5* *If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.*	139419	31936	3028	2596
[3]Surface Loading Rate *Maximum 5.0 in/hr*	5	5	5	5
[4]BMP Surface Area (ft^2) *Top of BMP*	120110	64557	4688	3502
[5]Infiltration rate of underlying soils (in/hr)	0.05	0.05	0.05	0.05
[6]Maximum ponding depth (ft) *BMP specific, see BMP design details*	1.00	1.00	1.00	1.00
[7]Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 5 * 48 hrs) or Item 6*	0.2	0.2	0.2	0.2
[8]Infiltrating surface area, SA_{BMP} (ft^2) *Bottom of BMP*	104422	34717	2001	1482
[9]Planting media depth, d_{media} (ft)	1.5	1.5	1.5	1.5
[10]Planting media porosity	0.35	0.35	0.35	0.35
[11]Gravel depth, d_{media} (ft) *Only included in certain BMP types*	1.75	1.00	2.25	3.00
[12]Gravel porosity	0.35	0.35	0.35	0.35
[13]Retention Volume (ft^3) $V_{retention}$ *= Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5* (Item 5 / 12))]*	140,317.1	37,537.8	3,039.0	2,639.8
[14]Untreated Volume (ft^3) $V_{untreated}$ *= Item 2 – Item 13* *If greater than zero, adjust BMP sizing variables and re-compute retention volume*	0	0	0	0
[15]Treated Flow Rate (ft^3/s) $Q_{treated}$ *= 1/43,200*(Item 3 * Item 4)*	13.9016	7.4719	0.5426	0.4053
[16]Total Treated Flow Rate for Project (ft^3/s) Q_{total} *= Sum of Item 15 for all DMAs*	35.8028			
[17]**Is WQV for each DMA treated on-site?** *Check Yes if Item 14 equals 0 for all DMAs*	**Yes**	**X**	**No**	

Form 3-6 Volume-Based Infiltrating Bioretention Measures				
[1]**DMA ID No.** *If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.*	**5**	**6**	**7**	**8**
[2]WQV (ft^3) *Item 5 in Form 3-5* *If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.*	2505	3218	3401	3279
[3]Surface Loading Rate *Maximum 5.0 in/hr*	5	5	5	5
[4]BMP Surface Area (ft^2) *Top of BMP*	4298	5552	5552	5552
[5]Infiltration rate of underlying soils (in/hr)	0.05	0.05	0.05	0.05
[6]Maximum ponding depth (ft) *BMP specific, see BMP design details*	1.00	1.00	1.00	1.00
[7]Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 5 * 48 hrs) or Item 6*	0.2	0.2	0.2	0.2
[8]Infiltrating surface area, SA_{BMP} (ft^2) *Bottom of BMP*	2663	3447	3447	3447
[9]Planting media depth, d_{media} (ft)	1.5	1.5	1.5	1.5
[10]Planting media porosity	0.35	0.35	0.35	0.35
[11]Gravel depth, d_{media} (ft) *Only included in certain BMP types*	1.00	1.00	1.00	1.00
[12]Gravel porosity	0.35	0.35	0.35	0.35
[13]Retention Volume (ft^3) $V_{retention}$ *= Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5* (Item 5 / 12))]*	2,879.4	3,727.1	3,727.1	3,727.1
[14]Untreated Volume (ft^3) $V_{untreated}$ *= Item 2 – Item 13* *If greater than zero, adjust BMP sizing variables and re-compute retention volume*	0	0	0	0
[15]Treated Flow Rate (ft^3/s) $Q_{treated}$ *= 1/43,200*(Item 3 * Item 4)*	0.4975	0.6426	0.6426	0.6426

Form 3-6 Volume-Based Infiltrating Bioretention Measures				
[1]**DMA ID No.** *If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.*	**9**	**10**	**11**	**12**
[2]WQV (ft^3) *Item 5 in Form 3-5* *If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.*	3357	1792	2018	2029
[3]Surface Loading Rate *Maximum 5.0 in/hr*	5	5	5	5
[4]BMP Surface Area (ft^2) *Top of BMP*	3083	4757	5552	5552
[5]Infiltration rate of underlying soils (in/hr)	0.05	0.05	0.05	0.05
[6]Maximum ponding depth (ft) *BMP specific, see BMP design details*	1.00	1.00	1.00	1.00
[7]Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 5 * 48 hrs) or Item 6*	0.2	0.2	0.2	0.2
[8]Infiltrating surface area, SA_{BMP} (ft^2) *Bottom of BMP*	1903	2950	3447	3447
[9]Planting media depth, d_{media} (ft)	1.5	1.5	1.5	1.5
[10]Planting media porosity	0.35	0.35	0.35	0.35
[11]Gravel depth, d_{media} (ft) *Only included in certain BMP types*	3.00	1.00	1.00	1.00
[12]Gravel porosity	0.35	0.35	0.35	0.35
[13]Retention Volume (ft^3) $V_{retention}$ *= Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5* (Item 5 / 12))]*	3,389.7	3,189.7	3,727.1	3,727.1
[14]Untreated Volume (ft^3) $V_{untreated}$ *= Item 2 – Item 13* *If greater than zero, adjust BMP sizing variables and re-compute retention volume*	0	0	0	0
[15]Treated Flow Rate (ft^3/s) $Q_{treated}$ *= 1/43,200*(Item 3 * Item 4)*	0.3568	0.5506	0.6426	0.6426

Form 3-6 Volume-Based Infiltrating Bioretention Measures				
[1]**DMA ID No.** *If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.*	**13**	**14**	**15**	**16**
[2]WQV (ft^3) *Item 5 in Form 3-5* *If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.*	1920	5262	5866	3963
[3]Surface Loading Rate *Maximum 5.0 in/hr*	5	5	5	5
[4]BMP Surface Area (ft^2) *Top of BMP*	5552	7911	10288	8116
[5]Infiltration rate of underlying soils (in/hr)	0.05	0.05	0.05	0.05
[6]Maximum ponding depth (ft) *BMP specific, see BMP design details*	1.00	1.00	1.00	1.00
[7]Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 5 * 48 hrs) or Item 6*	0.2	0.2	0.2	0.2
[8]Infiltrating surface area, SA_{BMP} (ft^2) *Bottom of BMP*	3447	3051	3986	3132
[9]Planting media depth, d_{media} (ft)	1.5	1.5	1.5	1.5
[10]Planting media porosity	0.35	0.35	0.35	0.35
[11]Gravel depth, d_{media} (ft) *Only included in certain BMP types*	1.00	3.00	2.25	1.75
[12]Gravel porosity	0.35	0.35	0.35	0.35
[13]Retention Volume (ft^3) $V_{retention}$ *= Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5* (Item 5 / 12))]*	3,727.1	5,434.6	6,053.7	4,208.6
[14]Untreated Volume (ft^3) $V_{untreated}$ *= Item 2 – Item 13* *If greater than zero, adjust BMP sizing variables and re-compute retention volume*	0	0	0	0
[15]Treated Flow Rate (ft^3/s) $Q_{treated}$ *= 1/43,200*(Item 3 * Item 4)*	0.6426	0.9156	1.1907	0.9394

Form 3-6 Volume-Based Infiltrating Bioretention Measures				
[1]**DMA ID No.** *If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.*	**17**	**18**	**19**	**20**
[2]WQV (ft^3) *Item 5 in Form 3-5* *If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.*	3371	3911	3854	1850
[3]Surface Loading Rate *Maximum 5.0 in/hr*	5	5	5	5
[4]BMP Surface Area (ft^2) *Top of BMP*	5665	5665	5609	8757
[5]Infiltration rate of underlying soils (in/hr)	0.05	0.05	0.05	0.05
[6]Maximum ponding depth (ft) *BMP specific, see BMP design details*	1.00	1.00	1.00	1.00
[7]Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 5 * 48 hrs) or Item 6*	0.2	0.2	0.2	0.2
[8]Infiltrating surface area, SA_{BMP} (ft^2) *Bottom of BMP*	3517	3517	3482	3384
[9]Planting media depth, d_{media} (ft)	1.5	1.5	1.5	1.5
[10]Planting media porosity	0.35	0.35	0.35	0.35
[11]Gravel depth, d_{media} (ft) *Only included in certain BMP types*	1.00	1.25	1.25	1.00
[12]Gravel porosity	0.35	0.35	0.35	0.35
[13]Retention Volume (ft^3) $V_{retention}$ *= Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5* (Item 5 / 12))]*	3,802.8	4,110.5	4,069.6	3,659.0
[14]Untreated Volume (ft^3) $V_{untreated}$ *= Item 2 – Item 13* *If greater than zero, adjust BMP sizing variables and re-compute retention volume*	0	0	0	0
[15]Treated Flow Rate (ft^3/s) $Q_{treated}$ *= 1/43,200*(Item 3 * Item 4)*	0.6557	0.6557	0.6492	1.0135

Form 3-6 Volume-Based Infiltrating Bioretention Measures				
[1]**DMA ID No.** *If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.*	**21**	**22**	**23P**	**24P**
[2]WQV (ft^3) *Item 5 in Form 3-5* *If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.*	1703	1936	961	179
[3]Surface Loading Rate *Maximum 5.0 in/hr*	5	5	5	5
[4]BMP Surface Area (ft^2) *Top of BMP*	9042	9976	908	211
[5]Infiltration rate of underlying soils (in/hr)	0.05	0.05	0.05	0.05
[6]Maximum ponding depth (ft) *BMP specific, see BMP design details*	1.00	1.00	1.00	1.00
[7]Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 5 * 48 hrs) or Item 6*	0.2	0.2	0.2	0.2
[8]Infiltrating surface area, SA_{BMP} (ft^2) *Bottom of BMP*	3496	3864	540	91
[9]Planting media depth, d_{media} (ft)	1.5	1.5	1.50	1.50
[10]Planting media porosity	0.35	0.35	0.35	0.35
[11]Gravel depth, d_{media} (ft) *Only included in certain BMP types*	1.00	1.00	3.00	3.75
[12]Gravel porosity	0.35	0.35	0.35	0.35
[13]Retention Volume (ft^3) $V_{retention}$ *= Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5* (Item 5 / 12))]*	3,780.1	4,178.0	961.9	186.0
[14]Untreated Volume (ft^3) $V_{untreated}$ *= Item 2 – Item 13* *If greater than zero, adjust BMP sizing variables and re-compute retention volume*	0	0	0	0
[15]Treated Flow Rate (ft^3/s) $Q_{treated}$ *= 1/43,200*(Item 3 * Item 4)*	1.0465	1.1546	0.1051	0.0244

Form 3-6 Volume-Based Infiltrating Bioretention Measures				
[1]**DMA ID No.** *If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.*	**25P**	**26P**	**27P**	**28P**
[2]WQV (ft^3) *Item 5 in Form 3-5* *If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.*	412	828	545	285
[3]Surface Loading Rate *Maximum 5.0 in/hr*	5	5	5	5
[4]BMP Surface Area (ft^2) *Top of BMP*	443	753	598	366
[5]Infiltration rate of underlying soils (in/hr)	0.05	0.05	0.05	0.05
[6]Maximum ponding depth (ft) *BMP specific, see BMP design details*	1.00	1.00	1.00	1.00
[7]Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 5 * 48 hrs) or Item 6*	0.2	0.2	0.2	0.2
[8]Infiltrating surface area, SA_{BMP} (ft^2) *Bottom of BMP*	241	441	341	191
[9]Planting media depth, d_{media} (ft)	1.50	1.50	1.50	1.50
[10]Planting media porosity	0.35	0.35	0.35	0.35
[11]Gravel depth, d_{media} (ft) *Only included in certain BMP types*	3.00	3.50	2.50	2.25
[12]Gravel porosity	0.35	0.35	0.35	0.35
[13]Retention Volume (ft^3) $V_{retention}$ *= Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5* (Item 5 / 12))]*	429.3	862.7	547.7	290.1
[14]Untreated Volume (ft^3) $V_{untreated}$ *= Item 2 – Item 13* *If greater than zero, adjust BMP sizing variables and re-compute retention volume*	0	0	0	0
[15]Treated Flow Rate (ft^3/s) $Q_{treated}$ *= 1/43,200*(Item 3 * Item 4)*	0.0513	0.0872	0.0692	0.0424

Form 3-6 Volume-Based Infiltrating Bioretention Measures				
[1]**DMA ID No.** *If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.*	**29P**	**30P**	**31P**	**32P**
[2]WQV (ft^3) *Item 5 in Form 3-5* *If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.*	249	596	721	447
[3]Surface Loading Rate *Maximum 5.0 in/hr*	5	5	5	5
[4]BMP Surface Area (ft^2) *Top of BMP*	288	599	443	443
[5]Infiltration rate of underlying soils (in/hr)	0.05	0.05	0.05	0.05
[6]Maximum ponding depth (ft) *BMP specific, see BMP design details*	1.00	1.00	1.00	1.00
[7]Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 5 * 48 hrs) or Item 6*	0.2	0.2	0.2	0.2
[8]Infiltrating surface area, SA_{BMP} (ft^2) *Bottom of BMP*	141	341	240	240
[9]Planting media depth, d_{media} (ft)	1.50	1.50	1.50	1.50
[10]Planting media porosity	0.35	0.35	0.35	0.35
[11]Gravel depth, d_{media} (ft) *Only included in certain BMP types*	3.00	3.00	6.50	3.75
[12]Gravel porosity	0.35	0.35	0.35	0.35
[13]Retention Volume (ft^3) $V_{retention}$ *= Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5* (Item 5 / 12))]*	251.2	607.4	721.5	490.5
[14]Untreated Volume (ft^3) $V_{untreated}$ *= Item 2 – Item 13* *If greater than zero, adjust BMP sizing variables and re-compute retention volume*	0	0	0	0
[15]Treated Flow Rate (ft^3/s) $Q_{treated}$ *= 1/43,200*(Item 3 * Item 4)*	0.0333	0.0693	0.0513	0.0513

Form 3-6 Volume-Based Infiltrating Bioretention Measures				
[1]**DMA ID No.** *If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.*	**33P**	**34P**	**35P**	**36P**
[2]WQV (ft^3) *Item 5 in Form 3-5* *If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.*	1033	1302	542	880
[3]Surface Loading Rate *Maximum 5.0 in/hr*	5	5	5	5
[4]BMP Surface Area (ft^2) *Top of BMP*	831	970	474	753
[5]Infiltration rate of underlying soils (in/hr)	0.05	0.05	0.05	0.05
[6]Maximum ponding depth (ft) *BMP specific, see BMP design details*	1.00	1.00	1.00	1.00
[7]Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 5 * 48 hrs) or Item 6*	0.2	0.2	0.2	0.2
[8]Infiltrating surface area, SA_{BMP} (ft^2) *Bottom of BMP*	490	580	260	440
[9]Planting media depth, d_{media} (ft)	1.50	1.50	1.50	1.50
[10]Planting media porosity	0.35	0.35	0.35	0.35
[11]Gravel depth, d_{media} (ft) *Only included in certain BMP types*	4.00	4.50	4.00	3.75
[12]Gravel porosity	0.35	0.35	0.35	0.35
[13]Retention Volume (ft^3) $V_{retention}$ *= Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5* (Item 5 / 12))]*	1,044.3	1,337.6	554.1	899.3
[14]Untreated Volume (ft^3) $V_{untreated}$ *= Item 2 – Item 13* *If greater than zero, adjust BMP sizing variables and re-compute retention volume*	0	0	0	0
[15]Treated Flow Rate (ft^3/s) $Q_{treated}$ *= 1/43,200*(Item 3 * Item 4)*	0.0962	0.1123	0.0549	0.0872

Form 3-6 Volume-Based Infiltrating Bioretention Measures				
[1]**DMA ID No.** *If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.*	**37P**	**38P**	**39P**	
[2]WQV (ft^3) *Item 5 in Form 3-5* *If combining multiple DMAs from Form 3-5, enter the sum of their respective WQVs.*	865	870	1089	
[3]Surface Loading Rate *Maximum 5.0 in/hr*	5	5	5	
[4]BMP Surface Area (ft^2) *Top of BMP*	753	753	908	
[5]Infiltration rate of underlying soils (in/hr)	0.05	0.05	0.05	
[6]Maximum ponding depth (ft) *BMP specific, see BMP design details*	1.00	1.00	1.00	
[7]Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 5 * 48 hrs) or Item 6*	0.2	0.2	0.2	-
[8]Infiltrating surface area, SA_{BMP} (ft^2) *Bottom of BMP*	440	440	540	
[9]Planting media depth, d_{media} (ft)	1.50	1.50	1.50	
[10]Planting media porosity	0.35	0.35	0.35	
[11]Gravel depth, d_{media} (ft) *Only included in certain BMP types*	3.75	3.75	3.75	
[12]Gravel porosity	0.35	0.35	0.35	
[13]Retention Volume (ft^3) $V_{retention}$ *= Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (1.5* (Item 5 / 12))]*	899.3	899.3	1,103.6	-
[14]Untreated Volume (ft^3) $V_{untreated}$ *= Item 2 – Item 13* *If greater than zero, adjust BMP sizing variables and re-compute retention volume*	0	0	0	0
[15]Treated Flow Rate (ft^3/s) $Q_{treated}$ *= 1/43,200*(Item 3 * Item 4)*	0.0872	0.0872	0.1051	0.0000

Form 3-7 Flow-Through Planters, Tree Box and Media Filters				
[1]**DMA ID No.** *If combining multiple DMAs from Form 3-5, enter a new unique DMA ID No.*				
[2]WQF (ft3/s) *Item 6 in Form 3-5* *If combining multiple DMAs from Form 3-5, enter the sum of their respective WQFs.*				
[3]Surface Loading Rate *Maximum 5.0 in/hr*				
[4]Maximum Ponding Depth (ft) *BMP Specific, see BMP design details*				
[5]Soil/Media Surface Area (ft^2) *Top of BMP*				
[6]Soil/Media Depth (ft)				
[7]Soil/Media porosity				
[8]Gravel Depth (ft)				
[9]Gravel porosity				
[10]Detention Volume (ft^3) *Vd = Item 5 * [Item4 + (Item 6 * Item 7) + (Item 8 * Item 9) + (3* (Item 3 / 12))]*	0	0	0	0
[11]Manufacturers' specified flow rate for proprietary devices (ft3/s) (attach a copy of the product specifications)				
[12] Treated Flow Rate (ft^3/s) $Q_{treated}$ *= 1/43,200*(Item 3 * Item 5) or Item 11*	0.0000	0.0000	0.0000	0.0000
[13]Untreated Flow Rate (ft^3/s) $Q_{untreated}$ *= Item 2 - Item 12* *If greater than zero, adjust BMP sizing variables and re-compute treated flow*	0.0000	0.0000	0.0000	0.0000
[14]Total Treated Flow Rate for Project (ft^3/s) Q_{total} *= Sum of Item 12 for all DMAs*				
[15] Is WQF for each DMA treated on-site? *Check Yes if Item 13 equals 0 for all DMAs.*	**Yes**		**No**	

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 *Not to exceed 100 ft*	100				100			
[2]Slope of overland flow path (ft/ft)	0.0013				0.0050			
[3]Manning's roughness coefficient for overland flow surface *See Table 5-5 of the Placer County SWMM*	0.2400				0.1100			
[4]Overland flow response time (min) (0.355*(Item 1*Item 3)$^{0.6}$)/(Item 2$^{0.3}$)	17.41	0.00	0.00	0.00	7.33	0.00	0.00	0.00
[5]Hydrologic Soil Group *Refer to Section 3.1.1. or NRCS Web Soil Survey*	D				D			
[6]Current Land Cover Type(s) *Select from categories shown in Table 5-3 of the SWMM*	Small Grain				Comm. Landsc.			
[7]Pervious Area Condition: *Based on the extent of vegetated cover Good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating*	Good				Good			
[8]Infiltration Rate (in/hr) *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)*	0.05				0.05			
[9]Length of collector flow (ft)	3,100				4,600			
[10]Cross-sectional area of collector flow facility (ft^2)	1				7.00			
[11]Wetted perimeter of collector flow facility (ft)	2				9.40			
[12]Manning's roughness of collector flow facility	0.150				0.015			
[13]Slope of collector flow facility (ft/ft)	0.0013				0.0025			
[14]Channel flow velocity (ft/sec) *V = (1.49 / Item 12) * (Item 10/Item 11)^0.67 * (Item 13)^0.5*	0.23	0.00	0.00	0.00	4.08	0.00	0.00	0.00
[15]Collector flow facility response time (min) *T_c = Item 9 /(Item 14 * 60)*	226.12	0.00	0.00	0.00	18.79	0.00	0.00	0.00
[16]Total runoff response time or T_t (min) *T_t = Item 4 + Item 15*	243.53	0.00	0.00	0.00	26.12	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) *Sum of all outlet level DMAs should equal total project area.*	5,565,705				5,565,705			
[2] Impervious Area (ft^2) *Sum of all outlet level DMAs should equal total project impervious area.*	38,500				4,733,864			
[3] Rainfall depth for 2yr storm with duration equal to response time (in) *See Placer County SWMM Table 5-A-1 for elevation of site and duration equal to response time*	0.92				0.32			
[4] Unit peak runoff (cfs/acre) *q = 60/Form 4-1 Item 16 * Item 3*	0.23	-	-	-	0.73	-	-	-
[5] Infiltration factor (cfs/acre) *F_i = Form 4-1 Item 8 * (1 + 1 /(1.3 + 0.0005 * Form 3-1 Item 3))*	0.09	-	-	-	0.09	-	-	-
[6] Peak runoff from DMAs (cfs) *Q_p = Item 1 * Item 4 – Item 5 * (Item 1 - Item 2)*	17.88	-	-	-	93.01	-	-	-
[7] Total Pre-Project Peak Runof (ft^3/s) *Q_{total} = Sum of Item 6 for all Pre-construction DMAs*	17.88							
[8] Is the total post-project peak runoff equal to or less than the total pre-project peak runoff? *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.*	**NO - Modify flow control at BMP outlets to reduce discharge rate to be equal to, or less than, Item 7 above.**							

Form 4-3 Detention Volumes for Hydromodification Management

	Post-construction DMAs to Project Outlet			
	1	**2**	**3**	**4**
[1] Land cover and hydrologic condition *See NRCD TR-55 Manual Table 2-2 for types*	Industrial			
[2] Hydrologic Soil Group *Refer to Section 3.1.1. or NRCS Web Soil Survey*	D	-	-	-
[3] Drainage Area (A) (ft^2)	5,565,705	-	-	-
[4] Curve Number (CN) *Use Items 1 and 2 to select curve number from NRCS TR-55 Manual Table 2-2*	93			
[5] Post-development soil storage capacity, S (in): *S = (1000 / Item 4) – 10*	0.8	#DIV/0!	#DIV/0!	#DIV/0!
[6] Precipitation for 2-yr, 24-hr storm (in) *See Placer County SWMM Table 5-A-1 for elevation of site and 24-hr duration depths*	1.90			
[7] Post-developed runoff volume for 2-yr – 24-hour storm, V_{runoff} (ft^3): *V_{runoff} = Item 3 * (1 / 12) * [(Item 6 – 0.2 * Item 5)^2 / (Item 6 + 0.8 * Item 5)]*	567,329	#DIV/0!	#DIV/0!	#DIV/0!
[8] Attenuation Factor, $q_{out/in}$ (ratio of target outflow rate to peak inflow rate): *$q_{out/in}$ = Form 4-2 Item 6 Pre-Construction / Form 4-2 Item 6 Post-Construction*	0.19	#DIV/0!	#DIV/0!	#DIV/0!
[9] Equalization Factor, Vs/Vr (ratio of storage capacity to runoff volume) *Vs/Vr obtained using Item 8 and nomograph in Figure 6-1 of NRCS TR-55 Manual for Rainfall Type IA*	0.39			
[10] Runoff detention capacity to achieve hydromodification management criteria (ft^3) *$D_{hydromod}$ = Item 7 * Item 9*	221258	#DIV/0!	#DIV/0!	#DIV/0!
[11] Site Design Measure (SDM) Volume (ft^3): *Sum of Item 10 in Form 3-4 for all SDMs in this DMA.*	0			
[12] Bioretention Volume (ft3): *Sum of Item 13 in Form 3-6 for all bioretention measures in this DMA.*	266737			
[13] Flow-Through Detention Volume (ft3): *Sum of Item 10 in Form 3-7 for all flow-through facilities in this DMA.*	0			
[14] Supplemental Detention Volume (ft^3):	0			
[15] Combined Detention Volume in this DMA (ft^3): *Sum of Items 11 through 14*	266,737	-	-	-
[16] Is detention capacity to achieve hydromodification management criteria achieved at all project outlets? *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.*	**Yes**	**X**	**No**	

Form 5-1 BMP Inspection and Maintenance

BMP	Inspection Point and Frequency	Maintenance Activity Required

Form 5-1 BMP Inspection and Maintenance		
BMP	Inspection Point and Frequency	Maintenance Activity Required

Form 5-1 BMP Inspection and Maintenance

BMP	Inspection Point and Frequency	Maintenance Activity Required

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	
	Rain Barrels and Cisterns	
Stormwater Treatment and Baseline Hydromodification Measures	Bioretention with Infiltration	
	Flow-Through Planters, Tree Box Filters and Media Filters	
Hydromodification Management Measures	Supplemental Detention	

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	
	Rain Barrels and Cisterns	
Stormwater Treatment and Baseline Hydromodification Measures	Bioretention with Infiltration	
	Flow-Through Planters, Tree Box Filters and Media Filters	
Hydromodification Management Measures	Supplemental Detention	

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	
	Rain Barrels and Cisterns	
Stormwater Treatment and Baseline Hydromodification Measures	Bioretention with Infiltration	
	Flow-Through Planters, Tree Box Filters and Media Filters	
Hydromodification Management Measures	Supplemental Detention	

ATTACHMENT 4
STORMWATER CONTROL PLAN HYDROMODIFICATION SHED EXHIBITS

LEGEND

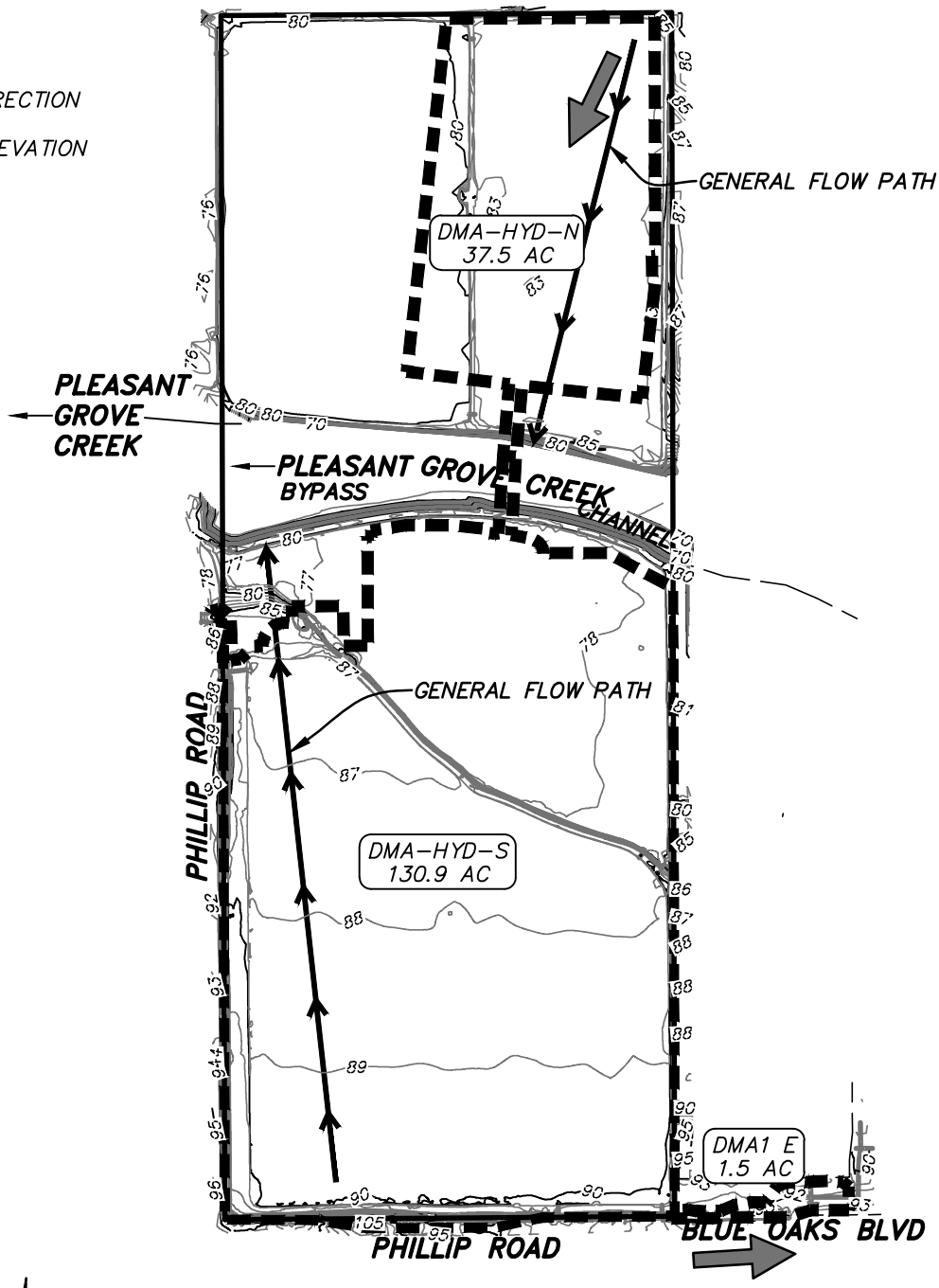
ID AREA — DMA DETAILS

DMA BOUNDARY

GENERAL RUNOFF DIRECTION

83 — EXISTING GROUND ELEVATION CONTOUR (NAVD88)

GENERAL FLOW PATH



REGISTERED PROFESSIONAL ENGINEER
BRIAN R. DELEMOS
No. 66421
CIVIL
STATE OF CALIFORNIA

0 400 800 1600

SCALE: 1"=800'

EXHIBIT 1
HYDROMODIFICATION SHEDS EXISTING CONDITIONS
FOR
ROSEVILLE INDUSTRIAL PARK
PHILLIP ROAD,
CITY OF ROSEVILLE, CALIFORNIA
SHEET 1 OF 1 DECEMBER 7, 2022

LM LAUGENOUR AND MEIKLE
CIVIL ENGINEERING · LAND SURVEYING · PLANNING
608 COURT STREET, WOODLAND, CALIFORNIA 95695 · PHONE: (530) 662–1755
P.O. BOX 828, WOODLAND, CALIFORNIA 95776 · FAX: (530) 662–4602

X:\Land Projects\4042-60-2\dwg\4042-60-2_Exhibit Hydromod - Existing

DMA–HYD–S
5,565,727 SF
127.772 AC

PROPOSED BUILDING "A"

PROPOSED BUILDING "B"

PROPOSED BUILDING "C"

PROPOSED BUILDING "D"

PROPOSED BUILDING "E"

PROPOSED BUILDING "F"

PROPOSED BUILDING "G"

PROPOSED BUILDING "H"

DMA–HYD–S

OUTFALL 1A*

OUTFALL 1B*

OUTFALL 1C*

OUTFALL 3

PLEASANT GROVE CREEK

GENERAL FLOW PATH

*OUTFALLS 1A, 1B, AND 1C ARE TREATED AS ONE CONCEPTUAL OUTFALL FOR HYDROMODIFICATION ANALYSIS

LEGEND

DMA	DRAINAGE MANAGEMENT AREA
DMA 1 1,000 SF	WATER QUALITY AREA NAME AND SQUARE FOOTAGE
	WATER QUALITY AREA BOUNDARY
	DIRECTION OF FLOW
	GENERAL FLOW PATH

0 50 100 200
SCALE: 1"=100'

ROSEVILLE INDUSTRIAL PARK

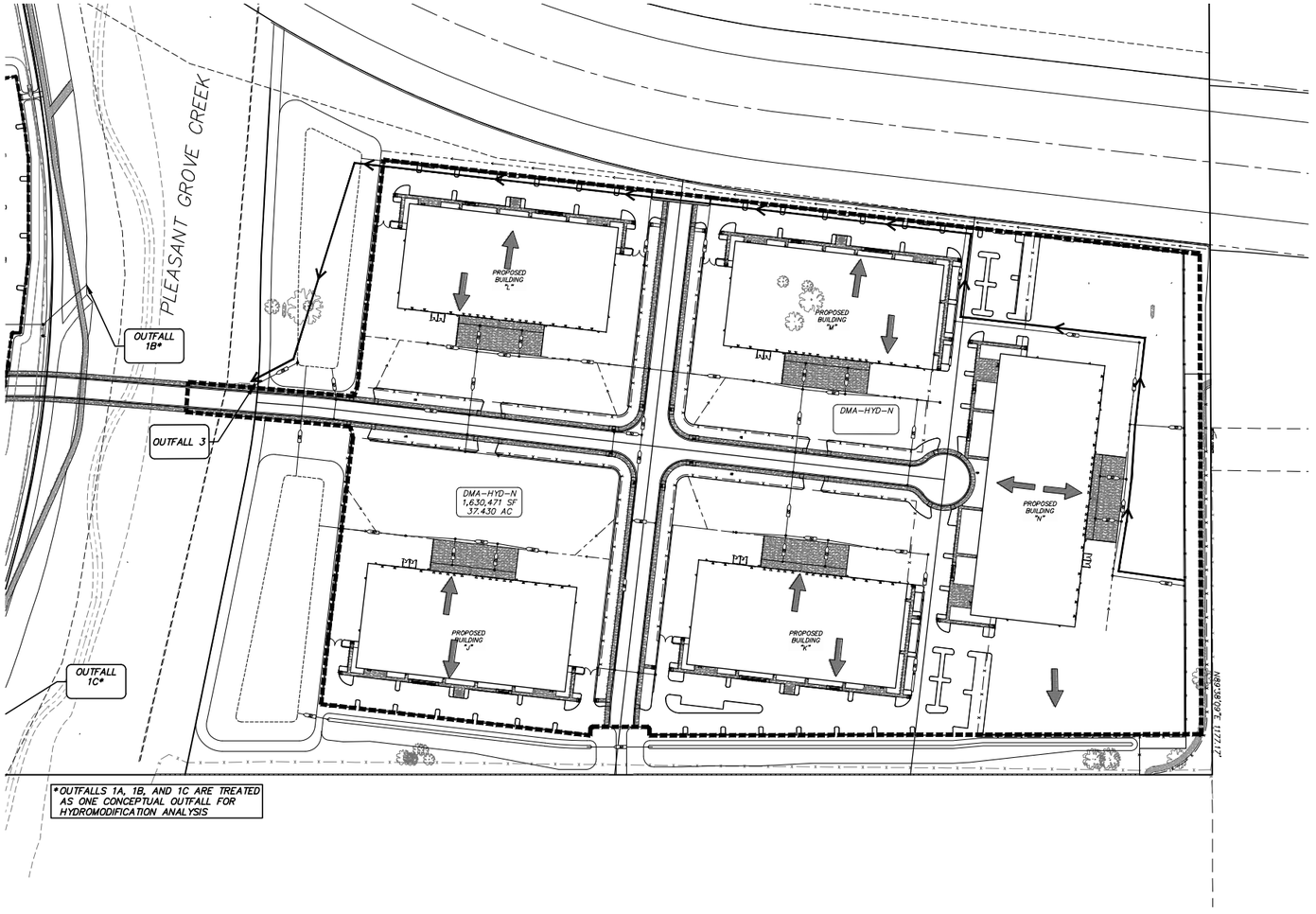
PHILLIP ROAD
ROSEVILLE, CA 95747

JOB NO. 4512490v2
SCALE AS NOTED
DATE
CHECKED BY PF
DRAWN BY PJ

C

HYDROMODIFICATION SHEDS FOR PROPOSED CONDITIONS
EXHIBIT 2

SHEET 1 OF 2



LEGEND

DMA	DRAINAGE MANAGEMENT AREA
DMA 1 1,000 SF	WATER QUALITY AREA NAME AND SQUARE FOOTAGE
	WATER QUALITY AREA BOUNDARY
	DIRECTION OF FLOW
	GENERAL FLOW PATH

0 50 100 200
SCALE: 1"=100'

ROSEVILLE INDUSTRIAL PARK

PHILLIP ROAD
ROSEVILLE, CA 95747

JOB NO. 161240X2
SCALE AS NOTED
DATE
CHECKED BY PF
DRAWN BY PJ

C

HYDROMODIFICATION SHEDS FOR PROPOSED CONDITIONS

EXHIBIT 2

SHEET 2 OF 2