Appendix G:
Hydrology Report

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Balance Hydrologics

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January 18, 2022

Mr. Joe Livaich
Vice President
Buzz Oates Construction, Inc.
555 Capitol Mall, Suite 900
Sacramento, California 95814

RE: Updated Stormwater Planning – Hydrologic and Water Quality Modeling for the Suisun Logistics Center, Suisun City, Solano County, California

Dear Mr. Livaich,

This letter summarizes the results of the updated hydrologic modeling, developed by Balance Hydrologics, intended to demonstrate compliance with the hydromodification and peak flow management requirements as spelled out in the Regional Water Quality Control Board Order R2-2015-0049 and Fairfield-Suisun Urban Runoff Management Program (FSURMP) Stormwater C.3 Guidebook as it pertains to the improvement plans for the Suisun Logistics Center in Suisun City, Solano County, California. Additionally, water quality modeling was completed to confirm that the design features are appropriately sized, confirming the best management practices (BMP) approach as requested by Coastland Engineers in comments dated November 22, 2021.

Hydrologic Modeling Approach

The basis of the updated hydrologic analysis was the U.S. Army Corps of Engineers Hydrologic System (HEC-HMS) hydrologic model as outlined in detail in the draft Stormwater Control Plan (SWCP) submitted on July 29, 2021.The model was updated to reflect the revised improvement plans prepared by Robert A Karn and Associates (RAK) updated January 13, 2022, also attached for reference as an appendix below.

<u>Model Updates</u>

The Project is divided into four drainage management areas (DMAs, not including the off-site "Run-on" areas), see **Figure 1**. Each DMA has been designed to drain into a bioretention basin. From there the treated runoff is conveyed off-site using underground storm drain pipes to the existing west or east ditch south of the Project. A comparison between the stormwater C3 plan set dated June 30, 201 and updated stormwater C3 plan set received January 2, 2022 reveals that DMA A thru C, Bio A thru C, and untreated areas remain the same as outlined in the draft SWCP. It is assumed all model inputs, analysis, and assumptions presented in the draft SWCP are relevant for the above areas. Updates to DMA D, Bio D, and self-treating areas, Land-5 (the perimeter ditch) are outlined below and are the focus of this update.

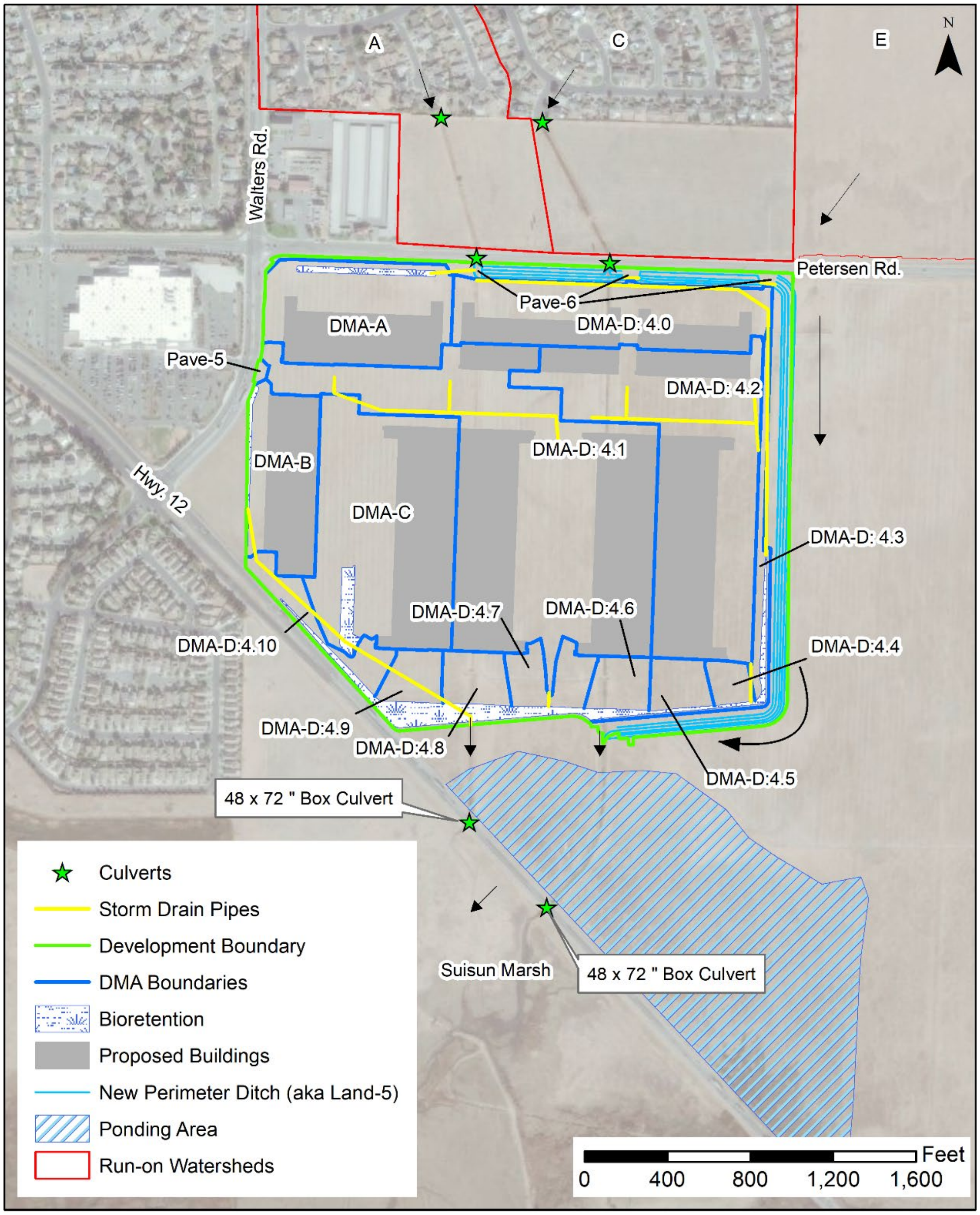


Figure 1. Post-Project Schematic, Suisun Logistics Center, Solano County, California

Model inputs for DMA-D and self-treating areas were revised to reflect the newest stormwater C3 plan set, and those inputs are summarized below in **Table 1** and **Table 2.**

Table 1. Post-Project: HEC-HMS model input updates

DMA	Landuse	Soils	Area *(ac)*	Initial Losses *(in)*	*weighted*	Constant Loss Rate *(in/hr)*	Impervious *(%)*	*weighted*
D	Developed	D	69.26	0	0.00	0.02	95	79.6
	Landscaped	D	10.54	0.3	0.04	0.02	10	1.3
	Bioretention	D	2.81	0.3	0.01	0.02	2	0.1
		Composite Total	**82.61**		**0.038**	**0.02**		**80.9**

Self-Treating	Landuse	Soils	Area *(ac)*	Initial Losses *(in)*	*weighted*	Constant Loss Rate *(in/hr)*	Impervious *(%)*	*weighted*
Land-5	Landscaped	D	9.36		0.3	0.02		1

Table 2. Post-Project: Snyder lag time calculation updates

DMA	Urbanization *(%)*	Area *(ac)*	Slope *(ft/ft)*	L *(hrs)*
D	73.5	82.61	0.006	0.45

Self-Treating	Urbanization *(%)*	Area *(ac)*	Slope *(ft/ft)*	L *(hrs)*
Land-5	0	9.36	0.001	0.77

Bioretention facility sizing is based on a sizing factor of 0.04 (4%), which allows treatment of a rainfall intensity of 0.2 inches/hour by allowing runoff to filter through the select biosoil mix at a rate of 5 inches/hour. Detailed sizing calculations for the Bio-D are shown in **Table 3**, the associated elevation-discharge relationship for Bio-D is shown in **Table 4**.

Table 3. Bio-D: Sizing calculation

DMA Name	DMA Area (square feet)	Post-project surface type	DMA Runoff factor	DMA Area x runoff factor	Facility Name: Bio-D		
Roof 4.0	180,230	Developed	1	180,230			
Pave 4.0	262,930	Developed	1	262,930			
Land 4.0	28,480	Landscaped	0.1	2,848			
Roof 4.1	692,650	Developed	1	692,650			
Pave 4.1	609,680	Developed	1	609,680			
Land 4.1	128,990	Landscaped	0.1	12,899			
Roof 4.2	438,090	Developed	1	438,090			
Pave 4.2	413,910	Developed	1	413,910			
Land 4.2	73,650	Landscaped	0.1	7,365			
Pave 4.3	62,460	Developed	1	62,460			
Land 4.3	42,530	Landscaped	0.1	4,253			
Pave 4.4	27,820	Developed	1	27,820			
Land 4.4	13,980	Landscaped	0.1	1,398			
Pave 4.5	45,350	Developed	1	45,350			
Land 4.5	22,730	Landscaped	0.1	2,273			
Pave 4.6	47,880	Developed	1	47,880			
Land 4.6	24,040	Landscaped	0.1	2,404			
Pave 4.7	69,540	Developed	1	69,540			
Land 4.7	34,890	Landscaped	0.1	3,489			
Pave 4.8	53,480	Developed	1	53,480			
Land 4.8	26,810	Landscaped	0.1	2,681	Sizing factor	Minimum Facility Size	Proposed Facility Size
Pave 4.9	45,600	Developed	1	45,600			
Land 4.9	22,900	Landscaped	0.1	2,290			
Pave 4.10	69,290	Developed	1	69,290			
Land 4.10	40,230	Landscaped	0.1	4,023			
Total				3,064,833	0.04	122,593	122,600

Table 4. Bio-D: Elevation-Storage Relationship

Bio-D					
Elev. *(ft)*	Area *(sq ft)*	Porosity	Storage *(cu ft)*	Outlet	Fill
6.7	122,600	0.4	0		Class 2 Permeable Base
7.0	122,600	0.4	14,712		Class 2 Permeable Base
7.2	122,600	0.4	24,520		Class 2 Permeable Base
7.7	122,600	0.4	49,040	Perforated Pipe (Min. discharge = 14.19 cfs)	Class 2 Permeable Base
8.2	122,600	0.4	73,560		Soil Mix
8.7	122,600	0.4	98,080		Soil Mix
9.2	122,600	0.4	122,600		Soil Mix
9.5	122,600	1	159,380		Open
9.7	122,600	1	183,900	150 'Spillway	Open
10.2	122,600	1	245,200	150' Spillway	Open
10.5	122,600	1	281,980	Top of Berm	Open

Hydrologic Modeling Results

The updated post-project scenario was compared to the pre-project scenario to evaluate three concurrent stormwater management objectives: runoff water quality, flow-duration control (hydromodification management), and peak flow control. These results are summarized in **Table 5** and **Table 6** below.

Table 5. HEC-HMS Peak Flow Summary

	2-yr	
	Pre-Project	Post-Project
West Ditch	88.9	18.7
East Ditch	187.2	222.4
Inflow to Hwy 12 Basin	263.4	241.2

	25-yr	
	Pre-Project	Post-Project
West Ditch	180.0	71.4
East Ditch	364.3	445.0
Inflow to Hwy 12 Basin	531.7	516.3

	100-yr	
	Pre-Project	Post-Project
West Ditch	224.3	111.6
East Ditch	450.2	554.3
Inflow to Hwy 12 Basin	660.2	660.7

Hydromodification Management. Peak flow from the site and upstream areas at Highway 12 for the 2-year, 24-hour storm under pre-project conditions is predicted to be 263.4 cfs. This is reduced to 241.2 cfs in the post-project case, due to the storage volume provided in the bioretention basins and new perimeter ditch.

Peak Flow Control (flood control). The HEC-HMS modeling predicts significant control of peak flow rates for the larger design storms as well. The combined peak flow rate at Highway 12 for the 25-year, 24-hour storm is predicted to decrease from 531.7 cfs to 516.3 cfs in post-project conditions. For the 100-year, 24-hour storm, the modeling predicts almost equivalent peak flow into the open space area upstream of Highway 12 from 660.2 cfs to 660.7 cfs in the post-project condition. However, when taking into account the timing of the various inflows to the area upstream of the highway, the peak volume into the basin is actually reduced in the 100-year post-project condition, and thus the peak water surface elevation (WSE) is reduced as discussed below. In all scenarios (including existing/pre-project conditions), runoff will pond north of the highway before flowing through the two existing culverts to Suisun Marsh. The predicted post-project flows through the culverts provide freeboard for highway 12 and the WSE does not come near overtopping the road. Further, the actual depth of ponded water upstream of Highway 12 is reduced in the post-project condition across all modeled flows. Therefore, the implementation of the project presents no downstream impacts and does not exceed the capacity of the existing system.

WSE at Highway 12. Predicted WSEs upstream of the highway are shown in **Table 6** and are visualized in a typical cross section in **Figure 3.**

Table 6. HEC-HMS Water surface elevation at Hwy 12

	2-yr	25-yr	100-yr
Pre-Project	9.39	10.58	11.05
Post-Project	9.36	10.54	11.00

Highway 12 roadway elevations range from 12.8 feet at the western culvert to 13.2 feet at the eastern culvert. The HEC-HMS modeling predicts reductions in WSEs at the highway for all modeled flows. The maximum WSE for the 25-year, 24-hour storm is predicted to decrease from 10.58 feet to 10.54 feet in post-project conditions. For the 100-year, 24-hour storm, the modeling predicts a reduction in maximum WSE from 11.05 feet to 11.00 feet in the post-project condition. While the 100-year peak flow rates are roughly equivalent for the pre- and post-project scenarios, the stored volumes to the ponded area north of the highway are reduced in the post-project condition. This indicates that the timing and duration of the peak flows of the post-project scenario are favorable in reducing WSEs at Highway 12. Ultimately, the post-project scenario demonstrates compliance with no adverse impacts to downstream infrastructure.

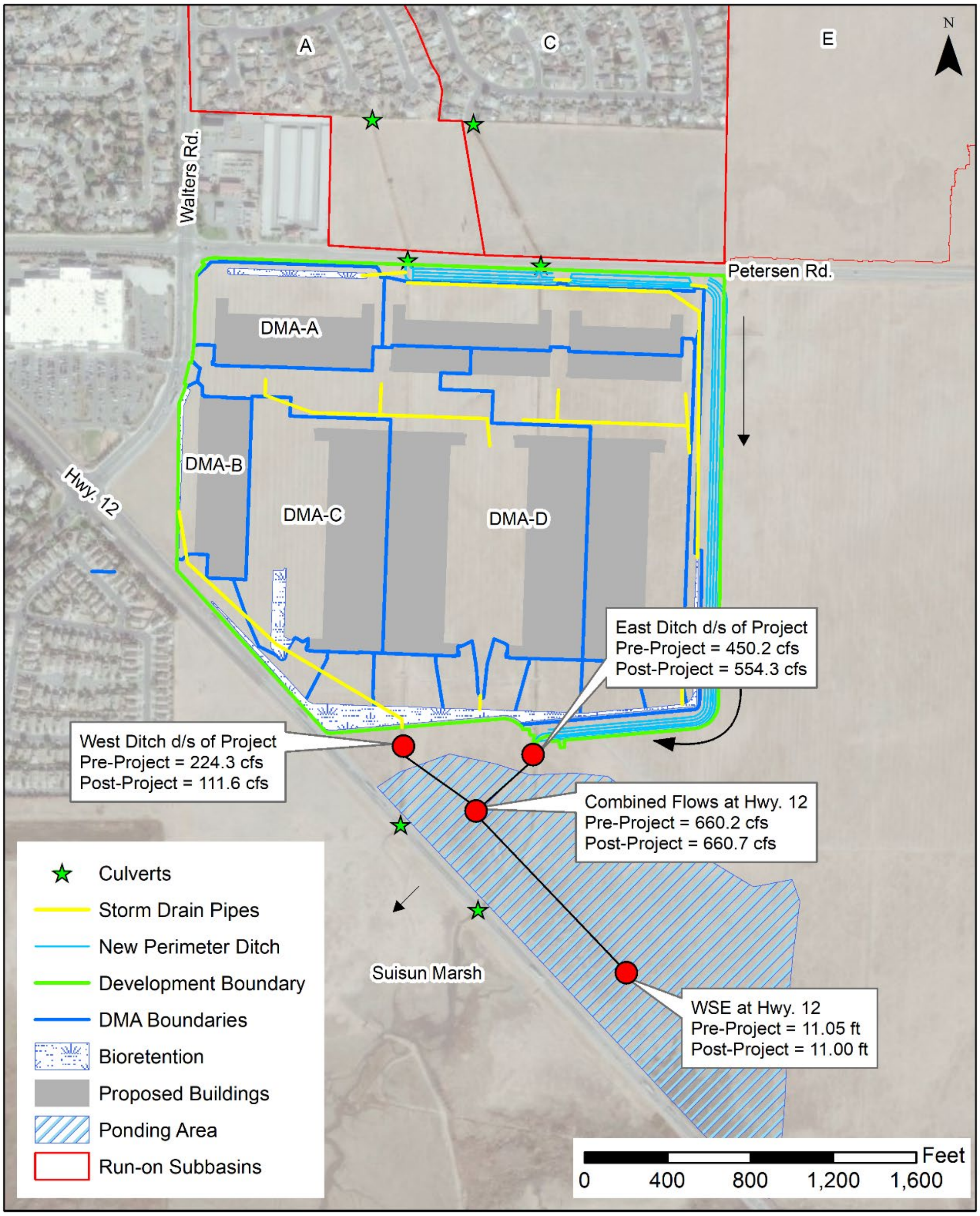


Figure 2. 100-year Model results, Suisun Logistics Center, Solano County, California.

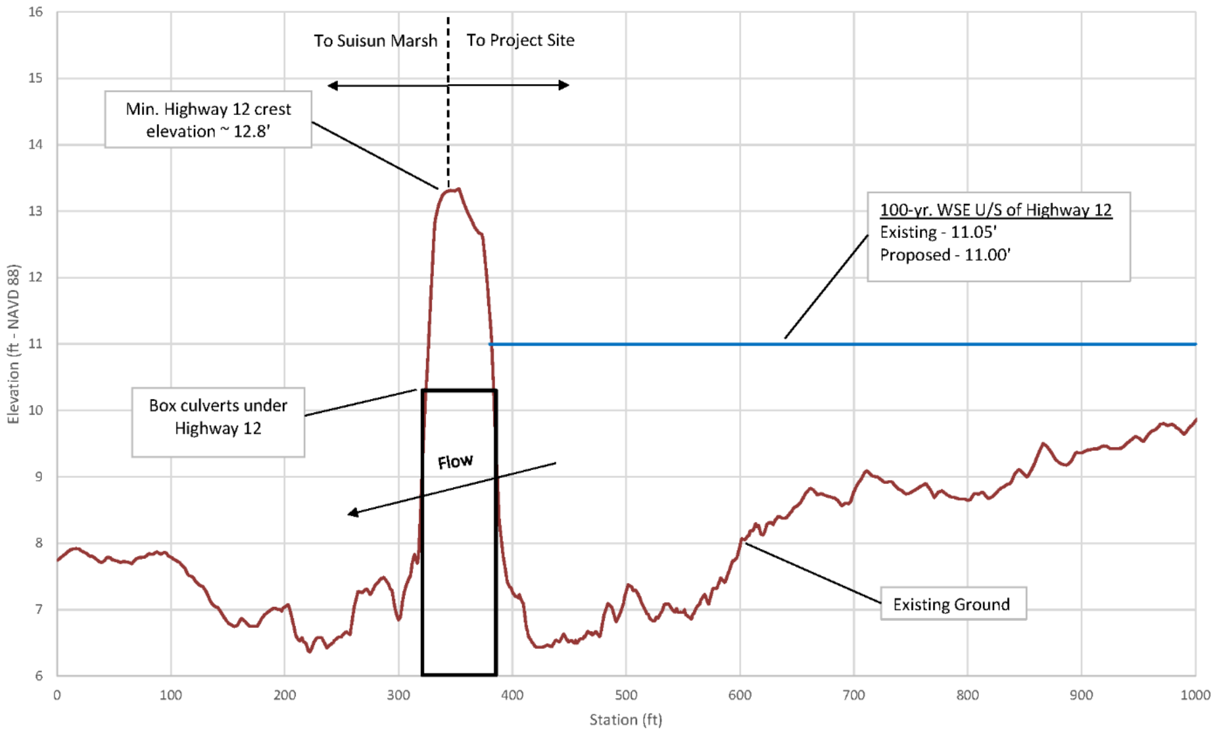


Figure 3. Highway 12 Cross section, Suisun Logistics Center, Solano County, California.

Water Quality Modeling Approach

Water quality requirements are satisfied by using bioretention areas as described in the Fairfield-Suisun Urban Runoff Management Program Stormwater C.3 Guidebook (2012), which stipulates water quality requirements are met if the site implements bioretention areas equivalent to approximately 4% of the effective impervious area. However, to address City comments, additional water quality modeling was completed to assess the adequacy of the design features. The additional water quality analysis was carried out using the Bay Area Hydrology Model (BAHM) created by Clear Creek Solutions. This model is a multi-decadal model which uses continuous hourly hydrologic data from water years 1960-2003 which captures both wet, dry, and average precipitation periods.

Though not specifically parameterized for Solano County, the long-period precipitation record for the Berkeley gage in Alameda County is representative of storm patterns that can be expected at the site. The model was run with a precipitation scaling factor of 0.833 to correct the long-term Berkeley rainfall of approximately 23 inches per year to the mean annual value of 19.5 inches at the site. Based on the typical bioretention facility detail, proposed drainage management and bioretention areas, modeled water quality results are detailed below in **Table 7**.

Table 7. Water quality summary for bioretention areas

Bioretention	Overflow Structure [1]	Underdrain Diameter [2] (in)	Water Quality Filtered (%)
A	4- 24" grate	6.0	98.2
B	5- 24" grate	6.0	98.7
C	8- 24" grate	6.0	93.3
D	150' spillway	18.0	97.6

Notes:

[1] *Overflow structures dictated by hydromodification runs in HEC-HMS*

[2] *Suggested underdrain diameters set using BAHM modeling*

Overflow structures were designed based on the hydromodification analysis conducted in HEC-HMS, and water quality filtration was optimized using different underdrain diameters in BAHM. The underdrain diameters cited in Table 7 represent the total underdrain capacity and could be divided between multiple underdrain outlets as needed. For the period of record, Bio-A, Bio-B, Bio-C were modeled with 6-inch diameter underdrains with predicted total filtration values of 98.2, 98.7 and 93.3 percent of total runoff. Bio-D, with a 150' overflow spillway and 18-inch diameter underdrain will be capable of filtering 97.6 percent of the long-term runoff volume. In all cases, the predicted treatment levels far exceed the 80 percent of annual runoff standard in the Statewide MS4 Stormwater Permit.

Bioretention Sizing: Hydraulic Approach

To further assess potential bioretention performance, specifically concerns that the narrowest portion of Bio-D at the southeast corner of Project might not have sufficient size to allow inflow to reach all portions of the basin, the US Army Corps of Engineers HEC-RAS hydraulic software was used to create a one-dimensional (1D) hydraulic analysis. For the purposes of this analysis, only the narrowest portion of Bio-D, located east of DMA-D: 4.6 was considered as it has the highest ratio of drainage area to potential basin flow width. The rational method (Q=CiA) was used to estimate inflow boundary conditions (BCs) including flows to Bio-D from DMA D subareas: 4.0, 4.2, 4.3, 4.4, and 4.5. These inflows are detailed below in **Table 8**.

Table 8. Water-quality design inflow estimates for the southeast portion of Bio-D

DMA	Type	Area *(sq ft)*	Area *(acres)*	Runoff Factors	Area x Runoff Factor
4.0	Roof	180,230	4.1	0.8	3.3
	Pave	262,930	6.0	0.9	5.4
	Land	28,480	0.7	0.1	0.1
				Composite Total (acres)	8.8
				Rain Intensity (in/hr)	0.2
				Estimated Flow (cfs)	1.76
4.2	Roof	438,090	10.1	0.8	8.0
	Pave	413,910	9.5	0.9	8.6
	Land	73,650	1.7	0.1	0.2
				Composite Total (acres)	16.8
				Rain Intensity (in/hr)	0.2
				Estimated Flow (cfs)	3.35
4.3	Pave	62,460	1.4	0.9	1.3
	Land	42,530	1.0	0.1	0.1
				Composite Total (acres)	1.4
				Rain Intensity (in/hr)	0.2
				Estimated Flow (cfs)	0.28
4.4	Pave	27,820	0.6	0.9	0.6
	Land	13,980	0.3	0.1	0.03
				Composite Total (acres)	0.6
				Rain Intensity (ft/sec)	0.2
				Estimated Flow (cfs)	0.12
4.5	Pave	45,350	1.0	0.9	0.9
	Land	22,730	0.5	0.1	0.1
				Composite Total (acres)	1.0
				Rain Intensity (ft/sec)	0.2
				Estimated Flow (cfs)	0.20

Notes:

The rational method (Q = CiA) was used to estimate inflow to Bio-D from each DMA-D subareas including DMA-D: 4.0, 4.2, 4.3, 4.4, 4.5

The southeast portion of Bio-D was represented in HEC-RAS using cross sections which assumed a flat basin bottom at an elevation of 9.2 feet (top of the soil mix), vertical side slopes, the top of the bioretention area at an elevation of 10.5 feet (top of the berm), and varies in width based on the newest stormwater C3 plan set and as described below in **Table 9**. As a conservative approach, accumulative flows were assumed, where inflows from DMA D: 4.0 enter at the northeast corner of Bio-D and are combined with other DMA D subareas inflows before spreading out into the wider portion of Bio-D in the southern portion of the Project.

Table 9. Southeast portion of Bio-D represented in HEC-RAS

Station	Cross Section Width *(ft)*	Downstream Reach Length *(ft)*	Flow Change *(cfs)*	Description
1392.6	7.8	150.0	1.8	Upstream. Northeast end of Bio-D. Inflow location for DMA D: 4.0
1242.6	13.8	150.0		
1092.6	19.7	220.7		
871.8	28.4	118.7	2.0	Upstream of bend. Inflow location for DMA D: 4.3
753.1	18.5	64.3		
688.8	37.5	52.9		At bend
635.9	16.7	27.0	5.4	Downstream of bend. Inflow location for DMA D: 4.2
608.9	15.3	156.0	5.5	Inflow location for DMA D: 4.4
452.9	13.4	160.9		At boundary between DMA D: 4.4, 4.5
292.0	16.1	149.0	5.7	Inflow location for DMA D: 4.5
143.1	17.7	143.1		At boundary between DMA D: 4.5, 4.6
0.0	36.9	0.0		Downstream. Where Bio-D widens at DMA D: 4.6

Notes:
Conservative approach assumes accumulative inflow and no percolation

Hydraulic Modeling Results

Two scenarios were modeled for two different downstream BCs. Scenario 1 assumes a downstream WSE of 9.45 feet in elevation which equates to a ponded depth of 3 inches above the bioretention soil mix. Scenario 2 assumes a downstream WSE of 9.7 feet, the elevation of the 150’ spillway.

Bioretention areas are designed to be equivalent to 4% of the effective impervious area and assumed to have no ponding with storms intensities of 0.2 inches/hour. These scenarios assume three to six inches of ponding and therefore are conservative approaches to assessing bioretention performance. The results of both scenarios are shown below in **Table 10**.

Table 10. HEC-RAS Results

Scenario 1

River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1392.6	1.8	9.2	9.96	9.96	0.00012	0.3	5.94	7.8	0.06
1242.6	1.8	9.2	9.95	9.95	0.00004	0.17	10.39	13.8	0.04
1092.6	1.8	9.2	9.95	9.95	0.00002	0.12	14.76	19.7	0.02
871.8	2	9.2	9.95	9.95	0.00001	0.09	21.2	28.4	0.02
753.1	2	9.2	9.94	9.94	0.00003	0.15	13.77	18.5	0.03
688.8	2	9.2	9.94	9.94	0.00001	0.07	27.9	37.5	0.01
635.9	5.4	9.2	9.94	9.94	0.00023	0.44	12.34	16.7	0.09
608.9	5.5	9.2	9.93	9.93	0.00030	0.49	11.18	15.3	0.1
452.9	5.5	9.2	9.87	9.87	0.00053	0.61	8.95	13.4	0.13
292	5.7	9.2	9.78	9.78	0.00062	0.61	9.3	16.1	0.14
143.1	5.7	9.2	9.65	9.66	0.00113	0.71	8.01	17.7	0.19
0	5.7	9.2	9.45	9.46	0.00179	0.62	9.23	36.9	0.22

Notes:

Pertinent elevations include downstream WSE = 9.45', Spillway = 9.7', Top of Berm = 10.5'

Scenario 2

River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1392.6	1.8	9.2	9.98	9.98	0.00011	0.29	6.11	7.8	0.06
1242.6	1.8	9.2	9.98	9.98	0.00003	0.17	10.7	13.8	0.03
1092.6	1.8	9.2	9.97	9.97	0.00002	0.12	15.21	19.7	0.02
871.8	2	9.2	9.97	9.97	0.00001	0.09	21.85	28.4	0.02
753.1	2	9.2	9.97	9.97	0.00002	0.14	14.2	18.5	0.03
688.8	2	9.2	9.97	9.97	0.00001	0.07	28.77	37.5	0.01
635.9	5.4	9.2	9.96	9.97	0.00021	0.42	12.73	16.7	0.09
608.9	5.5	9.2	9.96	9.96	0.00027	0.48	11.55	15.3	0.1
452.9	5.5	9.2	9.9	9.9	0.00046	0.59	9.37	13.4	0.12
292	5.7	9.2	9.82	9.83	0.00048	0.57	10.06	16.1	0.13
143.1	5.7	9.2	9.74	9.75	0.00063	0.6	9.58	17.7	0.14
0	5.7	9.2	9.7	9.7	0.00018	0.31	18.45	36.9	0.08

Notes:

Pertinent elevations include downstream WSE = 9.7', Spillway = 9.7', Top of Berm = 10.5'

Bio-D Sizing. The HEC-RAS modeling predicts Bio-D is sized appropriately including freeboard below the top of the berm. Scenario 1 with a downstream BC of 9.45 feet, shows Bio-D at the inflow point for DMA D: 4.0 with a WSE of 9.96 feet, which is 0.54 feet below the top of the berm. Scenario 2 with a downstream BC of 9.7 feet, shows Bio-D at the inflow point for DMA D: 4.0 with a WSE of 9.98 feet, which is 0.52 feet below the top of the berm. Ultimately, these scenarios demonstrate that the narrowest portion of Bio-D in the southeast corner of the Project is sized correctly to capture the expected inflows from the subareas of DMA-D.

Closing

The hydrologic model results outlined above demonstrates that the proposed project is in compliance with the hydromodification, and peak flow management requirements as spelled out in the Regional Water Quality Control Board Order R2-2015-0049 and Fairfield-Suisun Urban Runoff Management Program (FSURMP) Stormwater C.3 Guidebook. Additionally, the water quality model verifies design features to address City comments dated November 22, 2021. Lastly, the hydraulic model confirms that Bio-D, in particular the narrowest portion in the southeast corner of the Project, is appropriately sized for the expected inflows from the subareas of DMA-D. Therefore, based on the provided information, this updated letter report should be considered an addendum to the draft SWCP submitted on July 29, 2021, in tandem with the improvement plans developed by RAK.

Do not hesitate to contact me if you have questions or require additional technical information.

Sincerely,

BALANCE HYDROLOGICS, Inc.

Denise Tu, E.I.T.
Fluvial Geomorphologist/Engineer

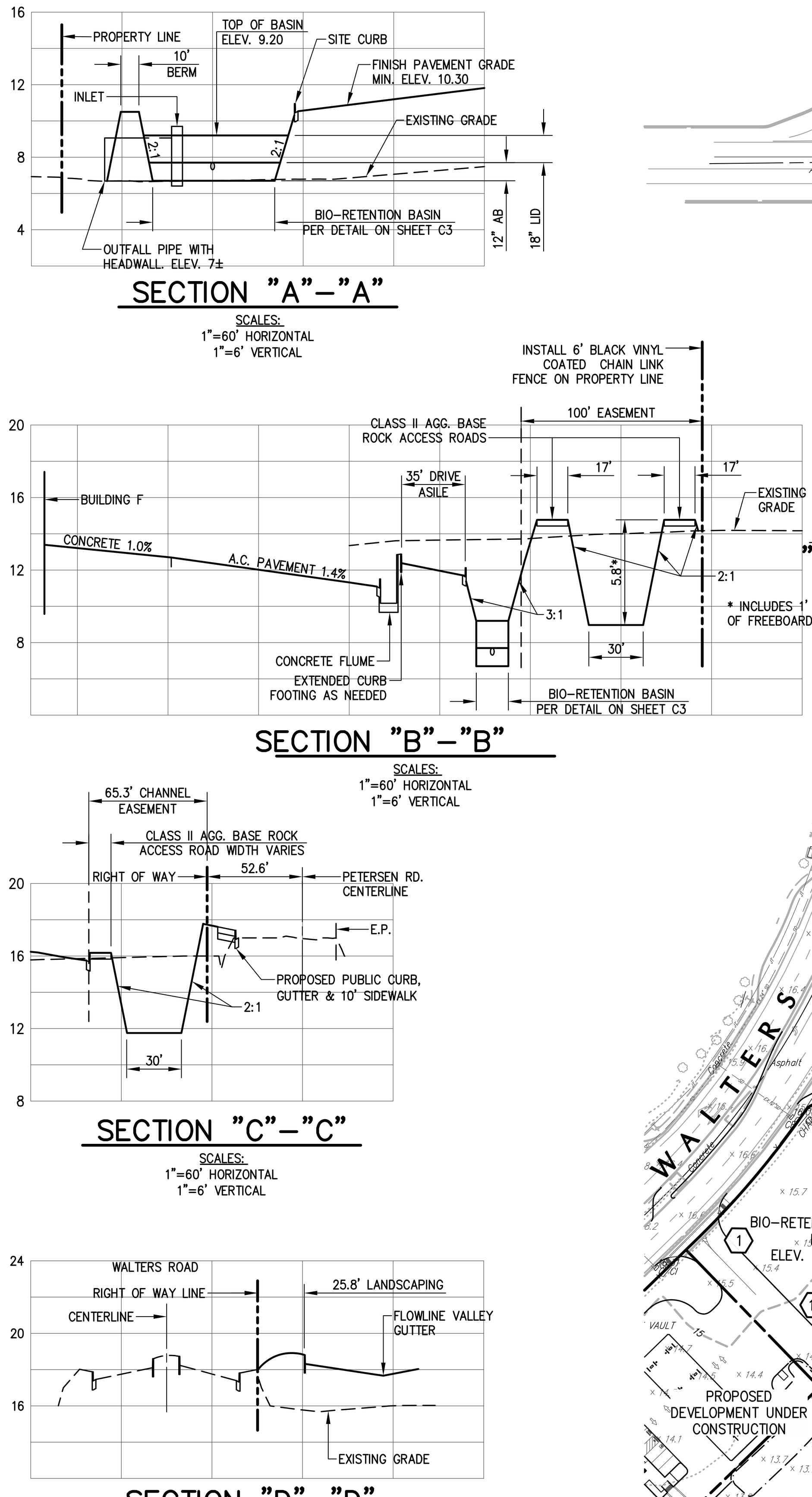
Ed Ballman, P.E., CFM
Principal Engineer

Enclosures: RAK Preliminary Stormwater Control Planset
HEC-HMS Model Output
BAHM Model Output

ATTACHMENTS

ATTACHMENT A

RAK Preliminary Stormwater Control Planset



SECTION "A"–"A"

SCALES:
1"=60' HORIZONTAL
1"=6' VERTICAL

SECTION "B"–"B"

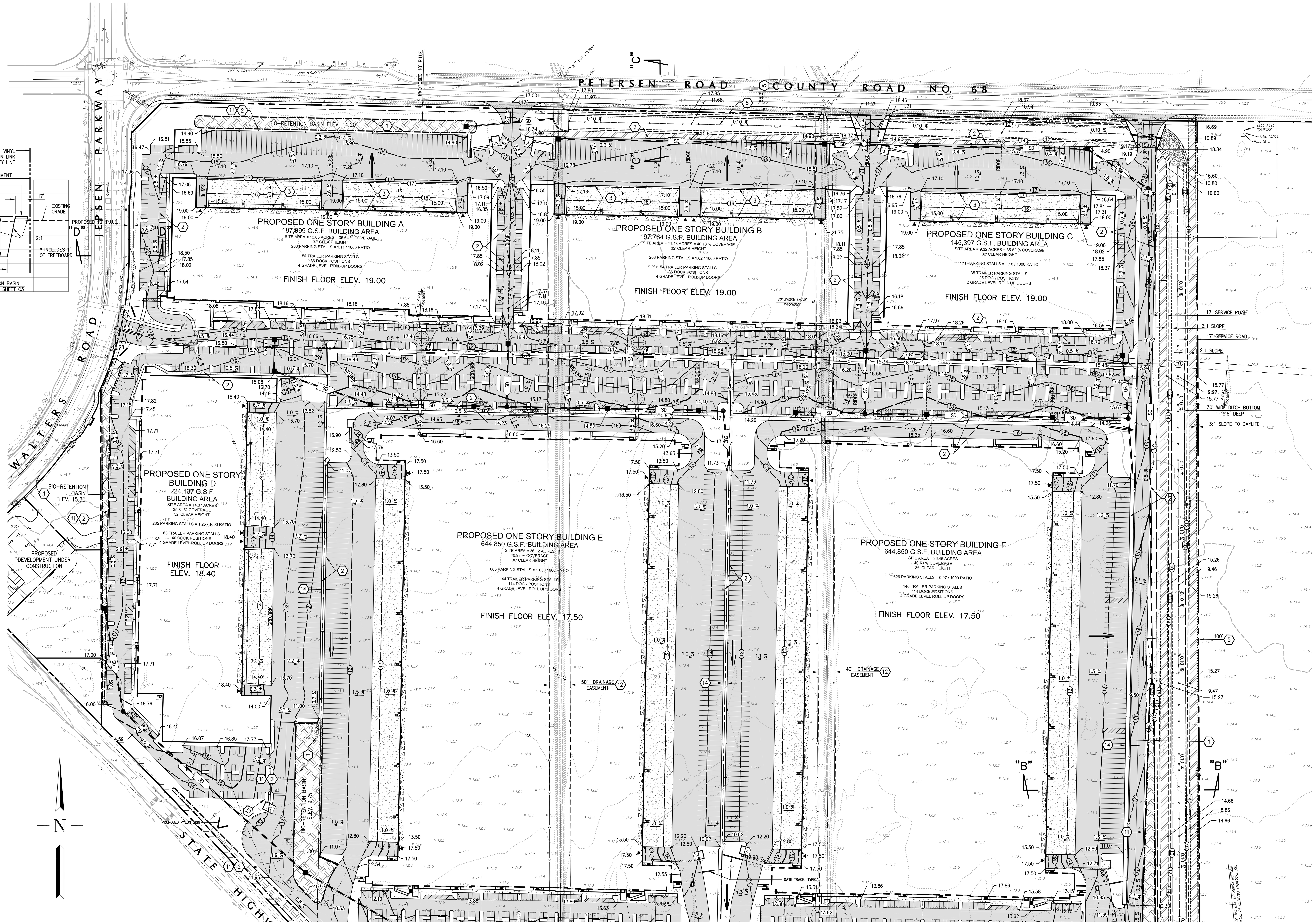
SCALES:
1"=60' HORIZONTAL
1"=6' VERTICAL

SECTION "C"–"C"

SCALES:
1"=60' HORIZONTAL
1"=6' VERTICAL

SECTION "D"–"D"

SCALES:
1"=60' HORIZONTAL
1"=6' VERTICAL



LEGEND:

PROPOSED / EXISTING

- BOUNDARY LINE
- BOUNDARY WITH LACK OF ABUTTER RIGHTS
- PARCEL LINE
- STREET CENTERLINE
- EASEMENT LINE
- FENCE
- STORM DRAIN PIPE
- DRAINAGE INLET
- MANHOLE
- CURB
- CURB & GUTTER
- PAVEMENT EDGE
- ELEVATION CONTOUR
- GRADE BREAK OR RIDGE
- FLOW LINE VALLEY GUTTER OR DITCH
- OVERLAND DRAINAGE RELEASE
- GRADING DAYLITE
- SPOT ELEVATION
- FINISH GRADE ELEVATION
- FINISH GRADE OR SLOPE
- CONCRETE
- NEW ASPHALT PAVING
- BIO-RETENTION PLANTER BOTTOM. DETAIL ON C3.
- SERVICE ROAD
- RIP-RAP SLOPE & OUTFALL PROTECTION ALSO AT ALL CURB OPENINGS

CONSTRUCTION NOTES:

1. PROPOSED BIO-RETENTION BASIN. RETAINING CURBS PROPOSED FOR PORTIONS OF THE SMALLER BASINS ADJACENT TO THE PARKING LOTS. BASIN SIDE SLOPE OF 2:1 MAXIMUM FOR THE LARGER BASINS. BASIN FINISH GRADE SHALL BE 0.7' MINIMUM BELOW ADJACENT PROPOSED PAVEMENT GRADE OR 1.0' BELOW LOWEST EXISTING GRADE. INSTALL 4" PERFORATED PIPE THROUGHOUT BASIN BOTTOM, SPACED AT 8' ON CENTER. SEE DETAIL OF BIO-RETENTION BASIN ON SHEET C3.
2. GRADES SHOWN AT 1.0% OR LESS SHALL REQUIRE A CONCRETE VALLEY GUTTER OR A CURB WITH A GUTTER PAN. NOT SHOWN.
3. TRUCK DOCK SLOPE TOWARD BUILDING AS SHOWN. DOCK LOW POINT REQUIRES INLET WITH DRAINAGE LIFT STATION UP TO ADJACENT FINISH GRADE. NOT SHOWN. LOADING DOCK AREAS SHALL BE EQUIPPED WITH A SPILL CONTROL VALVE WHICH SHALL BE KEPT CLOSED DURING PERIODS OF OPERATION. DOOR SKIRTS BETWEEN TRAILERS AND THE BUILDING SHALL BE INSTALLED. REFER TO FAIRFIELD SUISUN SEWER DISTRICT POST CONSTRUCTION BMP DRAWING SW–2.
5. PROPOSED DITCH RE–ALIGNMENT. WITH EASEMENT DEDICATION TO CITY OF SUISUN. DITCH SHOWN WITH A 30 FOOT WIDE BOTTOM AND 2:1 SIDE SLOPES.
7. PROPOSED 10' WIDE CONTAINMENT BERM ALONG BIO–RETENTION BASIN EDGE. TOP OF BERM ELEVATION 10.50'.
8. PROPOSED 150' WIDE PRIMARY BERM SPILLWAY. SPILLWAY ELEVATION 9.70'.
9. PROPOSED 150' WIDE SECONDARY BERM SPILLWAY. SPILLWAY ELEVATION 10.20'.
11. EXTENDED CURB FOOTING.
12. EXISTING DRAINAGE EASEMENT TO BE ABANDONED AFTER THE RELOCATION OF THE EXISTING CHANNEL.
13. LOW POINTS ALONG CURB LINES SHALL HAVE THRU CURB DRAINS, TYPICAL.
14. 9' WIDE CONCRETE FLUME PER SECTION ON SHEET C2.

0 100 200 300
GRAPHIC SCALE

RMW
Architecture
Interiors
1718 Third Street
Suite 101
Sacramento
California 95811

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rmw.com

OWNER / DEVELOPER:

BUZZ OATES
555 CAPITOL MALL SUITE 900
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PHONE: 916.379.3800

PRELIMINARY DESIGN DOCUMENTS FOR:

SUISUN LOGISTICS CENTER

WALTERS ROAD & PETERSON ROAD
SUISUN CITY, CA

approved for the owner by :

approved for the architect by :

issue :	description :	date :
A	PLANNING SUBMITTAL - INITIAL DESIGN REVIEW	11-20-2020
B	DITCH BYPASS & SERVICE ROADS	6-21-2021
C	PER PLAN REVIEW REVISION LETTER OCT. 25, 2021	11-4-21
D	PER PLAN REVIEW LETTER NOV. 22, 2021	11-24-21

RAK CIVIL ENGINEERS
ROBERT A. KARN & ASSOCIATES, Inc.
707 BECK AVENUE
FAIRFIELD, CALIFORNIA 94533

drawn by : A.B.L.

checked by : T.W.P.

stamp

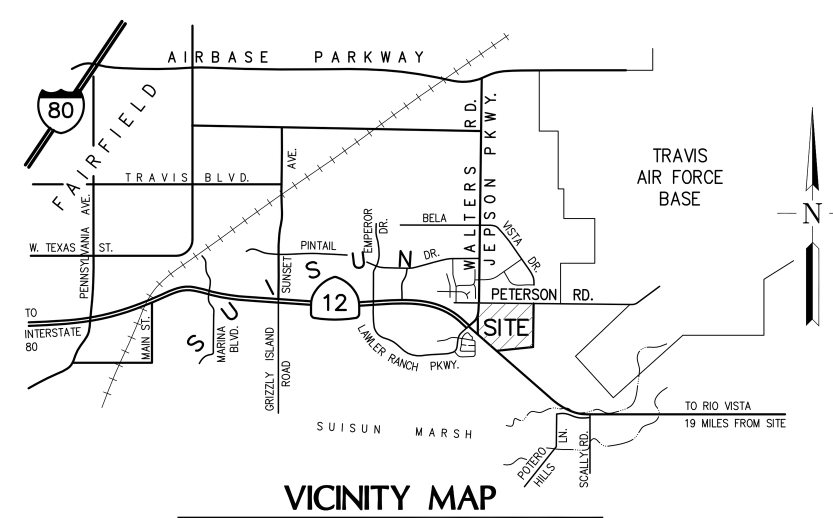
scale : 1"=100'

project number : A20026

PRELIMINARY GRADING AND DRAINAGE PLAN

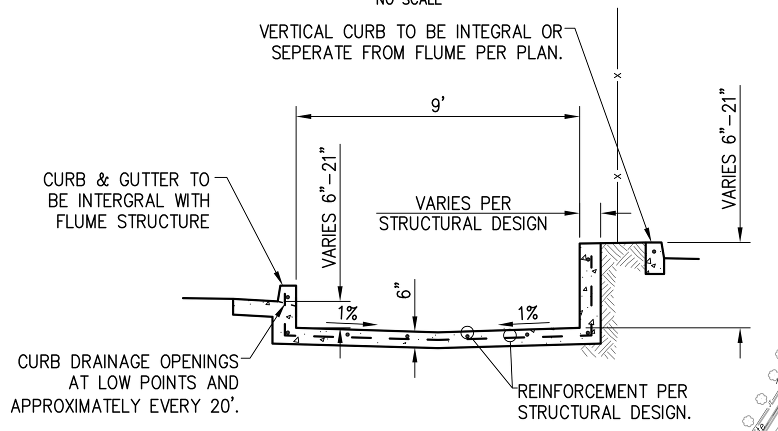
sheet no. :

C1



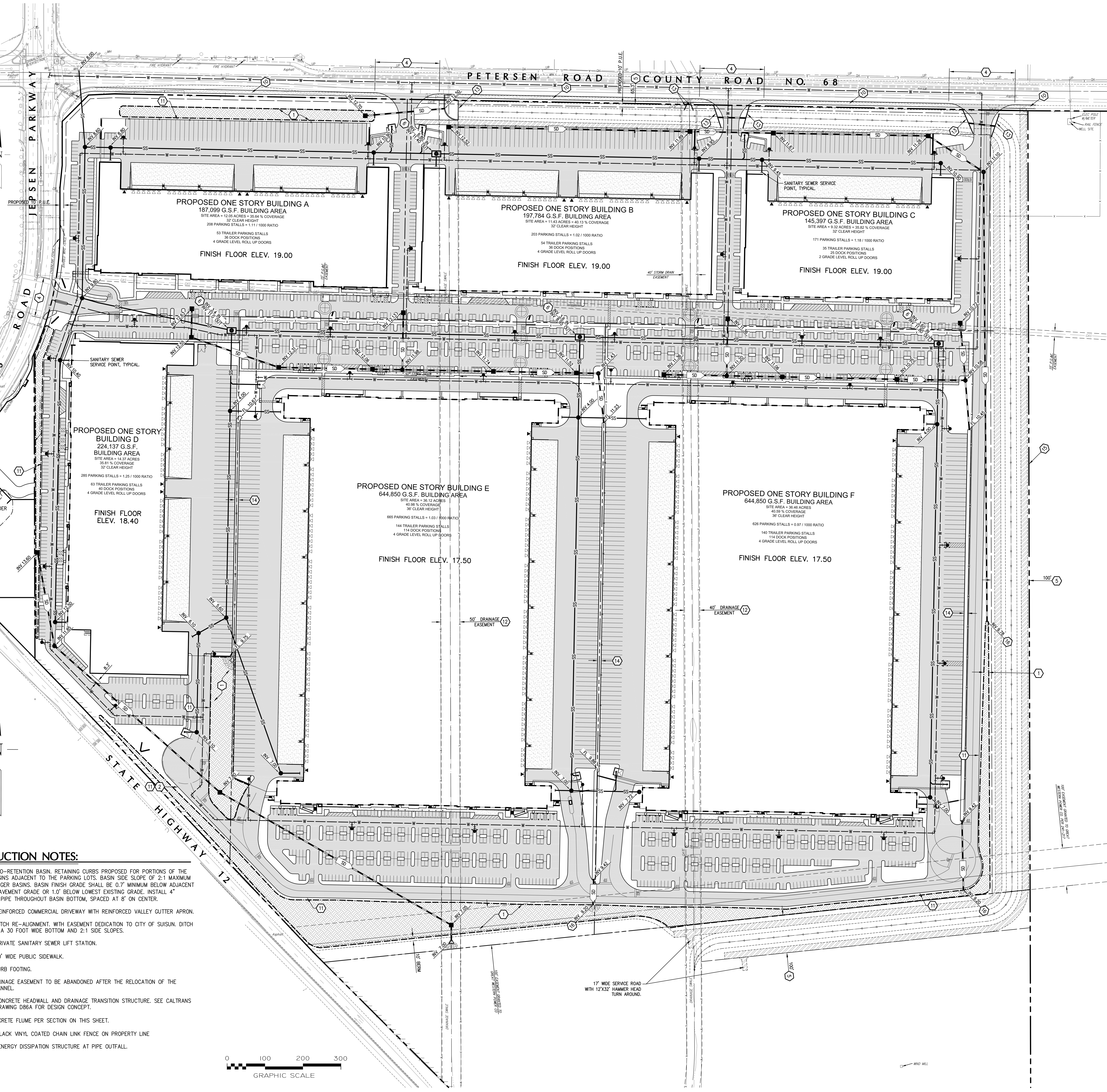
VICINITY MAP

NO SCALE



9' WIDE CONCRETE FLUME SECTION (14)

NO SCALE



LEGEND:

	PROPOSED	EXISTING
BOUNDARY LINE		
BOUNDARY WITH LACK OF ABUTTER RIGHTS		
PARCEL LINE		
STREET CENTERLINE		
EASEMENT LINE		
FENCE		
STORM DRAIN PIPE	SD	SD
SANITARY SEWER PIPE	SS	SS
WATER LINE	W	W
GAS MAIN		GAS
DRAINAGE INLET		
MANHOLE		
SEWER LIFT STATION		
FIRE HYDRANT		
CURB		
CURB & GUTTER		
PAVEMENT EDGE		
GRADE BREAK OR RIDGE		
FLOW LINE VALLEY GUTTER OR DITCH		
CONCRETE		
NEW ASPHALT PAVING		
BIO-RETENTION PLANTER BOTTOM		
SERVICE ROAD		

CONSTRUCTION NOTES:

1. PROPOSED BIO-RETENTION BASIN. RETAINING CURBS PROPOSED FOR PORTIONS OF THE SMALLER BASINS ADJACENT TO THE PARKING LOTS. BASIN SIDE SLOPE OF 2:1 MAXIMUM FOR THE LARGER BASINS. BASIN FINISH GRADE SHALL BE 0.7' MINIMUM BELOW ADJACENT PROPOSED PAVEMENT GRADE OR 1.0' BELOW LOWEST EXISTING GRADE. INSTALL 4" PERFORATED PIPE THROUGHOUT BASIN BOTTOM, SPACED AT 8' ON CENTER.
4. PROPOSED REINFORCED COMMERCIAL DRIVEWAY WITH REINFORCED VALLEY GUTTER APRON.
5. PROPOSED DITCH RE-ALIGNMENT. WITH EASEMENT DEDICATION TO CITY OF SUISUN. DITCH SHOWN WITH A 30 FOOT WIDE BOTTOM AND 2:1 SIDE SLOPES.
6. PROPOSED PRIVATE SANITARY SEWER LIFT STATION.
10. PROPOSED 10' WIDE PUBLIC SIDEWALK.
11. EXTENDED CURB FOOTING.
12. EXISTING DRAINAGE EASEMENT TO BE ABANDONED AFTER THE RELOCATION OF THE EXISTING CHANNEL.
13. PROPOSED CONCRETE HEADWALL AND DRAINAGE TRANSITION STRUCTURE. SEE CALTRANS STANDARD DRAWING D86A FOR DESIGN CONCEPT.
14. 9' WIDE CONCRETE FLUME PER SECTION ON THIS SHEET.
15. INSTALL 6' BLACK VINYL COATED CHAIN LINK FENCE ON PROPERTY LINE
16. CONSTRUCT ENERGY DISSIPATION STRUCTURE AT PIPE OUTFALL.

RMW

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1718 Third Street Suite 101 Sacramento California 95811

Office 916 449-1400

rmw.com

OWNER / DEVELOPER:

BUZZ OATES
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SACRAMENTO, CA 95814
PHONE: 916.379.3800

PRELIMINARY DESIGN DOCUMENTS FOR:

SUISUN LOGISTICS CENTER

WALTERS ROAD & PETERSON ROAD
SUISUN CITY, CA

approved for the owner by :

approved for the architect by :

issue :	description :	date :
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RAK CIVIL ENGINEERS
ROBERT A. KARN & ASSOCIATES, Inc.
707 BECK AVENUE
FAIRFIELD, CALIFORNIA 94533

drawn by : A.B.L.

checked by : T.W.P.

stamp

scale : 1"=100'

project number : A20026

PRELIMINARY SITE AND UTILITY PLAN

sheet no. :

C2

Project Name: **Suisun Logistics, Suisun**
Project Type: **Treatment Only**
C.3. Compliance Required?: **YES**

Area: **127 acres**
MAP: **19.5 inches**
Soil Group: **Type D**

Untreated

DMA Name	DMA Area (SF)
PAVE-5	5,700
PAVE-6	28,300

Self-Treating

DMA Name	DMA Area (SF)
LAND-5	407,650

IMP Name: **IMP-1 (BR-A)**
IMP Type: Bioretention Facility

DMA Name	DMA Area (SF)	Post-Project Surface Type	DMA Runoff Factor	DMA Area X Runoff Factor
ROOF-1	199,600	Roof	1.00	199,600
PAVE-1	158,600	Asphalt/Concrete	1.00	158,600
LAND-1	58,500	Landscaping	0.10	5,850
			Total	364,050

IMP Sizing Factor	Rain Adjust. Factor	Minimum Area	Proposed Area
0.04	1.000	14,562	19,240

IMP Name: **IMP-2 (BR-B)**
IMP Type: Bioretention Facility

DMA Name	DMA Area (SF)	Post-Project Surface Type	DMA Runoff Factor	DMA Area X Runoff Factor
ROOF-2	212,000	Roof	1.00	212,000
PAVE-2	51,550	Asphalt/Concrete	1.00	51,550
LAND-2	24,400	Landscaping	0.10	2,440
			Total	265,990

IMP Sizing Factor	Rain Adjust. Factor	Minimum Area	Proposed Area
0.04	1.000	10,640	11,100

IMP Name: **IMP-3 (BR-C)**
IMP Type: Bioretention Facility

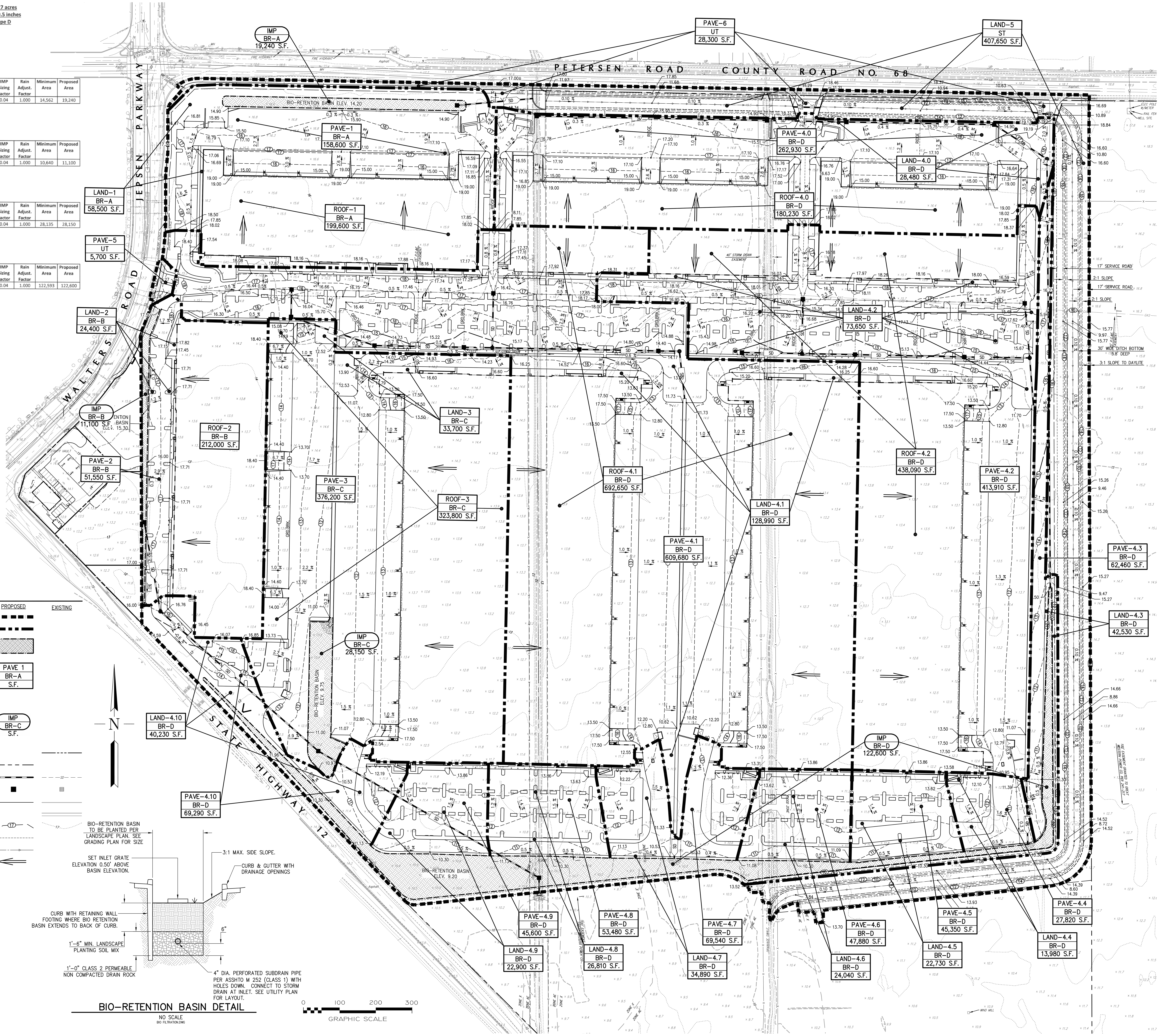
DMA Name	DMA Area (SF)	Post-Project Surface Type	DMA Runoff Factor	DMA Area X Runoff Factor
ROOF-3	323,800	Roof	1.00	323,800
PAVE-3	376,200	Asphalt/Concrete	1.00	376,200
LAND-3	33,700	Landscaping	0.10	3,370
			Total	703,370

IMP Sizing Factor	Rain Adjust. Factor	Minimum Area	Proposed Area
0.04	1.000	28,135	28,150

IMP Name: **IMP-4 (BR-D)**
IMP Type: Bioretention Facility

DMA Name	DMA Area (SF)	Post-Project Surface Type	DMA Runoff Factor	DMA Area X Runoff Factor
IMP-4.0				
ROOF-4.0	180,230	Roof	1.00	180,230
PAVE-4.0	262,930	Asphalt/Concrete	1.00	262,930
LAND-4.0	28,480	Landscaping	0.10	2,848
IMP-4.1				
ROOF-4.1	692,650	Roof	1.00	692,650
PAVE-4.1	609,680	Asphalt/Concrete	1.00	609,680
LAND-4.1	128,990	Landscaping	0.10	12,899
IMP-4.2				
ROOF-4.2	438,090	Roof	1.00	438,090
PAVE-4.2	413,910	Asphalt/Concrete	1.00	413,910
LAND-4.2	73,650	Landscaping	0.10	7,365
IMP-4.3				
PAVE-4.3	62,460	Asphalt/Concrete	1.00	62,460
LAND-4.3	42,530	Landscaping	0.10	4,253
IMP-4.4				
PAVE-4.4	27,820	Asphalt/Concrete	1.00	27,820
LAND-4.4	13,980	Landscaping	0.10	1,398
IMP-4.5				
PAVE-4.5	45,350	Asphalt/Concrete	1.00	45,350
LAND-4.5	22,730	Landscaping	0.10	2,273
IMP-4.6				
PAVE-4.6	47,880	Asphalt/Concrete	1.00	47,880
LAND-4.6	24,040	Landscaping	0.10	2,404
IMP-4.7				
PAVE-4.7	69,540	Asphalt/Concrete	1.00	69,540
LAND-4.7	34,890	Landscaping	0.10	3,489
IMP-4.8				
PAVE-4.8	53,480	Asphalt/Concrete	1.00	53,480
LAND-4.8	26,810	Landscaping	0.10	2,681
IMP-4.9				
PAVE-4.9	45,600	Asphalt/Concrete	1.00	45,600
LAND-4.9	22,900	Landscaping	0.10	2,290
IMP-4.10				
PAVE-4.10	69,290	Asphalt/Concrete	1.00	69,290
LAND-4.10	40,230	Landscaping	0.10	4,023
			Total	3,064,833

IMP Sizing Factor	Rain Adjust. Factor	Minimum Area	Proposed Area
0.04	1.000	122,593	122,600



LEGEND:

	PROPOSED	EXISTING
LIMIT OF IMPROVEMENTS		
DRAINAGE AREA BOUNDARY		
BIO-RETENTION TREATMENT AREA		
DRAINAGE MANAGEMENT AREA (DMA) ID	PAVE 1 / BR-A / S.F.	
TREATMENT DEVICE ID: BIO-RETENTION BASIN (BR), UNTREATED (UT), SELF TREATED (ST)		
INTEGRATED MANAGEMENT PRACTICE (IMP)	IMP / BR-C / S.F.	
BIO-RETENTION BASIN (BR)		
BOUNDARY LINE		
PROPOSED PARCEL LINE		
STORM DRAIN PIPE		
DRAINAGE INLET		
VERTICAL CURB		
CURB AND GUTTER		
CONTOUR		
GRADE BREAK		
FLOW LINE SWALE OR GUTTER		
ROOF DRAINAGE DIRECTION		

BIO-RETENTION BASIN TO BE PLANTED PER LANDSCAPE PLAN. SEE GRADING PLAN FOR SIZE
3:1 MAX. SIDE SLOPE.
SET INLET GRATE ELEVATION 0.50' ABOVE BASIN ELEVATION.
CURB & GUTTER WITH DRAINAGE OPENINGS
CURB WITH RETAINING WALL FOOTING WHERE BIO RETENTION BASIN EXTENDS TO BACK OF CURB.
6"
1'-6" MIN. LANDSCAPE PLANTING SOIL MIX
1'-0" CLASS 2 PERMEABLE NON COMPACTED DRAIN ROCK
4" DIA. PERFORATED SUBDRAIN PIPE PER ASSHTO M 252 (CLASS 1) WITH HOLES DOWN. CONNECT TO STORM DRAIN AT INLET. SEE UTILITY PLAN FOR LAYOUT.

BIO-RETENTION BASIN DETAIL
NO SCALE
BIO FILTRATION.DWG

0 100 200 300
GRAPHIC SCALE

RMW

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PRELIMINARY DESIGN DOCUMENTS FOR:

SUISUN LOGISTICS CENTER

WALTERS ROAD & PETERSON ROAD
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drawn by : A.B.L.
checked by : T.W.P.
stamp

scale : 1"=100'
project number : A20026

PRELIMINARY STORM WATER CONTROL PLAN

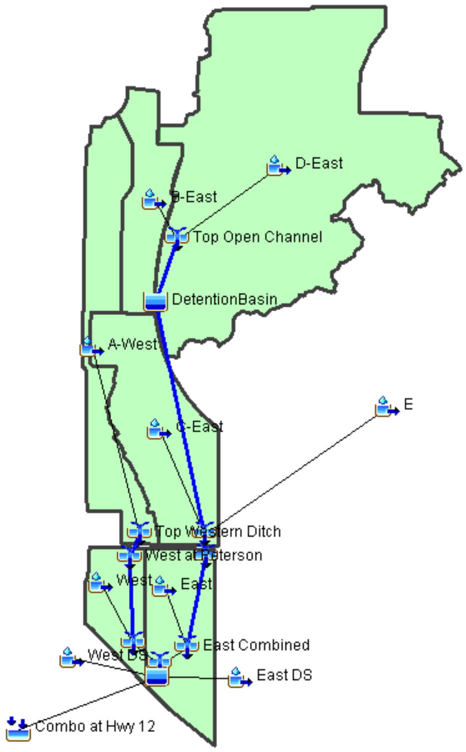
sheet no. :
C3

ATTACHMENT B

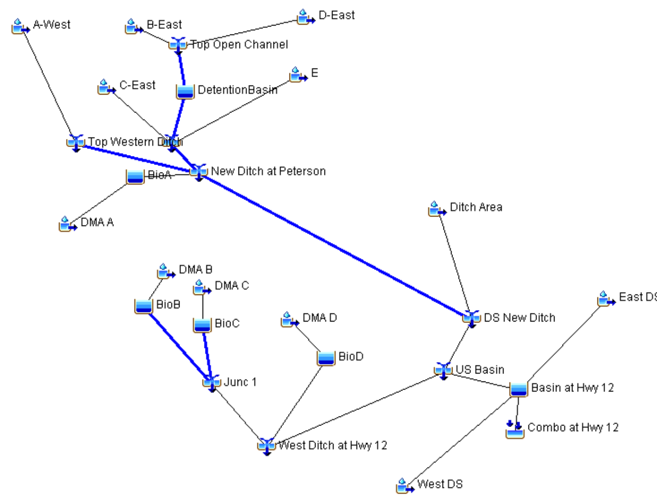
HEC-HMS Model Output

HEC-HMS Model Output

Pre-Project HEC-HMS Schematic



Post-Project HEC-HMS Schematic



2-Year Pre-Project Results

Global Summary Results for Run "EC - 2-yr"

Project: Suisun Logistics Center   Simulation Run: EC - 2-yr

Start of Run: 01Jan2050, 00:00   Basin Model: EC - ProjectSite
End of Run: 02Jan2050, 00:00   Meteorologic Model: 2-yr
Compute Time: DATA CHANGED, RECOMPUTE   Control Specifications: 24 h control

Show Elements: All Elements   Volume Units: IN / ACRE-FT   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
A-West	0.2025	82.35	01Jan2050, 12:18	19.78
Top Western Ditch	0.2025	82.35	01Jan2050, 12:18	19.78
Western Open Ditch	0.2025	81.21	01Jan2050, 12:21	19.75
West at Peterson	0.2025	81.21	01Jan2050, 12:21	19.75
W Ditch on Property	0.2025	76.48	01Jan2050, 12:33	19.65
West	0.0848281	15.83	01Jan2050, 13:01	6.40
B-East	0.1209	51.12	01Jan2050, 12:17	11.59
D-East	0.8720	121.61	01Jan2050, 13:36	64.44
Top Open Channel	0.9929	134.43	01Jan2050, 13:29	76.03
Open Channel	0.9929	134.41	01Jan2050, 13:31	75.93
Main Storm Drain	0.9929	101.25	01Jan2050, 15:15	75.26
C-East	0.2479	87.14	01Jan2050, 12:22	23.85
Top Eastern Ditch	1.2408	131.45	01Jan2050, 12:33	99.10
Eastern Open Ditch	1.2408	131.42	01Jan2050, 12:35	98.95
East at Peterson	1.2408	131.42	01Jan2050, 12:35	98.95
E Ditch on Property	1.2408	130.67	01Jan2050, 12:47	98.23
DetentionBasin	0.9929	101.27	01Jan2050, 15:04	75.77
East	0.110016	20.15	01Jan2050, 13:03	8.28
East Combined	1.350816	149.65	01Jan2050, 12:51	106.51
West Combined	0.2873281	88.93	01Jan2050, 12:35	26.05
US Basin	1.6381441	232.98	01Jan2050, 12:40	132.56
East DS	0.0460852	9.22	01Jan2050, 12:54	3.49
West DS	0.0040333	1.03	01Jan2050, 12:36	0.31
Basin at Hwy 12	1.6882626	146.50	01Jan2050, 15:27	136.16
Combo at Hwy 12	1.6882626	146.50	01Jan2050, 15:27	136.16

2-Year Post-Project Results

Global Summary Results for Run "Pro wE DMA D- 2-yr"

Project: Suisun Logistics Center   Simulation Run: Pro wE DMA D- 2-yr

Start of Run: 01Jan2050, 00:00   Basin Model: Proposed - wE - DMA D Update
End of Run: 02Jan2050, 00:00   Meteorologic Model: 2-yr
Compute Time: DATA CHANGED, RECOMPUTE   Control Specifications: 24 h control

Show Elements: All Elements   Volume Units: IN / ACRE-FT   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
DMA A	0.0156370	6.97	01Jan2050, 12:15	1.63
BioA	0.0156370	2.23	01Jan2050, 12:07	1.62
New Ditch at Peterson	1.6889370	236.56	01Jan2050, 12:26	137.63
New East Ditch	1.6889370	219.44	01Jan2050, 13:04	134.63
DMA B	0.0107266	5.98	01Jan2050, 12:11	1.14
BioB	0.0107266	1.28	01Jan2050, 11:55	1.13
Reach BioB-J1	0.0107266	1.29	01Jan2050, 11:58	1.13
DMA C	0.0273185	13.14	01Jan2050, 12:14	2.91
BioC	0.0273185	3.26	01Jan2050, 11:59	2.89
Reach BioC-J1	0.0273185	3.26	01Jan2050, 12:09	2.89
Junc 1	0.0380451	4.54	01Jan2050, 12:06	4.01
DMA D	0.1291	40.46	01Jan2050, 12:28	13.41
BioD	0.1291	14.19	01Jan2050, 12:10	13.29
A-West	0.2025	82.35	01Jan2050, 12:18	19.78
Top Western Ditch	0.2025	82.35	01Jan2050, 12:18	19.78
Western Open Ditch	0.2025	81.21	01Jan2050, 12:21	19.75
B-East	0.1209	51.12	01Jan2050, 12:17	11.59
D-East	0.8720	121.61	01Jan2050, 13:36	64.44
Top Open Channel	0.9929	134.43	01Jan2050, 13:29	76.03
Open Channel	0.9929	134.41	01Jan2050, 13:31	75.93
Main Storm Drain	0.9929	101.25	01Jan2050, 15:15	75.26
C-East	0.2479	87.14	01Jan2050, 12:22	23.85
Top Eastern Ditch	1.4708	167.67	01Jan2050, 12:46	116.42
Eastern Open Ditch	1.4708	167.64	01Jan2050, 12:49	116.26
DetentionBasin	0.9929	101.27	01Jan2050, 15:04	75.77
West Ditch at Hwy 12	0.1671451	18.73	01Jan2050, 12:10	17.30
Basin at Hwy 12	1.9208226	163.05	01Jan2050, 16:18	156.03
Combo at Hwy 12	1.9208226	163.05	01Jan2050, 16:18	156.03
DS New Ditch	1.7035590	222.43	01Jan2050, 13:04	135.72
Ditch Area	0.014622	3.21	01Jan2050, 12:46	1.09
US Basin	1.8707041	241.16	01Jan2050, 13:04	153.02
West DS	0.0040333	1.03	01Jan2050, 12:36	0.31
East DS	0.0460852	9.22	01Jan2050, 12:54	3.49
E	0.23	42.12	01Jan2050, 13:03	17.32

25-Year Pre-Project Results

Global Summary Results for Run "EC wE - 25-yr"

Project: Suisun Logistics Center   Simulation Run: EC wE - 25-yr

Start of Run: 01Jan2050, 00:00   Basin Model: EC - ProjectSite - with E
End of Run: 02Jan2050, 00:00   Meteorologic Model: 25-yr
Compute Time: DATA CHANGED, RECOMPUTE   Control Specifications: 24 h control

Show Elements: All Elements   Volume Units: IN ACRE-FT   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
A-West	0.2025	166.3	01Jan2050, 12:18	42.1
Top Western Ditch	0.2025	166.3	01Jan2050, 12:18	42.1
Western Open Ditch	0.2025	164.1	01Jan2050, 12:20	42.1
West at Peterson	0.2025	164.1	01Jan2050, 12:20	42.1
W Ditch on Property	0.2025	155.0	01Jan2050, 12:31	41.8
West	0.0848281	32.7	01Jan2050, 13:01	15.2
B-East	0.1209	103.3	01Jan2050, 12:17	24.9
D-East	0.8720	254.6	01Jan2050, 13:35	152.2
Top Open Channel	0.9929	282.2	01Jan2050, 13:30	177.0
Open Channel	0.9929	282.2	01Jan2050, 13:32	176.8
Main Storm Drain	0.9929	187.7	01Jan2050, 15:57	169.8
C-East	0.2479	176.2	01Jan2050, 12:22	51.1
E	0.23	87.1	01Jan2050, 13:02	41.2
Top Eastern Ditch	1.4708	326.6	01Jan2050, 12:32	262.1
Eastern Open Ditch	1.4708	326.5	01Jan2050, 12:34	261.7
DetentionBasin	0.9929	187.7	01Jan2050, 15:47	171.2
East at Peterson	1.4708	326.5	01Jan2050, 12:34	261.7
E Ditch on Property	1.4708	324.9	01Jan2050, 12:46	259.8
East	0.110016	41.7	01Jan2050, 13:02	19.7
East Combined	1.580816	364.3	01Jan2050, 12:52	279.5
West Combined	0.2873281	180.0	01Jan2050, 12:32	57.0
US Basin	1.8681441	531.7	01Jan2050, 12:38	336.5
East DS	0.0460852	19.0	01Jan2050, 12:54	8.3
West DS	0.0040333	2.1	01Jan2050, 12:36	0.7
Basin at Hwy 12	1.9182626	290.2	01Jan2050, 16:41	310.5
Combo at Hwy 12	1.9182626	290.2	01Jan2050, 16:41	310.5

25-Year Post-Project Results

Global Summary Results for Run "Pro wE DMA D- 25-yr"

Project: Suisun Logistics Center   Simulation Run: Pro wE DMA D- 25-yr

Start of Run: 01Jan2050, 00:00   Basin Model: Proposed - wE - DMA D Update
End of Run: 02Jan2050, 00:00   Meteorologic Model: 25-yr
Compute Time: DATA CHANGED, RECOMPUTE   Control Specifications: 24 h control

Show Elements: All Elements   Volume Units: IN ACRE-FT   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
DMA A	0.0156370	14.01	01Jan2050, 12:16	3.35
BioA	0.0156370	9.18	01Jan2050, 12:37	3.33
New Ditch at Peterson	1.6889370	483.06	01Jan2050, 12:24	307.09
New East Ditch	1.6889370	438.59	01Jan2050, 12:55	300.47
DMA B	0.0107266	12.03	01Jan2050, 12:11	2.32
BioB	0.0107266	10.27	01Jan2050, 12:18	2.30
Reach BioB-J1	0.0107266	10.30	01Jan2050, 12:20	2.30
DMA C	0.0273185	26.40	01Jan2050, 12:14	5.93
BioC	0.0273185	21.57	01Jan2050, 12:25	5.88
Reach BioC-J1	0.0273185	21.53	01Jan2050, 12:27	5.87
Junc 1	0.0380451	30.63	01Jan2050, 12:25	8.17
DMA D	0.1291	81.35	01Jan2050, 12:28	27.54
BioD	0.1291	57.85	01Jan2050, 13:02	27.27
A-West	0.2025	166.27	01Jan2050, 12:18	42.12
Top Western Ditch	0.2025	166.27	01Jan2050, 12:18	42.12
Western Open Ditch	0.2025	164.11	01Jan2050, 12:20	42.05
B-East	0.1209	103.29	01Jan2050, 12:17	24.89
D-East	0.8720	254.65	01Jan2050, 13:35	152.16
Top Open Channel	0.9929	282.23	01Jan2050, 13:30	177.04
Open Channel	0.9929	282.21	01Jan2050, 13:32	176.82
Main Storm Drain	0.9929	187.70	01Jan2050, 15:57	169.81
C-East	0.2479	176.17	01Jan2050, 12:22	51.08
Top Eastern Ditch	1.4708	326.58	01Jan2050, 12:32	262.10
Eastern Open Ditch	1.4708	326.52	01Jan2050, 12:34	261.71
DetentionBasin	0.9929	187.73	01Jan2050, 15:47	171.23
West Ditch at Hwy 12	0.1671451	71.40	01Jan2050, 12:57	35.44
Basin at Hwy 12	1.9208226	285.74	01Jan2050, 16:56	309.45
Combo at Hwy 12	1.9208226	285.74	01Jan2050, 16:56	309.45
DS New Ditch	1.7035590	445.02	01Jan2050, 12:54	303.10
Ditch Area	0.014622	6.61	01Jan2050, 12:46	2.63
US Basin	1.8707041	516.26	01Jan2050, 12:55	338.54
West DS	0.0040333	2.11	01Jan2050, 12:36	0.74
East DS	0.0460852	19.01	01Jan2050, 12:54	8.31
E	0.23	87.08	01Jan2050, 13:02	41.21

100-Year Pre-Project Results

Global Summary Results for Run "EC wE - 100-yr"

Project: Suisun Logistics Center   Simulation Run: EC wE - 100-yr

Start of Run: 01Jan2050, 00:00   Basin Model: EC - ProjectSite - with E
End of Run: 02Jan2050, 00:00   Meteorologic Model: 100-yr
Compute Time: DATA CHANGED, RECOMPUTE   Control Specifications: 24 h control

Show Elements: All Elements   Volume Units: IN ACRE-FT   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
A-West	0.2025	207.1	01Jan2050, 12:18	52.9
Top Western Ditch	0.2025	207.1	01Jan2050, 12:18	52.9
Western Open Ditch	0.2025	204.5	01Jan2050, 12:20	52.8
West at Peterson	0.2025	204.5	01Jan2050, 12:20	52.8
W Ditch on Property	0.2025	193.3	01Jan2050, 12:31	52.5
West	0.0848281	40.9	01Jan2050, 13:01	19.5
B-East	0.1209	128.7	01Jan2050, 12:17	31.3
D-East	0.8720	318.8	01Jan2050, 13:35	194.9
Top Open Channel	0.9929	353.2	01Jan2050, 13:30	226.2
Open Channel	0.9929	353.1	01Jan2050, 13:32	226.0
Main Storm Drain	0.9929	215.2	01Jan2050, 16:24	212.3
C-East	0.2479	219.5	01Jan2050, 12:22	64.2
E	0.23	108.8	01Jan2050, 13:02	52.9
Top Eastern Ditch	1.4708	404.8	01Jan2050, 12:31	329.3
Eastern Open Ditch	1.4708	404.7	01Jan2050, 12:32	328.8
DetentionBasin	0.9929	215.3	01Jan2050, 16:14	214.1
East at Peterson	1.4708	404.7	01Jan2050, 12:32	328.8
E Ditch on Property	1.4708	401.9	01Jan2050, 12:44	326.3
East	0.110016	52.1	01Jan2050, 13:02	25.3
East Combined	1.580816	450.2	01Jan2050, 12:50	351.6
West Combined	0.2873281	224.3	01Jan2050, 12:32	72.0
US Basin	1.8681441	660.2	01Jan2050, 12:37	423.6
East DS	0.0460852	23.7	01Jan2050, 12:54	10.7
West DS	0.0040333	2.6	01Jan2050, 12:36	0.9
Basin at Hwy 12	1.9182626	337.7	01Jan2050, 16:59	377.2
Combo at Hwy 12	1.9182626	337.7	01Jan2050, 16:59	377.2

100-Year Post-Project Results

Global Summary Results for Run "Pro wE DMA D- 100-yr"

Project: Suisun Logistics Center   Simulation Run: Pro wE DMA D- 100-yr

Start of Run: 01Jan2050, 00:00   Basin Model: Proposed - wE - DMA D Update
End of Run: 02Jan2050, 00:00   Meteorologic Model: 100-yr
Compute Time: DATA CHANGED, RECOMPUTE   Control Specifications: 24 h control

Show Elements: All Elements   Volume Units: IN ACRE-FT   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
DMA A	0.0156370	17.44	01Jan2050, 12:16	4.18
BioA	0.0156370	13.78	01Jan2050, 12:29	4.15
New Ditch at Peterson	1.6889370	610.78	01Jan2050, 12:25	385.71
New East Ditch	1.6889370	546.21	01Jan2050, 12:52	377.36
DMA B	0.0107266	14.97	01Jan2050, 12:11	2.90
BioB	0.0107266	14.08	01Jan2050, 12:14	2.85
Reach BioB-J1	0.0107266	14.08	01Jan2050, 12:16	2.85
DMA C	0.0273185	32.85	01Jan2050, 12:14	7.39
BioC	0.0273185	29.55	01Jan2050, 12:21	7.27
Reach BioC-J1	0.0273185	29.51	01Jan2050, 12:22	7.26
Junc 1	0.0380451	42.69	01Jan2050, 12:20	10.11
DMA D	0.1291	101.23	01Jan2050, 12:28	34.34
BioD	0.1291	86.27	01Jan2050, 12:46	33.28
A-West	0.2025	207.13	01Jan2050, 12:18	52.86
Top Western Ditch	0.2025	207.13	01Jan2050, 12:18	52.86
Western Open Ditch	0.2025	204.54	01Jan2050, 12:20	52.78
B-East	0.1209	128.69	01Jan2050, 12:17	31.30
D-East	0.8720	318.79	01Jan2050, 13:35	194.94
Top Open Channel	0.9929	353.17	01Jan2050, 13:30	226.24
Open Channel	0.9929	353.14	01Jan2050, 13:32	225.96
Main Storm Drain	0.9929	215.24	01Jan2050, 16:24	212.25
C-East	0.2479	219.50	01Jan2050, 12:22	64.18
Top Eastern Ditch	1.4708	404.77	01Jan2050, 12:31	329.29
Eastern Open Ditch	1.4708	404.69	01Jan2050, 12:32	328.79
DetentionBasin	0.9929	215.28	01Jan2050, 16:14	214.13
West Ditch at Hwy 12	0.1671451	111.63	01Jan2050, 12:42	43.39
Basin at Hwy 12	1.9208226	333.77	01Jan2050, 17:04	374.67
Combo at Hwy 12	1.9208226	333.77	01Jan2050, 17:04	374.67
DS New Ditch	1.7035590	554.34	01Jan2050, 12:52	380.73
Ditch Area	0.014622	8.25	01Jan2050, 12:46	3.38
US Basin	1.8707041	660.71	01Jan2050, 12:49	424.12
West DS	0.0040333	2.63	01Jan2050, 12:36	0.94
East DS	0.0460852	23.75	01Jan2050, 12:54	10.66
E	0.23	108.82	01Jan2050, 13:02	52.86

ATTACHMENT C

BAHM Model Output

BAHM2013

PROJECT REPORT

General Model Information

Project Name:	SuisunLogisticsCenter_BAHM
Site Name:	Suisun Logistics Center
Site Address:	
City:	Suisun, CA
Report Date:	1/18/2022
Gage:	BERKELEY
Data Start:	1959/10/01
Data End:	2003/09/30
Timestep:	Hourly
Precip Scale:	0.833
Version Date:	2020/04/06

POC Thresholds

Landuse Basin Data

Predeveloped Land Use

Mitigated Land Use

DMA-B

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.56
Pervious Total	0.56
Impervious Land Use	acre
Roof Area	4.87
Parking,Flat(0-5%)	1.18
Impervious Total	6.05
Basin Total	6.61

Element Flows To:

Surface	Interflow	Groundwater
Surface Bio-B		

DMA-C

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	0.77
Pervious Total	0.77
Impervious Land Use	acre
Roof Area	7.43
Parking,Flat(0-5%)	8.64
Impervious Total	16.07
Basin Total	16.84

Element Flows To:

Surface	Interflow	Groundwater
Surface Bio-C		

DMA-D

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	10.54
Pervious Total	10.54
Impervious Land Use	acre
Roof Area	30.1
Parking,Flat(0-5%)	39.21
Impervious Total	69.31
Basin Total	79.85

Element Flows To:

Surface	Interflow	Groundwater
Surface Bio-D		

DMA-A

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C D,Shrub,Flat(0-5%)	1.34
Pervious Total	1.34
Impervious Land Use	acre
Roof Area	4.58
Parking,Flat(0-5%)	3.64
Impervious Total	8.22
Basin Total	9.56

Element Flows To:

Surface	Interflow	Groundwater
Surface Bio-A		

Routing Elements
Predeveloped Routing

Mitigated Routing

Bio-B

Bottom Length:	807.00 ft.
Bottom Width:	13.75 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	1
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	6
Offset (in.):	0
Flow Through Underdrain (ac-ft.):	349.692
Total Outflow (ac-ft.):	354.393
Percent Through Underdrain:	98.67

Discharge Structure

Riser Height:	0.5 ft.
Riser Diameter:	120 in.

Element Flows To:

Outlet 1	Outlet 2

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
12.800	0.2547	0.0000	0.0000	0.0000
12.836	0.2547	0.0035	0.0000	0.0000
12.871	0.2547	0.0069	0.0000	0.0000
12.907	0.2547	0.0104	0.0000	0.0000
12.943	0.2547	0.0138	0.0000	0.0000
12.979	0.2547	0.0173	0.0000	0.0000
13.014	0.2547	0.0207	0.0000	0.0000
13.050	0.2547	0.0242	0.0000	0.0000
13.086	0.2547	0.0277	0.0000	0.0000
13.121	0.2547	0.0311	0.0000	0.0000
13.157	0.2547	0.0346	0.0000	0.0000
13.193	0.2547	0.0380	0.0000	0.0000
13.229	0.2547	0.0415	0.0000	0.0000
13.264	0.2547	0.0449	0.0000	0.0000
13.300	0.2547	0.0484	0.0000	0.0000
13.336	0.2547	0.0519	0.0000	0.0000
13.371	0.2547	0.0553	0.0000	0.0000
13.407	0.2547	0.0588	0.0000	0.0000
13.443	0.2547	0.0622	0.0000	0.0000
13.479	0.2547	0.0657	0.0000	0.0000
13.514	0.2547	0.0691	0.0000	0.0000
13.550	0.2547	0.0726	0.0000	0.0000
13.586	0.2547	0.0761	0.0000	0.0000
13.621	0.2547	0.0795	0.0000	0.0000
13.657	0.2547	0.0830	0.0000	0.0000
13.693	0.2547	0.0864	0.0000	0.0000
13.729	0.2547	0.0899	0.0000	0.0000
13.764	0.2547	0.0933	0.0000	0.0000
13.800	0.2547	0.0968	0.0000	0.0000

13.836	0.2547	0.1003	0.0000	0.0000
13.871	0.2547	0.1037	0.0000	0.0000
13.907	0.2547	0.1072	0.0000	0.0000
13.943	0.2547	0.1106	0.0000	0.0000
13.979	0.2547	0.1141	0.0000	0.0000
14.014	0.2547	0.1175	0.0000	0.0000
14.050	0.2547	0.1210	0.0000	0.0000
14.086	0.2547	0.1245	0.0000	0.0000
14.121	0.2547	0.1279	0.0000	0.0000
14.157	0.2547	0.1314	0.0000	0.0000
14.193	0.2547	0.1348	0.0000	0.0000
14.229	0.2547	0.1383	0.0000	0.0000
14.264	0.2547	0.1417	0.0000	0.0000
14.300	0.2547	0.1455	0.0000	0.0000
14.336	0.2547	0.1493	0.0000	0.0000
14.371	0.2547	0.1531	0.0000	0.0000
14.407	0.2547	0.1568	0.0000	0.0000
14.443	0.2547	0.1606	0.0000	0.0000
14.479	0.2547	0.1644	0.0000	0.0000
14.514	0.2547	0.1682	0.0000	0.0000
14.550	0.2547	0.1719	0.0000	0.0000
14.586	0.2547	0.1757	0.0000	0.0000
14.621	0.2547	0.1795	0.0000	0.0000
14.657	0.2547	0.1833	0.0000	0.0000
14.693	0.2547	0.1870	0.0000	0.0000
14.729	0.2547	0.1908	0.0000	0.0000
14.764	0.2547	0.1946	0.0000	0.0000
14.800	0.2547	0.1984	0.0000	0.0000
14.836	0.2547	0.2022	0.0000	0.0000
14.871	0.2547	0.2059	0.0000	0.0000
14.907	0.2547	0.2097	0.0000	0.0000
14.943	0.2547	0.2135	0.0000	0.0000
14.979	0.2547	0.2173	0.0000	0.0000
15.014	0.2547	0.2210	0.0000	0.0000
15.050	0.2547	0.2248	0.0000	0.0000
15.086	0.2547	0.2286	0.0000	0.0000
15.121	0.2547	0.2324	0.0000	0.0000
15.157	0.2547	0.2361	0.0000	0.0000
15.193	0.2547	0.2399	0.0000	0.0000
15.229	0.2547	0.2437	0.0000	0.0000
15.264	0.2547	0.2475	0.0000	0.0000
15.300	0.2547	0.2512	0.0000	0.0000

Bioretention Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**To Amended(cfs)**	**Infilt(cfs)**
2.5000	0.2547	0.2512	0.0000	1.2843	0.0000
2.5357	0.2547	0.2603	0.0000	1.2843	0.0000
2.5714	0.2547	0.2694	0.0000	1.3454	0.0000
2.6071	0.2547	0.2785	0.0000	1.3760	0.0000
2.6429	0.2547	0.2876	0.0000	1.4066	0.0000
2.6786	0.2547	0.2967	0.0000	1.4372	0.0000
2.7143	0.2547	0.3058	0.0000	1.4678	0.0000
2.7500	0.2547	0.3149	0.0000	1.4983	0.0000
2.7857	0.2547	0.3240	0.0000	1.5289	0.0000
2.8214	0.2547	0.3331	0.0000	1.5595	0.0000
2.8571	0.2547	0.3422	0.0000	1.5901	0.0000
2.8929	0.2547	0.3513	0.0521	1.6207	0.0000
2.9286	0.2547	0.3604	0.0604	1.6512	0.0000

2.9643	0.2547	0.3695	0.0700	1.6818	0.0000
3.0000	0.2547	0.3786	0.0810	1.7124	0.0000
3.0357	0.2547	0.3877	0.0934	1.7430	0.0000
3.0714	0.2547	0.3968	0.1073	1.7735	0.0000
3.1071	0.2547	0.4059	0.1227	1.8041	0.0000
3.1429	0.2547	0.4150	0.1397	1.8347	0.0000
3.1786	0.2547	0.4241	0.1584	1.8653	0.0000
3.2143	0.2547	0.4332	0.1625	1.8959	0.0000
3.2500	0.2547	0.4423	0.2010	1.9264	0.0000
3.2500	0.2547	0.4423	0.2111	1.9264	0.0000

Surface Bio-B

Element Flows To:

Outlet 1	Outlet 2
	Bio-B

Bio-C

Bottom Length:	416.00 ft.
Bottom Width:	67.67 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	1
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	0.5
Orifice Diameter (in.):	6
Offset (in.):	0
Flow Through Underdrain (ac-ft.):	871.079
Total Outflow (ac-ft.):	933.66
Percent Through Underdrain:	93.3

Discharge Structure

Riser Height: 0.5 ft.

Riser Diameter: 192 in.

Element Flows To:

Outlet 1 Outlet 2

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.6463	0.0000	0.0000	0.0000
0.0357	0.6463	0.0088	0.0000	0.0000
0.0714	0.6463	0.0175	0.0000	0.0000
0.1071	0.6463	0.0263	0.0000	0.0000
0.1429	0.6463	0.0351	0.0000	0.0000
0.1786	0.6463	0.0439	0.0000	0.0000
0.2143	0.6463	0.0526	0.0000	0.0000
0.2500	0.6463	0.0614	0.0000	0.0000
0.2857	0.6463	0.0702	0.0000	0.0000
0.3214	0.6463	0.0789	0.0000	0.0000
0.3571	0.6463	0.0877	0.0000	0.0000
0.3929	0.6463	0.0965	0.1322	0.0000
0.4286	0.6463	0.1052	0.1533	0.0000
0.4643	0.6463	0.1140	0.1625	0.0000
0.5000	0.6463	0.1228	0.2055	0.0000
0.5357	0.6463	0.1316	0.2111	0.0000
0.5714	0.6463	0.1403	0.2499	0.0000
0.6071	0.6463	0.1491	0.2722	0.0000
0.6429	0.6463	0.1579	0.2833	0.0000
0.6786	0.6463	0.1666	0.3130	0.0000
0.7143	0.6463	0.1754	0.3399	0.0000
0.7500	0.6463	0.1842	0.3648	0.0000
0.7857	0.6463	0.1930	0.3881	0.0000
0.8214	0.6463	0.2017	0.4100	0.0000
0.8571	0.6463	0.2105	0.4307	0.0000
0.8929	0.6463	0.2193	0.4505	0.0000
0.9286	0.6463	0.2280	0.4694	0.0000
0.9643	0.6463	0.2368	0.4876	0.0000
1.0000	0.6463	0.2456	0.5050	0.0000
1.0357	0.6463	0.2543	0.5219	0.0000
1.0714	0.6463	0.2631	0.5383	0.0000

1.1071	0.6463	0.2719	0.5541	0.0000
1.1429	0.6463	0.2807	0.5695	0.0000
1.1786	0.6463	0.2894	0.5845	0.0000
1.2143	0.6463	0.2982	0.5992	0.0000
1.2500	0.6463	0.3070	0.6134	0.0000
1.2857	0.6463	0.3157	0.6273	0.0000
1.3214	0.6463	0.3245	0.6410	0.0000
1.3571	0.6463	0.3333	0.6543	0.0000
1.3929	0.6463	0.3421	0.6674	0.0000
1.4286	0.6463	0.3508	0.6802	0.0000
1.4643	0.6463	0.3596	0.6928	0.0000
1.5000	0.6463	0.3692	0.7051	0.0000
1.5357	0.6463	0.3787	0.7173	0.0000
1.5714	0.6463	0.3883	0.7292	0.0000
1.6071	0.6463	0.3979	0.7410	0.0000
1.6429	0.6463	0.4075	0.7526	0.0000
1.6786	0.6463	0.4171	0.7639	0.0000
1.7143	0.6463	0.4266	0.7752	0.0000
1.7500	0.6463	0.4362	0.7862	0.0000
1.7857	0.6463	0.4458	0.7972	0.0000
1.8214	0.6463	0.4554	0.8079	0.0000
1.8571	0.6463	0.4650	0.8186	0.0000
1.8929	0.6463	0.4745	0.8291	0.0000
1.9286	0.6463	0.4841	0.8395	0.0000
1.9643	0.6463	0.4937	0.8497	0.0000
2.0000	0.6463	0.5033	0.8599	0.0000
2.0357	0.6463	0.5128	0.8699	0.0000
2.0714	0.6463	0.5224	0.8799	0.0000
2.1071	0.6463	0.5320	0.8897	0.0000
2.1429	0.6463	0.5416	0.8995	0.0000
2.1786	0.6463	0.5512	0.9091	0.0000
2.2143	0.6463	0.5607	0.9187	0.0000
2.2500	0.6463	0.5703	0.9283	0.0000
2.2857	0.6463	0.5799	0.9378	0.0000
2.3214	0.6463	0.5895	0.9474	0.0000
2.3571	0.6463	0.5991	0.9572	0.0000
2.3929	0.6463	0.6086	0.9769	0.0000
2.4286	0.6463	0.6182	0.9856	0.0000
2.4643	0.6463	0.6278	0.9942	0.0000
2.5000	0.6463	0.6374	1.0028	0.0000

Bioretention Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**To Amended(cfs)**	**Infilt(cfs)**
2.5000	0.6463	0.6374	0.0000	3.2582	0.0000
2.5357	0.6463	0.6604	0.0000	3.2582	0.0000
2.5714	0.6463	0.6835	0.0000	3.4133	0.0000
2.6071	0.6463	0.7066	0.0000	3.4909	0.0000
2.6429	0.6463	0.7297	0.0000	3.5685	0.0000
2.6786	0.6463	0.7528	0.0000	3.6461	0.0000
2.7143	0.6463	0.7758	0.0000	3.7236	0.0000
2.7500	0.6463	0.7989	0.0000	3.8012	0.0000
2.7857	0.6463	0.8220	0.0000	3.8788	0.0000
2.8214	0.6463	0.8451	0.0000	3.9564	0.0000
2.8571	0.6463	0.8682	0.0000	4.0339	0.0000
2.8929	0.6463	0.8913	0.0000	4.1115	0.0000
2.9286	0.6463	0.9143	0.0000	4.1891	0.0000
2.9643	0.6463	0.9374	0.0000	4.2667	0.0000
3.0000	0.6463	0.9605	0.0000	4.3443	0.0000

3.0357	0.6463	0.9836	1.1469	4.4218	0.0000
3.0714	0.6463	1.0067	3.2435	4.4994	0.0000
3.1071	0.6463	1.0297	5.9579	4.5770	0.0000
3.1429	0.6463	1.0528	9.1716	4.6546	0.0000
3.1786	0.6463	1.0759	12.816	4.7321	0.0000
3.2143	0.6463	1.0990	16.845	4.8097	0.0000
3.2500	0.6463	1.1221	21.225	4.8873	0.0000
3.2500	0.6463	1.1221	25.930	4.8873	0.0000

Surface Bio-C

Element Flows To:

Outlet 1	Outlet 2
	Bio-C

Bio-D

Bottom Length:	3229.00 ft.
Bottom Width:	37.97 ft.
Material thickness of first layer:	1.5
Material type for first layer:	BAHM 5
Material thickness of second layer:	1
Material type for second layer:	GRAVEL
Material thickness of third layer:	0
Material type for third layer:	GRAVEL
Underdrain used	
Underdrain Diameter (feet):	2
Orifice Diameter (in.):	18
Offset (in.):	0
Flow Through Underdrain (ac-ft.):	3997.446
Total Outflow (ac-ft.):	4097.052
Percent Through Underdrain:	97.57

Discharge Structure

Riser Height: 0.5 ft.

Riser Diameter: 575 in.

Element Flows To:

Outlet 1 Outlet 2

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	2.8146	0.0000	0.0000	0.0000
0.0357	2.8146	0.0382	0.0000	0.0000
0.0714	2.8146	0.0764	0.0000	0.0000
0.1071	2.8146	0.1146	0.0000	0.0000
0.1429	2.8146	0.1528	0.0000	0.0000
0.1786	2.8146	0.1910	0.0000	0.0000
0.2143	2.8146	0.2292	0.0000	0.0000
0.2500	2.8146	0.2674	0.0000	0.0000
0.2857	2.8146	0.3056	0.0000	0.0000
0.3214	2.8146	0.3438	0.0000	0.0000
0.3571	2.8146	0.3820	0.0000	0.0000
0.3929	2.8146	0.4202	0.5758	0.0000
0.4286	2.8146	0.4584	0.6676	0.0000
0.4643	2.8146	0.4966	0.7737	0.0000
0.5000	2.8146	0.5348	0.8950	0.0000
0.5357	2.8146	0.5730	1.0319	0.0000
0.5714	2.8146	0.6112	1.1854	0.0000
0.6071	2.8146	0.6494	1.3559	0.0000
0.6429	2.8146	0.6876	1.4628	0.0000
0.6786	2.8146	0.7258	1.7506	0.0000
0.7143	2.8146	0.7640	1.8608	0.0000
0.7500	2.8146	0.8022	1.8996	0.0000
0.7857	2.8146	0.8404	2.2495	0.0000
0.8214	2.8146	0.8786	2.4852	0.0000
0.8571	2.8146	0.9168	2.5497	0.0000
0.8929	2.8146	0.9550	2.8166	0.0000
0.9286	2.8146	0.9932	3.0594	0.0000
0.9643	2.8146	1.0314	3.2373	0.0000
1.0000	2.8146	1.0696	3.2836	0.0000
1.0357	2.8146	1.1078	3.4928	0.0000
1.0714	2.8146	1.1460	3.6898	0.0000

1.1071	2.8146	1.1842	3.8765	0.0000
1.1429	2.8146	1.2224	4.0544	0.0000
1.1786	2.8146	1.2606	4.2246	0.0000
1.2143	2.8146	1.2987	4.3880	0.0000
1.2500	2.8146	1.3369	4.5454	0.0000
1.2857	2.8146	1.3751	4.6974	0.0000
1.3214	2.8146	1.4133	4.8445	0.0000
1.3571	2.8146	1.4515	4.9872	0.0000
1.3929	2.8146	1.4897	5.1259	0.0000
1.4286	2.8146	1.5279	5.2608	0.0000
1.4643	2.8146	1.5661	5.3924	0.0000
1.5000	2.8146	1.6079	5.5207	0.0000
1.5357	2.8146	1.6496	5.6461	0.0000
1.5714	2.8146	1.6913	5.7688	0.0000
1.6071	2.8146	1.7330	5.8889	0.0000
1.6429	2.8146	1.7747	6.0065	0.0000
1.6786	2.8146	1.8164	6.1219	0.0000
1.7143	2.8146	1.8582	6.2351	0.0000
1.7500	2.8146	1.8999	6.3463	0.0000
1.7857	2.8146	1.9416	6.4556	0.0000
1.8214	2.8146	1.9833	6.5631	0.0000
1.8571	2.8146	2.0250	6.6689	0.0000
1.8929	2.8146	2.0667	6.7730	0.0000
1.9286	2.8146	2.1085	6.8755	0.0000
1.9643	2.8146	2.1502	6.9766	0.0000
2.0000	2.8146	2.1919	7.0762	0.0000
2.0357	2.8146	2.2336	7.1745	0.0000
2.0714	2.8146	2.2753	7.2715	0.0000
2.1071	2.8146	2.3170	7.3672	0.0000
2.1429	2.8146	2.3588	7.4618	0.0000
2.1786	2.8146	2.4005	7.5552	0.0000
2.2143	2.8146	2.4422	7.6476	0.0000
2.2500	2.8146	2.4839	7.7389	0.0000
2.2857	2.8146	2.5256	7.8293	0.0000
2.3214	2.8146	2.5673	7.9187	0.0000
2.3571	2.8146	2.6091	8.0951	0.0000
2.3929	2.8146	2.6508	8.2686	0.0000
2.4286	2.8146	2.6925	8.4404	0.0000
2.4643	2.8146	2.7342	8.6144	0.0000
2.5000	2.8146	2.7759	8.8705	0.0000

Bioretention Hydraulic Table

Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**To Amended(cfs)**	**Infilt(cfs)**
2.5000	2.8146	2.7759	0.0000	14.190	0.0000
2.5357	2.8146	2.8764	0.0000	14.190	0.0000
2.5714	2.8146	2.9770	0.0000	14.866	0.0000
2.6071	2.8146	3.0775	0.0000	15.204	0.0000
2.6429	2.8146	3.1780	0.0000	15.542	0.0000
2.6786	2.8146	3.2785	0.0000	15.880	0.0000
2.7143	2.8146	3.3791	0.0000	16.218	0.0000
2.7500	2.8146	3.4796	0.0000	16.555	0.0000
2.7857	2.8146	3.5801	0.0000	16.893	0.0000
2.8214	2.8146	3.6806	0.0000	17.231	0.0000
2.8571	2.8146	3.7811	0.0000	17.569	0.0000
2.8929	2.8146	3.8817	0.0000	17.907	0.0000
2.9286	2.8146	3.9822	0.0000	18.245	0.0000
2.9643	2.8146	4.0827	0.0000	18.583	0.0000
3.0000	2.8146	4.1832	0.0000	18.921	0.0000

3.0357	2.8146	4.2838	3.4351	19.258	0.0000
3.0714	2.8146	4.3843	9.7154	19.596	0.0000
3.1071	2.8146	4.4848	17.847	19.934	0.0000
3.1429	2.8146	4.5853	27.477	20.272	0.0000
3.1786	2.8146	4.6859	38.398	20.610	0.0000
3.2143	2.8146	4.7864	50.473	20.948	0.0000
3.2500	2.8146	4.8869	63.600	21.286	0.0000
3.2500	2.8146	4.8869	77.701	21.286	0.0000

Surface Bio-D

Element Flows To:

Outlet 1	Outlet 2
	Bio-D

Bio-A

Bottom Length: 666.00 ft.
Bottom Width: 28.89 ft.
Material thickness of first layer: 1.5
Material type for first layer: BAHM 5
Material thickness of second layer: 1
Material type for second layer: GRAVEL
Material thickness of third layer: 0
Material type for third layer: GRAVEL
Underdrain used
Underdrain Diameter (feet): 0.5
Orifice Diameter (in.): 6
Offset (in.): 0
Flow Through Underdrain (ac-ft.): 479.769
Total Outflow (ac-ft.): 488.527
Percent Through Underdrain: 98.21
Discharge Structure
Riser Height: 0.5 ft.
Riser Diameter: 96 in.
Element Flows To:
Outlet 1 Outlet 2

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.4417	0.0000	0.0000	0.0000
0.0357	0.4417	0.0060	0.0000	0.0000
0.0714	0.4417	0.0120	0.0000	0.0000
0.1071	0.4417	0.0180	0.0000	0.0000
0.1429	0.4417	0.0240	0.0000	0.0000
0.1786	0.4417	0.0300	0.0000	0.0000
0.2143	0.4417	0.0360	0.0000	0.0000
0.2500	0.4417	0.0420	0.0000	0.0000
0.2857	0.4417	0.0480	0.0000	0.0000
0.3214	0.4417	0.0540	0.0000	0.0000
0.3571	0.4417	0.0599	0.0000	0.0000
0.3929	0.4417	0.0659	0.0904	0.0000
0.4286	0.4417	0.0719	0.1048	0.0000
0.4643	0.4417	0.0779	0.1214	0.0000
0.5000	0.4417	0.0839	0.1404	0.0000
0.5357	0.4417	0.0899	0.1619	0.0000
0.5714	0.4417	0.0959	0.1625	0.0000
0.6071	0.4417	0.1019	0.2111	0.0000
0.6429	0.4417	0.1079	0.2272	0.0000
0.6786	0.4417	0.1139	0.2423	0.0000
0.7143	0.4417	0.1199	0.2499	0.0000
0.7500	0.4417	0.1259	0.2833	0.0000
0.7857	0.4417	0.1319	0.3130	0.0000
0.8214	0.4417	0.1379	0.3399	0.0000
0.8571	0.4417	0.1439	0.3648	0.0000
0.8929	0.4417	0.1499	0.3881	0.0000
0.9286	0.4417	0.1559	0.4100	0.0000
0.9643	0.4417	0.1619	0.4307	0.0000
1.0000	0.4417	0.1678	0.4505	0.0000
1.0357	0.4417	0.1738	0.4694	0.0000
1.0714	0.4417	0.1798	0.4876	0.0000

1.1071	0.4417	0.1858	0.5050	0.0000
1.1429	0.4417	0.1918	0.5219	0.0000
1.1786	0.4417	0.1978	0.5383	0.0000
1.2143	0.4417	0.2038	0.5541	0.0000
1.2500	0.4417	0.2098	0.5695	0.0000
1.2857	0.4417	0.2158	0.5845	0.0000
1.3214	0.4417	0.2218	0.5992	0.0000
1.3571	0.4417	0.2278	0.6134	0.0000
1.3929	0.4417	0.2338	0.6273	0.0000
1.4286	0.4417	0.2398	0.6410	0.0000
1.4643	0.4417	0.2458	0.6543	0.0000
1.5000	0.4417	0.2523	0.6674	0.0000
1.5357	0.4417	0.2589	0.6802	0.0000
1.5714	0.4417	0.2654	0.6928	0.0000
1.6071	0.4417	0.2720	0.7051	0.0000
1.6429	0.4417	0.2785	0.7173	0.0000
1.6786	0.4417	0.2851	0.7292	0.0000
1.7143	0.4417	0.2916	0.7410	0.0000
1.7500	0.4417	0.2982	0.7526	0.0000
1.7857	0.4417	0.3047	0.7639	0.0000
1.8214	0.4417	0.3112	0.7752	0.0000
1.8571	0.4417	0.3178	0.7862	0.0000
1.8929	0.4417	0.3243	0.7972	0.0000
1.9286	0.4417	0.3309	0.8079	0.0000
1.9643	0.4417	0.3374	0.8186	0.0000
2.0000	0.4417	0.3440	0.8291	0.0000
2.0357	0.4417	0.3505	0.8395	0.0000
2.0714	0.4417	0.3571	0.8497	0.0000
2.1071	0.4417	0.3636	0.8599	0.0000
2.1429	0.4417	0.3702	0.8699	0.0000
2.1786	0.4417	0.3767	0.8799	0.0000
2.2143	0.4417	0.3833	0.8897	0.0000
2.2500	0.4417	0.3898	0.8995	0.0000
2.2857	0.4417	0.3964	0.9091	0.0000
2.3214	0.4417	0.4029	0.9187	0.0000
2.3571	0.4417	0.4094	0.9283	0.0000
2.3929	0.4417	0.4160	0.9378	0.0000
2.4286	0.4417	0.4225	0.9474	0.0000
2.4643	0.4417	0.4291	0.9572	0.0000
2.5000	0.4417	0.4356	0.9856	0.0000

Bioretention Hydraulic Table

Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	To Amended(cfs)	Infilt(cfs)
2.5000	0.4417	0.4356	0.0000	2.2269	0.0000
2.5357	0.4417	0.4514	0.0000	2.2269	0.0000
2.5714	0.4417	0.4672	0.0000	2.3330	0.0000
2.6071	0.4417	0.4830	0.0000	2.3860	0.0000
2.6429	0.4417	0.4987	0.0000	2.4390	0.0000
2.6786	0.4417	0.5145	0.0000	2.4921	0.0000
2.7143	0.4417	0.5303	0.0000	2.5451	0.0000
2.7500	0.4417	0.5461	0.0000	2.5981	0.0000
2.7857	0.4417	0.5618	0.0000	2.6511	0.0000
2.8214	0.4417	0.5776	0.0000	2.7041	0.0000
2.8571	0.4417	0.5934	0.0000	2.7572	0.0000
2.8929	0.4417	0.6092	0.0000	2.8102	0.0000
2.9286	0.4417	0.6249	0.0000	2.8632	0.0000
2.9643	0.4417	0.6407	0.0000	2.9162	0.0000
3.0000	0.4417	0.6565	0.0000	2.9693	0.0000

3.0357	0.4417	0.6723	0.5734	3.0223	0.0000
3.0714	0.4417	0.6880	1.6213	3.0753	0.0000
3.1071	0.4417	0.7038	2.9779	3.1283	0.0000
3.1429	0.4417	0.7196	4.5838	3.1813	0.0000
3.1786	0.4417	0.7354	6.4048	3.2344	0.0000
3.2143	0.4417	0.7511	8.4179	3.2874	0.0000
3.2500	0.4417	0.7669	10.606	3.3404	0.0000
3.2500	0.4417	0.7669	12.956	3.3404	0.0000

Surface Bio-A

Element Flows To:

Outlet 1	Outlet 2
	Bio-A

Analysis Results

POC 1

POC #1 was not reported because POC must exist in both scenarios and both scenarios must have been run.

Model Default Modifications

Total of 0 changes have been made.

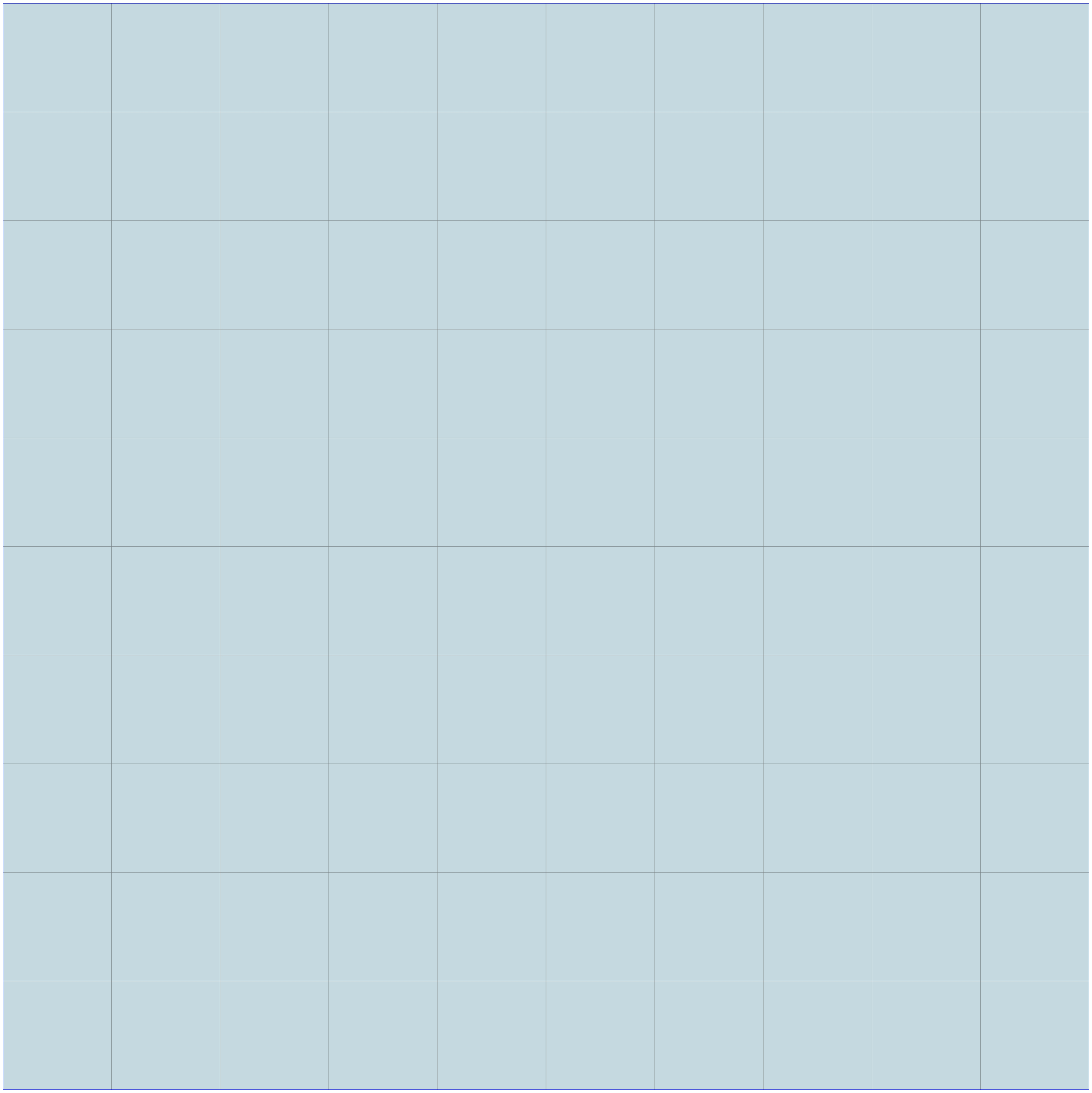
PERLND Changes

No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic

Predeveloped UCI File

Mitigated UCI File

```
RUN

GLOBAL
  WWHM4 model simulation
  START       1959 10 01        END    2003 09 30
  RUN INTERP OUTPUT LEVEL    3    0
  RESUME     0 RUN     1                   UNIT SYSTEM     1
END GLOBAL

FILES
<File>  <Un#>   <-----------File Name------------------------------>***
<-ID->                                                             ***
WDM        26   SuisunLogisticsCenter_BAHM.wdm
MESSU      25   MitSuisunLogisticsCenter_BAHM.MES
           27   MitSuisunLogisticsCenter_BAHM.L61
           28   MitSuisunLogisticsCenter_BAHM.L62
END FILES

OPN SEQUENCE
    INGRP              INDELT 00:60
      PERLND      37
      IMPLND       5
      IMPLND      14
      GENER        2
      RCHRES       1
      RCHRES       2
      GENER        4
      RCHRES       3
      RCHRES       4
      GENER        6
      RCHRES       5
      RCHRES       6
      GENER        8
      RCHRES       7
      RCHRES       8
    END INGRP
END OPN SEQUENCE
DISPLY
  DISPLY-INFO1
    # -  #<----------Title----------->***TRAN PIVL DIG1 FIL1  PYR DIG2 FIL2 YRND
  END DISPLY-INFO1
END DISPLY
COPY
  TIMESERIES
    # -  #  NPT  NMN ***
    1         1    1
  END TIMESERIES
END COPY
GENER
  OPCODE
    #    # OPCD ***
    2       24
    4       24
    6       24
    8       24
  END OPCODE
  PARM
    #    #         K ***
    2             0.
    4             0.
    6             0.
    8             0.
  END PARM
END GENER
PERLND
  GEN-INFO
    <PLS ><-------Name------->NBLKS   Unit-systems   Printer ***
    # -  #                          User  t-series Engl Metr ***
```

```
                                         in  out           ***
  37     C/D,Shrub,Flat(0-5%)    1    1    1    1   27    0
  END GEN-INFO
  *** Section PWATER***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC ***
  37         0    0    1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ***************************** PIVL  PYR
    # -  # ATMP SNOW PWAT  SED  PST  PWG PQAL MSTL PEST NITR PHOS TRAC  *********
  37         0    0    4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  PWAT-PARM1
    <PLS >  PWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP UZFG  VCS  VUZ  VNN VIFW VIRC  VLE INFC  HWT ***
  37         0    0    0    1    0    0    0    0    1    0    0
  END PWAT-PARM1

  PWAT-PARM2
    <PLS >      PWATER input info: Part 2         ***
    # -  # ***FOREST      LZSN    INFILT      LSUR     SLSUR     KVARY     AGWRC
  37              0         4      0.04       400      0.05         2      0.95
  END PWAT-PARM2

  PWAT-PARM3
    <PLS >      PWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN    INFEXP    INFILD    DEEPFR    BASETP    AGWETP
  37             40        35         3         2      0.15      0.15         0
  END PWAT-PARM3
  PWAT-PARM4
    <PLS >     PWATER input info: Part 4                               ***
    # -  #     CEPSC      UZSN      NSUR     INTFW       IRC     LZETP ***
  37              0       0.3       0.3      0.75       0.5         0
  END PWAT-PARM4
  MON-LZETPARM
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
  37        0.5  0.5  0.5  0.6 0.65 0.65 0.65 0.65 0.65 0.65 0.55  0.5
  END MON-LZETPARM
  MON-INTERCEP
    <PLS >      PWATER input info: Part 3         ***
    # -  #  JAN  FEB  MAR  APR  MAY  JUN  JUL  AUG  SEP  OCT  NOV  DEC  ***
  37       0.13 0.13 0.13 0.14 0.15 0.15 0.15 0.15 0.15 0.15 0.14 0.13
  END MON-INTERCEP

  PWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
              ran from 1990 to end of 1992 (pat 1-11-95) RUN 21 ***
    # -  # ***  CEPS      SURS       UZS      IFWS       LZS      AGWS      GWVS
  37              0         0      0.01         0       0.5       0.3      0.01
  END PWAT-STATE1

END PERLND

IMPLND
  GEN-INFO
    <PLS ><-------Name------->   Unit-systems   Printer ***
    # -  #                     User  t-series Engl Metr ***
                                      in  out           ***
    5     Roof Area              1    1    1   27    0
   14     Parking,Flat(0-5%)     1    1    1   27    0
  END GEN-INFO
  *** Section IWATER***

  ACTIVITY
```

```
    <PLS > ************* Active Sections *****************************
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL   ***
    5         0    0    1    0    0    0
   14         0    0    1    0    0    0
  END ACTIVITY

  PRINT-INFO
    <ILS > ******** Print-flags ******** PIVL  PYR
    # -  # ATMP SNOW IWAT  SLD  IWG IQAL    *********
    5         0    0    4    0    0    0    1    9
   14         0    0    4    0    0    0    1    9
  END PRINT-INFO

  IWAT-PARM1
    <PLS >  IWATER variable monthly parameter value flags  ***
    # -  # CSNO RTOP  VRS  VNN RTLI     ***
    5         0    0    0    0    0
   14         0    0    0    0    0
  END IWAT-PARM1

  IWAT-PARM2
    <PLS >      IWATER input info: Part 2         ***
    # -  # ***  LSUR     SLSUR      NSUR     RETSC
    5            100      0.05       0.1       0.1
   14            100      0.05       0.1       0.1
  END IWAT-PARM2

  IWAT-PARM3
    <PLS >      IWATER input info: Part 3         ***
    # -  # ***PETMAX    PETMIN
    5             0         0
   14             0         0
  END IWAT-PARM3

  IWAT-STATE1
    <PLS > *** Initial conditions at start of simulation
    # -  # ***  RETS      SURS
    5             0         0
   14             0         0
  END IWAT-STATE1

END IMPLND

SCHEMATIC
<-Source->                  <--Area-->     <-Target->   MBLK   ***
<Name>   #                  <-factor->     <Name>   #   Tbl#   ***
DMA-B***
PERLND  37                        0.56     RCHRES   1      2
IMPLND   5                        4.87     RCHRES   1      5
IMPLND  14                        1.18     RCHRES   1      5
DMA-C***
PERLND  37                        0.77     RCHRES   3      2
IMPLND   5                        7.43     RCHRES   3      5
IMPLND  14                        8.64     RCHRES   3      5
DMA-D***
PERLND  37                       10.54     RCHRES   5      2
IMPLND   5                        30.1     RCHRES   5      5
IMPLND  14                       39.21     RCHRES   5      5
DMA-A***
PERLND  37                        1.34     RCHRES   7      2
IMPLND   5                        4.58     RCHRES   7      5
IMPLND  14                        3.64     RCHRES   7      5

******Routing******
RCHRES   1                           1     RCHRES   2      8
RCHRES   3                           1     RCHRES   4      8
RCHRES   5                           1     RCHRES   6      8
RCHRES   7                           1     RCHRES   8      8
END SCHEMATIC
```

```
NETWORK
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
GENER    2 OUTPUT TIMSER      .0002778     RCHRES   1     EXTNL  OUTDGT 1
GENER    4 OUTPUT TIMSER      .0002778     RCHRES   3     EXTNL  OUTDGT 1
GENER    6 OUTPUT TIMSER      .0002778     RCHRES   5     EXTNL  OUTDGT 1
GENER    8 OUTPUT TIMSER      .0002778     RCHRES   7     EXTNL  OUTDGT 1


<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   #        <Name> # #<-factor->strg <Name>   #   #        <Name> # #  ***
END NETWORK

RCHRES
  GEN-INFO
    RCHRES       Name        Nexits   Unit Systems   Printer                 ***
    # -  #<------------------><---> User T-series  Engl Metr LKFG            ***
                                          in  out                            ***
    1     Surface Bio-B          2    1    1    1   28    0    1
    2     Bio-B                  1    1    1    1   28    0    1
    3     Surface Bio-C          2    1    1    1   28    0    1
    4     Bio-C                  1    1    1    1   28    0    1
    5     Surface Bio-D          2    1    1    1   28    0    1
    6     Bio-D                  1    1    1    1   28    0    1
    7     Surface Bio-A          2    1    1    1   28    0    1
    8     Bio-A                  1    1    1    1   28    0    1
  END GEN-INFO
  *** Section RCHRES***

  ACTIVITY
    <PLS > ************* Active Sections *****************************
    # -  # HYFG ADFG CNFG HTFG SDFG GQFG OXFG NUFG PKFG PHFG ***
    1         1    0    0    0    0    0    0    0    0    0
    2         1    0    0    0    0    0    0    0    0    0
    3         1    0    0    0    0    0    0    0    0    0
    4         1    0    0    0    0    0    0    0    0    0
    5         1    0    0    0    0    0    0    0    0    0
    6         1    0    0    0    0    0    0    0    0    0
    7         1    0    0    0    0    0    0    0    0    0
    8         1    0    0    0    0    0    0    0    0    0
  END ACTIVITY

  PRINT-INFO
    <PLS > ***************** Print-flags ****************** PIVL  PYR
    # -  # HYDR ADCA CONS HEAT  SED  GQL OXRX NUTR PLNK PHCB PIVL  PYR   *********
    1         4    0    0    0    0    0    0    0    0    0    1    9
    2         4    0    0    0    0    0    0    0    0    0    1    9
    3         4    0    0    0    0    0    0    0    0    0    1    9
    4         4    0    0    0    0    0    0    0    0    0    1    9
    5         4    0    0    0    0    0    0    0    0    0    1    9
    6         4    0    0    0    0    0    0    0    0    0    1    9
    7         4    0    0    0    0    0    0    0    0    0    1    9
    8         4    0    0    0    0    0    0    0    0    0    1    9
  END PRINT-INFO

  HYDR-PARM1
    RCHRES  Flags for each HYDR Section                                      ***
    # -  #  VC A1 A2 A3  ODFVFG for each *** ODGTFG for each     FUNCT  for each
            FG FG FG FG  possible  exit  *** possible  exit      possible  exit
             *  *  *  *    *  *  *  *  *        *  *  *  *  *        ***
    1        0  1  0  0    4  5  0  0  0        0  1  0  0  0      2  1  2  2  2
    2        0  1  0  0    4  0  0  0  0        0  0  0  0  0      2  2  2  2  2
    3        0  1  0  0    4  5  0  0  0        0  1  0  0  0      2  1  2  2  2
    4        0  1  0  0    4  0  0  0  0        0  0  0  0  0      2  2  2  2  2
    5        0  1  0  0    4  5  0  0  0        0  1  0  0  0      2  1  2  2  2
    6        0  1  0  0    4  0  0  0  0        0  0  0  0  0      2  2  2  2  2
    7        0  1  0  0    4  5  0  0  0        0  1  0  0  0      2  1  2  2  2
    8        0  1  0  0    4  0  0  0  0        0  0  0  0  0      2  2  2  2  2
  END HYDR-PARM1
```

```
  HYDR-PARM2
    # -  #    FTABNO       LEN     DELTH     STCOR        KS      DB50       ***
  <------><--------><--------><--------><--------><--------><-------->       ***
    1            1      0.01       0.0      12.8       0.0       0.0
    2            2      0.15       0.0      12.8       0.0       0.0
    3            3      0.01       0.0       0.0       0.0       0.0
    4            4      0.08       0.0       0.0       0.0       0.0
    5            5      0.01       0.0       0.0       0.0       0.0
    6            6      0.61       0.0       0.0       0.0       0.0
    7            7      0.01       0.0       0.0       0.0       0.0
    8            8      0.13       0.0       0.0       0.0       0.0
  END HYDR-PARM2
  HYDR-INIT
    RCHRES  Initial conditions for each HYDR section                         ***
    # -  # ***   VOL     Initial  value  of COLIND     Initial  value  of OUTDGT
          *** ac-ft     for each possible exit       for each possible exit
  <------><-------->     <---><---><---><---><---> *** <---><---><---><---><--->
    1           0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    2           0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    3           0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    4           0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    5           0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    6           0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    7           0         4.0  5.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
    8           0         4.0  0.0  0.0  0.0  0.0       0.0  0.0  0.0  0.0  0.0
  END HYDR-INIT
END RCHRES

SPEC-ACTIONS
*** User-Defined Variable Quantity Lines
***                          addr
***                        <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol2   RCHRES   2 VOL              4
  UVQUAN v2m2   GLOBAL     WORKSP  1        3
  UVQUAN vpo2   GLOBAL     WORKSP  2        3
  UVQUAN v2d2   GENER    2 K       1        3
*** User-Defined Variable Quantity Lines
***                          addr
***                        <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol4   RCHRES   4 VOL              4
  UVQUAN v2m4   GLOBAL     WORKSP  3        3
  UVQUAN vpo4   GLOBAL     WORKSP  4        3
  UVQUAN v2d4   GENER    4 K       1        3
*** User-Defined Variable Quantity Lines
***                          addr
***                        <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol6   RCHRES   6 VOL              4
  UVQUAN v2m6   GLOBAL     WORKSP  5        3
  UVQUAN vpo6   GLOBAL     WORKSP  6        3
  UVQUAN v2d6   GENER    6 K       1        3
*** User-Defined Variable Quantity Lines
***                          addr
***                        <------>
*** kwd  varnam optyp  opn  vari  s1 s2 s3 tp multiply  lc ls ac as agfn ***
  <****> <----> <----> <-> <----><-><-><-><-><--------> <><-> <><-> <--> ***
  UVQUAN vol8   RCHRES   8 VOL              4
  UVQUAN v2m8   GLOBAL     WORKSP  7        3
  UVQUAN vpo8   GLOBAL     WORKSP  8        3
  UVQUAN v2d8   GENER    8 K       1        3
*** User-Defined Target Variable Names
***                  addr or                        addr or
***                 <------>                       <------>
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
```

```
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m2    1 WORKSP  1         1.0 QUAN
  UVNAME  vpo2    1 WORKSP  2         1.0 QUAN
  UVNAME  v2d2    1 K       1         1.0 QUAN
*** User-Defined Target Variable Names
***                 addr or                       addr or
***                <------->                     <------->
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m4    1 WORKSP  3         1.0 QUAN
  UVNAME  vpo4    1 WORKSP  4         1.0 QUAN
  UVNAME  v2d4    1 K       1         1.0 QUAN
*** User-Defined Target Variable Names
***                 addr or                       addr or
***                <------->                     <------->
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m6    1 WORKSP  5         1.0 QUAN
  UVNAME  vpo6    1 WORKSP  6         1.0 QUAN
  UVNAME  v2d6    1 K       1         1.0 QUAN
*** User-Defined Target Variable Names
***                 addr or                       addr or
***                <------->                     <------->
*** kwd   varnam ct  vari  s1 s2 s3  frac oper     vari  s1 s2 s3  frac oper
  <****>  <----><-> <----><-><-><-> <---> <-->    <----><-><-><-> <---> <-->
  UVNAME  v2m8    1 WORKSP  7         1.0 QUAN
  UVNAME  vpo8    1 WORKSP  8         1.0 QUAN
  UVNAME  v2d8    1 K       1         1.0 QUAN
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   2                               v2m2            =  14491.87
*** Compute remaining available pore space
  GENER   2                               vpo2            =  v2m2
  GENER   2                               vpo2           -=  vol2
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo2 < 0.0) THEN
  GENER   2                               vpo2            =  0.0
END IF
*** Infiltration volume
  GENER   2                               v2d2            =  vpo2
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   4                               v2m4            =  31373.55
*** Compute remaining available pore space
  GENER   4                               vpo4            =  v2m4
  GENER   4                               vpo4           -=  vol4
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo4 < 0.0) THEN
  GENER   4                               vpo4            =  0.0
END IF
*** Infiltration volume
  GENER   4                               v2d4            =  vpo4
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   6                               v2m6            =  152853.04
*** Compute remaining available pore space
  GENER   6                               vpo6            =  v2m6
  GENER   6                               vpo6           -=  vol6
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo6 < 0.0) THEN
  GENER   6                               vpo6            =  0.0
END IF
*** Infiltration volume
  GENER   6                               v2d6            =  vpo6
*** opt foplop dcdts  yr mo dy hr mn d t   vnam  s1 s2 s3 ac quantity  tc  ts rp
  <****><-><--><><-><--> <> <> <> <><><>  <----><-><-><-><-><--------> <> <-><->
  GENER   8                               v2m8            =  22524.37
*** Compute remaining available pore space
  GENER   8                               vpo8            =  v2m8
  GENER   8                               vpo8           -=  vol8
```

```
*** Check to see if VPORA goes negative; if so set VPORA = 0.0
IF (vpo8 < 0.0) THEN
  GENER   8                             vpo8            =  0.0
END IF
*** Infiltration volume
  GENER   8                             v2d8            =  vpo8
END SPEC-ACTIONS
FTABLES
  FTABLE      2
   71    4
     Depth      Area    Volume  Outflow1 Velocity  Travel Time***
      (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
  0.000000  0.254735  0.000000  0.000000
  0.035714  0.254735  0.003457  0.000000
  0.071429  0.254735  0.006914  0.000000
  0.107143  0.254735  0.010371  0.000000
  0.142857  0.254735  0.013828  0.000000
  0.178571  0.254735  0.017286  0.000000
  0.214286  0.254735  0.020743  0.000000
  0.250000  0.254735  0.024200  0.000000
  0.285714  0.254735  0.027657  0.000000
  0.321429  0.254735  0.031114  0.000000
  0.357143  0.254735  0.034571  0.000000
  0.392857  0.254735  0.038028  0.052109
  0.428571  0.254735  0.041485  0.060419
  0.464286  0.254735  0.044943  0.070026
  0.500000  0.254735  0.048400  0.080997
  0.535714  0.254735  0.051857  0.093395
  0.571429  0.254735  0.055314  0.107282
  0.607143  0.254735  0.058771  0.122713
  0.642857  0.254735  0.062228  0.139746
  0.678571  0.254735  0.065685  0.158432
  0.714286  0.254735  0.069142  0.162537
  0.750000  0.254735  0.072599  0.200971
  0.785714  0.254735  0.076057  0.211064
  0.821429  0.254735  0.079514  0.237588
  0.857143  0.254735  0.082971  0.249944
  0.892857  0.254735  0.086428  0.278418
  0.928571  0.254735  0.089885  0.283298
  0.964286  0.254735  0.093342  0.312959
  1.000000  0.254735  0.096799  0.339670
  1.035714  0.254735  0.100256  0.339933
  1.071429  0.254735  0.103713  0.364840
  1.107143  0.254735  0.107171  0.388092
  1.142857  0.254735  0.110628  0.409983
  1.178571  0.254735  0.114085  0.430727
  1.214286  0.254735  0.117542  0.450489
  1.250000  0.254735  0.120999  0.469396
  1.285714  0.254735  0.124456  0.487552
  1.321429  0.254735  0.127913  0.505039
  1.357143  0.254735  0.131370  0.521929
  1.392857  0.254735  0.134828  0.538277
  1.428571  0.254735  0.138285  0.554134
  1.464286  0.254735  0.141742  0.569543
  1.500000  0.254735  0.145517  0.584538
  1.535714  0.254735  0.149293  0.599153
  1.571429  0.254735  0.153068  0.613415
  1.607143  0.254735  0.156844  0.627349
  1.642857  0.254735  0.160619  0.640977
  1.678571  0.254735  0.164395  0.654318
  1.714286  0.254735  0.168170  0.667391
  1.750000  0.254735  0.171946  0.680211
  1.785714  0.254735  0.175722  0.692793
  1.821429  0.254735  0.179497  0.705150
  1.857143  0.254735  0.183273  0.717294
  1.892857  0.254735  0.187048  0.729235
  1.928571  0.254735  0.190824  0.740986
  1.964286  0.254735  0.194599  0.752553
  2.000000  0.254735  0.198375  0.763947
  2.035714  0.254735  0.202150  0.775176
```

```
2.071429  0.254735  0.205926  0.786247
2.107143  0.254735  0.209701  0.797167
2.142857  0.254735  0.213477  0.807943
2.178571  0.254735  0.217252  0.818581
2.214286  0.254735  0.221028  0.829089
2.250000  0.254735  0.224804  0.839470
2.285714  0.254735  0.228579  0.859880
2.321429  0.254735  0.232355  0.879858
2.357143  0.254735  0.236130  0.899454
2.392857  0.254735  0.239906  0.918733
2.428571  0.254735  0.243681  0.937818
2.464286  0.254735  0.247457  0.957153
2.500000  0.254735  0.332688  0.985609
END FTABLE  2
FTABLE      1
 23    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)      (cfs)   (ft/sec)    (Minutes)***
0.000000  0.254735  0.000000  0.000000  0.000000
0.035714  0.254735  0.009098  0.000000  1.284289
0.071429  0.254735  0.018195  0.000000  1.345446
0.107143  0.254735  0.027293  0.000000  1.376024
0.142857  0.254735  0.036391  0.000000  1.406602
0.178571  0.254735  0.045488  0.000000  1.437181
0.214286  0.254735  0.054586  0.000000  1.467759
0.250000  0.254735  0.063684  0.000000  1.498337
0.285714  0.254735  0.072781  0.000000  1.528916
0.321429  0.254735  0.081879  0.000000  1.559494
0.357143  0.254735  0.090977  0.000000  1.590072
0.392857  0.254735  0.100074  0.000000  1.620651
0.428571  0.254735  0.109172  0.000000  1.651229
0.464286  0.254735  0.118270  0.000000  1.681807
0.500000  0.254735  0.127367  0.000000  1.712386
0.535714  0.254735  0.136465  0.716752  1.742964
0.571429  0.254735  0.145563  2.026852  1.773542
0.607143  0.254735  0.154660  3.722847  1.804121
0.642857  0.254735  0.163758  5.730686  1.834699
0.678571  0.254735  0.172856  8.007567  1.865277
0.714286  0.254735  0.181953  10.52461  1.895856
0.750000  0.254735  0.191051  13.26059  1.926434
0.750000  0.254735  0.191051  16.19904  1.926434
END FTABLE  1
FTABLE      4
 71    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  0.646252  0.000000  0.000000
0.035714  0.646252  0.008771  0.000000
0.071429  0.646252  0.017541  0.000000
0.107143  0.646252  0.026312  0.000000
0.142857  0.646252  0.035082  0.000000
0.178571  0.646252  0.043853  0.000000
0.214286  0.646252  0.052623  0.000000
0.250000  0.646252  0.061394  0.000000
0.285714  0.646252  0.070164  0.000000
0.321429  0.646252  0.078935  0.000000
0.357143  0.646252  0.087706  0.000000
0.392857  0.646252  0.096476  0.132199
0.428571  0.646252  0.105247  0.153280
0.464286  0.646252  0.114017  0.162537
0.500000  0.646252  0.122788  0.205486
0.535714  0.646252  0.131558  0.211064
0.571429  0.646252  0.140329  0.249944
0.607143  0.646252  0.149099  0.272169
0.642857  0.646252  0.157870  0.283298
0.678571  0.646252  0.166641  0.312959
0.714286  0.646252  0.175411  0.339933
0.750000  0.646252  0.184182  0.364840
0.785714  0.646252  0.192952  0.388092
0.821429  0.646252  0.201723  0.409983
```

0.857143	0.646252	0.210493	0.430727
0.892857	0.646252	0.219264	0.450489
0.928571	0.646252	0.228034	0.469396
0.964286	0.646252	0.236805	0.487552
1.000000	0.646252	0.245576	0.505039
1.035714	0.646252	0.254346	0.521929
1.071429	0.646252	0.263117	0.538277
1.107143	0.646252	0.271887	0.554134
1.142857	0.646252	0.280658	0.569543
1.178571	0.646252	0.289428	0.584538
1.214286	0.646252	0.298199	0.599153
1.250000	0.646252	0.306970	0.613415
1.285714	0.646252	0.315740	0.627349
1.321429	0.646252	0.324511	0.640977
1.357143	0.646252	0.333281	0.654318
1.392857	0.646252	0.342052	0.667391
1.428571	0.646252	0.350822	0.680211
1.464286	0.646252	0.359593	0.692793
1.500000	0.646252	0.369171	0.705150
1.535714	0.646252	0.378750	0.717294
1.571429	0.646252	0.388328	0.729235
1.607143	0.646252	0.397906	0.740986
1.642857	0.646252	0.407485	0.752553
1.678571	0.646252	0.417063	0.763947
1.714286	0.646252	0.426641	0.775176
1.750000	0.646252	0.436220	0.786247
1.785714	0.646252	0.445798	0.797167
1.821429	0.646252	0.455377	0.807943
1.857143	0.646252	0.464955	0.818581
1.892857	0.646252	0.474533	0.829089
1.928571	0.646252	0.484112	0.839470
1.964286	0.646252	0.493690	0.849732
2.000000	0.646252	0.503268	0.859880
2.035714	0.646252	0.512847	0.869920
2.071429	0.646252	0.522425	0.879858
2.107143	0.646252	0.532004	0.889700
2.142857	0.646252	0.541582	0.899454
2.178571	0.646252	0.551160	0.909128
2.214286	0.646252	0.560739	0.918733
2.250000	0.646252	0.570317	0.928288
2.285714	0.646252	0.579895	0.937818
2.321429	0.646252	0.589474	0.947383
2.357143	0.646252	0.599052	0.957153
2.392857	0.646252	0.608631	0.976925
2.428571	0.646252	0.618209	0.985609
2.464286	0.646252	0.627787	0.994217
2.500000	0.646252	0.720238	1.002751

END FTABLE 4
FTABLE 3
23 5

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.646252	0.000000	0.000000	0.000000		
0.035714	0.646252	0.023080	0.000000	3.258188		
0.071429	0.646252	0.046161	0.000000	3.413340		
0.107143	0.646252	0.069241	0.000000	3.490915		
0.142857	0.646252	0.092322	0.000000	3.568491		
0.178571	0.646252	0.115402	0.000000	3.646067		
0.214286	0.646252	0.138482	0.000000	3.723643		
0.250000	0.646252	0.161563	0.000000	3.801219		
0.285714	0.646252	0.184643	0.000000	3.878795		
0.321429	0.646252	0.207724	0.000000	3.956371		
0.357143	0.646252	0.230804	0.000000	4.033947		
0.392857	0.646252	0.253885	0.000000	4.111523		
0.428571	0.646252	0.276965	0.000000	4.189099		
0.464286	0.646252	0.300045	0.000000	4.266674		
0.500000	0.646252	0.323126	0.000000	4.344250		
0.535714	0.646252	0.346206	1.146901	4.421826		
0.571429	0.646252	0.369287	3.243472	4.499402		
0.607143	0.646252	0.392367	5.957855	4.576978		

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0.642857  0.646252  0.415447  9.171581  4.654554
0.678571  0.646252  0.438528  12.81617  4.732130
0.714286  0.646252  0.461608  16.84543  4.809706
0.750000  0.646252  0.484689  21.22543  4.887282
0.750000  0.646252  0.484689  25.92988  4.887282
END FTABLE  3
FTABLE      6
 71    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)   (cfs)   (ft/sec)    (Minutes)***
0.000000  2.814626  0.000000  0.000000
0.035714  2.814626  0.038199  0.000000
0.071429  2.814626  0.076397  0.000000
0.107143  2.814626  0.114596  0.000000
0.142857  2.814626  0.152794  0.000000
0.178571  2.814626  0.190993  0.000000
0.214286  2.814626  0.229191  0.000000
0.250000  2.814626  0.267390  0.000000
0.285714  2.814626  0.305588  0.000000
0.321429  2.814626  0.343787  0.000000
0.357143  2.814626  0.381985  0.000000
0.392857  2.814626  0.420184  0.575769
0.428571  2.814626  0.458382  0.667584
0.464286  2.814626  0.496581  0.773732
0.500000  2.814626  0.534779  0.894954
0.535714  2.814626  0.572978  1.031948
0.571429  2.814626  0.611176  1.185382
0.607143  2.814626  0.649375  1.355890
0.642857  2.814626  0.687573  1.462830
0.678571  2.814626  0.725772  1.750557
0.714286  2.814626  0.763970  1.860824
0.750000  2.814626  0.802169  1.899578
0.785714  2.814626  0.840367  2.249500
0.821429  2.814626  0.878566  2.485212
0.857143  2.814626  0.916764  2.549678
0.892857  2.814626  0.954963  2.816631
0.928571  2.814626  0.993161  3.059399
0.964286  2.814626  1.031360  3.237318
1.000000  2.814626  1.069558  3.283558
1.035714  2.814626  1.107757  3.492832
1.071429  2.814626  1.145955  3.689848
1.107143  2.814626  1.184154  3.876544
1.142857  2.814626  1.222352  4.054397
1.178571  2.814626  1.260551  4.224563
1.214286  2.814626  1.298749  4.387964
1.250000  2.814626  1.336948  4.545355
1.285714  2.814626  1.375146  4.697357
1.321429  2.814626  1.413345  4.844494
1.357143  2.814626  1.451543  4.987210
1.392857  2.814626  1.489742  5.125883
1.428571  2.814626  1.527940  5.260842
1.464286  2.814626  1.566139  5.392376
1.500000  2.814626  1.607855  5.520734
1.535714  2.814626  1.649572  5.646139
1.571429  2.814626  1.691289  5.768791
1.607143  2.814626  1.733006  5.888865
1.642857  2.814626  1.774723  6.006520
1.678571  2.814626  1.816439  6.121901
1.714286  2.814626  1.858156  6.235138
1.750000  2.814626  1.899873  6.346349
1.785714  2.814626  1.941590  6.455643
1.821429  2.814626  1.983306  6.563119
1.857143  2.814626  2.025023  6.668870
1.892857  2.814626  2.066740  6.772979
1.928571  2.814626  2.108457  6.875526
1.964286  2.814626  2.150174  6.976583
2.000000  2.814626  2.191890  7.076220
2.035714  2.814626  2.233607  7.174501
2.071429  2.814626  2.275324  7.271486
2.107143  2.814626  2.317041  7.367233
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2.142857  2.814626  2.358758  7.461798
2.178571  2.814626  2.400474  7.555233
2.214286  2.814626  2.442191  7.647592
2.250000  2.814626  2.483908  7.738924
2.285714  2.814626  2.525625  7.829283
2.321429  2.814626  2.567341  7.918723
2.357143  2.814626  2.609058  8.095083
2.392857  2.814626  2.650775  8.268600
2.428571  2.814626  2.692492  8.440363
2.464286  2.814626  2.734209  8.614378
2.500000  2.814626  3.509023  8.870481
END FTABLE  6
FTABLE      5
 23    5
   Depth      Area    Volume  Outflow1  Outflow2  Velocity  Travel Time***
    (ft)   (acres) (acre-ft)    (cfs)      (cfs)  (ft/sec)    (Minutes)***
0.000000  2.814626  0.000000  0.000000  0.000000
0.035714  2.814626  0.100522  0.000000  14.19042
0.071429  2.814626  0.201045  0.000000  14.86615
0.107143  2.814626  0.301567  0.000000  15.20402
0.142857  2.814626  0.402089  0.000000  15.54189
0.178571  2.814626  0.502612  0.000000  15.87976
0.214286  2.814626  0.603134  0.000000  16.21762
0.250000  2.814626  0.703657  0.000000  16.55549
0.285714  2.814626  0.804179  0.000000  16.89336
0.321429  2.814626  0.904701  0.000000  17.23122
0.357143  2.814626  1.005224  0.000000  17.56909
0.392857  2.814626  1.105746  0.000000  17.90696
0.428571  2.814626  1.206268  0.000000  18.24483
0.464286  2.814626  1.306791  0.000000  18.58269
0.500000  2.814626  1.407313  0.000000  18.92056
0.535714  2.814626  1.507836  3.435066  19.25843
0.571429  2.814626  1.608358  9.715350  19.59629
0.607143  2.814626  1.708880  17.84737  19.93416
0.642857  2.814626  1.809403  27.47651  20.27203
0.678571  2.814626  1.909925  38.39781  20.60990
0.714286  2.814626  2.010447  50.47292  20.94776
0.750000  2.814626  2.110970  63.60030  21.28563
0.750000  2.814626  2.110970  77.70125  21.28563
END FTABLE  5
FTABLE      8
 71    4
   Depth      Area    Volume  Outflow1 Velocity  Travel Time***
    (ft)   (acres) (acre-ft)    (cfs)   (ft/sec)    (Minutes)***
0.000000  0.441707  0.000000  0.000000
0.035714  0.441707  0.005995  0.000000
0.071429  0.441707  0.011989  0.000000
0.107143  0.441707  0.017984  0.000000
0.142857  0.441707  0.023978  0.000000
0.178571  0.441707  0.029973  0.000000
0.214286  0.441707  0.035968  0.000000
0.250000  0.441707  0.041962  0.000000
0.285714  0.441707  0.047957  0.000000
0.321429  0.441707  0.053951  0.000000
0.357143  0.441707  0.059946  0.000000
0.392857  0.441707  0.065940  0.090357
0.428571  0.441707  0.071935  0.104766
0.464286  0.441707  0.077930  0.121424
0.500000  0.441707  0.083924  0.140447
0.535714  0.441707  0.089919  0.161946
0.571429  0.441707  0.095913  0.162537
0.607143  0.441707  0.101908  0.211064
0.642857  0.441707  0.107903  0.227198
0.678571  0.441707  0.113897  0.242317
0.714286  0.441707  0.119892  0.249944
0.750000  0.441707  0.125886  0.283298
0.785714  0.441707  0.131881  0.312959
0.821429  0.441707  0.137876  0.339933
0.857143  0.441707  0.143870  0.364840
0.892857  0.441707  0.149865  0.388092
```

0.928571	0.441707	0.155859	0.409983
0.964286	0.441707	0.161854	0.430727
1.000000	0.441707	0.167849	0.450489
1.035714	0.441707	0.173843	0.469396
1.071429	0.441707	0.179838	0.487552
1.107143	0.441707	0.185832	0.505039
1.142857	0.441707	0.191827	0.521929
1.178571	0.441707	0.197821	0.538277
1.214286	0.441707	0.203816	0.554134
1.250000	0.441707	0.209811	0.569543
1.285714	0.441707	0.215805	0.584538
1.321429	0.441707	0.221800	0.599153
1.357143	0.441707	0.227794	0.613415
1.392857	0.441707	0.233789	0.627349
1.428571	0.441707	0.239784	0.640977
1.464286	0.441707	0.245778	0.654318
1.500000	0.441707	0.252325	0.667391
1.535714	0.441707	0.258872	0.680211
1.571429	0.441707	0.265418	0.692793
1.607143	0.441707	0.271965	0.705150
1.642857	0.441707	0.278512	0.717294
1.678571	0.441707	0.285059	0.729235
1.714286	0.441707	0.291605	0.740986
1.750000	0.441707	0.298152	0.752553
1.785714	0.441707	0.304699	0.763947
1.821429	0.441707	0.311245	0.775176
1.857143	0.441707	0.317792	0.786247
1.892857	0.441707	0.324339	0.797167
1.928571	0.441707	0.330886	0.807943
1.964286	0.441707	0.337432	0.818581
2.000000	0.441707	0.343979	0.829089
2.035714	0.441707	0.350526	0.839470
2.071429	0.441707	0.357072	0.849732
2.107143	0.441707	0.363619	0.859880
2.142857	0.441707	0.370166	0.869920
2.178571	0.441707	0.376713	0.879858
2.214286	0.441707	0.383259	0.889700
2.250000	0.441707	0.389806	0.899454
2.285714	0.441707	0.396353	0.909128
2.321429	0.441707	0.402900	0.918733
2.357143	0.441707	0.409446	0.928288
2.392857	0.441707	0.415993	0.937818
2.428571	0.441707	0.422540	0.947383
2.464286	0.441707	0.429086	0.957153
2.500000	0.441707	0.517088	0.985609

END FTABLE 8
FTABLE 7
23 5

Depth (ft)	Area (acres)	Volume (acre-ft)	Outflow1 (cfs)	Outflow2 (cfs)	Velocity (ft/sec)	Travel Time*** (Minutes)***
0.000000	0.441707	0.000000	0.000000	0.000000		
0.035714	0.441707	0.015775	0.000000	2.226939		
0.071429	0.441707	0.031550	0.000000	2.332984		
0.107143	0.441707	0.047326	0.000000	2.386006		
0.142857	0.441707	0.063101	0.000000	2.439029		
0.178571	0.441707	0.078876	0.000000	2.492051		
0.214286	0.441707	0.094651	0.000000	2.545073		
0.250000	0.441707	0.110427	0.000000	2.598096		
0.285714	0.441707	0.126202	0.000000	2.651118		
0.321429	0.441707	0.141977	0.000000	2.704141		
0.357143	0.441707	0.157752	0.000000	2.757163		
0.392857	0.441707	0.173528	0.000000	2.810185		
0.428571	0.441707	0.189303	0.000000	2.863208		
0.464286	0.441707	0.205078	0.000000	2.916230		
0.500000	0.441707	0.220853	0.000000	2.969252		
0.535714	0.441707	0.236629	0.573370	3.022275		
0.571429	0.441707	0.252404	1.621322	3.075297		
0.607143	0.441707	0.268179	2.977879	3.128319		
0.642857	0.441707	0.283954	4.583799	3.181342		
0.678571	0.441707	0.299729	6.404834	3.234364		

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  0.714286  0.441707  0.315505  8.417859  3.287387
  0.750000  0.441707  0.331280  10.60586  3.340409
  0.750000  0.441707  0.331280  12.95561  3.340409
  END FTABLE  7
END FTABLES

EXT SOURCES
<-Volume-> <Member> SsysSgap<--Mult-->Tran <-Target vols> <-Grp> <-Member->  ***
<Name>   # <Name> # tem strg<-factor->strg <Name>   #   #        <Name> # #  ***
WDM      2 PREC     ENGL    0.833          PERLND   1 999 EXTNL  PREC
WDM      2 PREC     ENGL    0.833          IMPLND   1 999 EXTNL  PREC
WDM      1 EVAP     ENGL    1              PERLND   1 999 EXTNL  PETINP
WDM      1 EVAP     ENGL    1              IMPLND   1 999 EXTNL  PETINP
WDM      2 PREC     ENGL    0.833          RCHRES   1     EXTNL  PREC
WDM      2 PREC     ENGL    0.833          RCHRES   3     EXTNL  PREC
WDM      2 PREC     ENGL    0.833          RCHRES   5     EXTNL  PREC
WDM      2 PREC     ENGL    0.833          RCHRES   7     EXTNL  PREC
WDM      1 EVAP     ENGL    0.5            RCHRES   1     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   2     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.5            RCHRES   3     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   4     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.5            RCHRES   5     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   6     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.5            RCHRES   7     EXTNL  POTEV
WDM      1 EVAP     ENGL    0.7            RCHRES   8     EXTNL  POTEV

END EXT SOURCES

EXT TARGETS
<-Volume-> <-Grp> <-Member-><--Mult-->Tran <-Volume-> <Member> Tsys Tgap Amd ***
<Name>   #        <Name> # #<-factor->strg <Name>   # <Name>    tem strg strg***
END EXT TARGETS

MASS-LINK
<Volume>   <-Grp> <-Member-><--Mult-->     <Target>       <-Grp> <-Member->***
<Name>            <Name> # #<-factor->     <Name>                <Name> # #***
  MASS-LINK        2
PERLND     PWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    2

  MASS-LINK        5
IMPLND     IWATER SURO       0.083333      RCHRES         INFLOW IVOL
  END MASS-LINK    5

  MASS-LINK        8
RCHRES     OFLOW  OVOL   2                 RCHRES         INFLOW IVOL
  END MASS-LINK    8


END MASS-LINK

END RUN
```

Predeveloped HSPF Message File

Mitigated HSPF Message File

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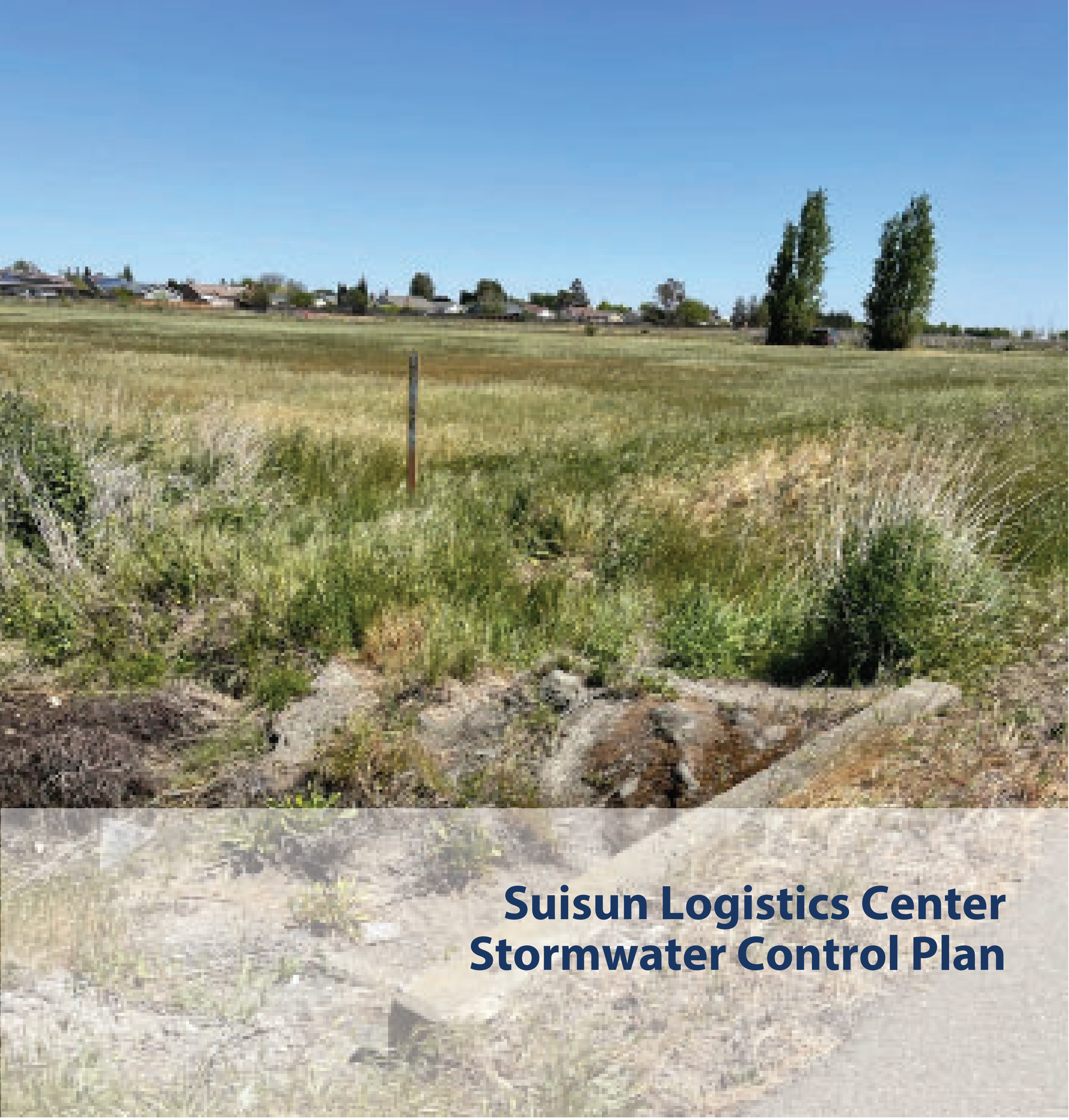

Suisun Logistics Center Stormwater Control Plan

Balance Hydrologics

July 29, 2021

July 29, 2021

A PRELIMINARY REPORT PREPARED FOR:

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1 INTRODUCTION

1.1 Project Data

Project Name/Number	Suisun Logistics Center
Application Submittal Date	TBA
Project Location	APN: 0174-190-140
Project Phase No.	N/A
Project Type and Description	Industrial: Six, one-story buildings
Total Project Site Area (acres)	124.01 acres
Total New and Replaced Impervious Surface Area	97.06 acres
Total Pre-Project Impervious Surface Area	0 acres
Total Post-Project Impervious Surface Area	97.06 acres

The Suisun Logistics Center project (Project) proposes to develop approximately 124.01 acres in unincorporated Solano County adjacent to Suisun City, California (**Figure 1-1**). The site currently consists of 1 undeveloped parcel (APN: 0174-190-140) located south of Petersen Road, east of Walters Road. The proposed project consists of six industrial buildings, loading docks, uncovered parking, driveway access from Walters and Petersen Road, bioretention areas and landscaping.

Figure 1-1 Vicinity Map, Suisun Logistics Center Solano County, California

1.2 Purpose

This document represents the Preliminary Stormwater Control Plan (SCP) for the Suisun Logistics Center project. It explains anticipated hydrologic changes to the site and discusses the proposed strategy for addressing both stormwater quality and quantity issues. The SCP is meant to accompany other project submittals, as well as to support additional environmental documentation and permitting. Appropriate best management practices (BMPs) are identified along with conceptual-level design parameters.

The SCP accompanies the detailed improvement plans for the project, and modeling and calculations presented herein are based on information derived from improvement plans developed by Robert A. Karn and Associates (RAK) (**Appendix C**). As such, the SCP should be viewed as a master planning document that details the stormwater management strategy for the entire project site.

1.3 Objectives

Given the characteristics of its hydrologic setting at the upper end of Suisun Marsh, the project will implement a comprehensive stormwater management strategy firmly based on understanding and preserving the overall water balance specific to the site. This strategy and its implementation will meet or exceed prevailing regulatory standards such as those in the Regional Water Quality Control Board Order R2-2015-0049 and Fairfield-Suisun Urban Runoff Management Program (FSURMP) Stormwater C.3 Guidebook.

Objectives of the SCP are summarized as follows:

- Characterize site-specific pre-project hydrologic conditions as a benchmark for selecting and designing stormwater management infrastructure.
- Develop a suite of BMPs consistent with the requirements of local and regional regulatory agencies (Fairfield-Suisun Urban Runoff Management Program, Regional Water Quality Control Board, Bay Area Stormwater Management Agencies Association).
- Provide flow controls for hydromodification management to comply with requirements embodied in the pertinent state-wide stormwater permits and such that flow and duration of runoff to Suisun Marsh are not adversely impacted.
- Provide facilities that will control peak flow rates for large storm events (up to and including the 100-year design storm) to, or below, pre-project levels such that flooding risk to adjacent properties or increase discharge to the Suisun Marsh is avoided.

- Design infrastructure to be self-maintaining to the highest degree possible.

1.4 Work Conducted

The following documents were reviewed to gain an understanding of the regulatory environment, stormwater infrastructure at neighboring properties, and the physical and hydrologic characteristics of the project site:

- Fairfield-Suisun Urban Runoff Management Program Stormwater C.3 Guidebook (2012)
- Solano Permittees Green Stormwater Infrastructure Plan (2019)
- Solano County Water Agency (SCWA) Hydrology Manual prepared by West Yost and Associates (1999)
- Suisun City Design Standards, Standard Specifications, and Details (Standards) Manual (1996)
- BASMAA Post-Construction Manual. Design Guidance for Stormwater Treatment and Control for Projects in Marin, Sonoma, Napa, and Solano Counties (2019)
- Hydromodification Management Plan for the Fairfield-Suisun Urban Runoff Management Program prepared by Balance Hydrologics (Balance) (2009)

The stormwater management strategy will start with low-impact site design, focusing on minimizing impervious cover and directing runoff from impervious surfaces to bioretention areas. Water cycle sensitive design will be further enhanced by source control measures aimed at limiting, or eliminating, the loading of pollutants that can be mobilized in runoff. Additionally, the drainage network will utilize an interconnected system of bioretention areas to convey runoff off-site.

With this strategy in mind, Balance developed U.S. Army Corps of Engineers Hydrologic Modeling System (HEC-HMS) hydrologic models of Pre- and Post-Project conditions that serve as the basis for the stormwater design. The Post-Project model was used to understand potential runoff patterns and calculate the storage capacity and peak outflows from the proposed bioretention basins.

2 SETTING

2.1 Location and Physical Characteristics

The Project occupies 124.01 acres of a 159.21-acre parcel (APN: 0174-190-140) in unincorporated Solano County, adjacent to Suisun City, California (see **Figure 1-1**). The site is bordered by Petersen Road to the north, Highway (Hwy) 12 to the south, Walters Road to the west and undeveloped grassland to the east. A largely residential development is located north of Petersen Road and east of Walters Road, undeveloped land is located east between the residential development and Travis Air Force Base, and Suisun Marsh is located south of Hwy 12.

Topographic relief throughout the site is mild with slopes less than one percent. The lowest elevations of the property are along Hwy 12 where existing drainage ditches convey water under Hwy 12 through box culverts with invert elevations of approximately 5.7 ft. The maximum elevations are along the northern property boundary along Petersen Road at approximately 15.8 ft.

2.2 Land Use

2.2.1 Pre-project Land Use

The existing land use is undeveloped grassland with two man-made ditches oriented north-south running the length of the property. The southern part of the parcel bordering Hwy 12 is defined by marshy low-lying land and scattered Mima mounds.

2.2.2 Post-project Land Use

The proposed project consists of six industrial buildings, loading docks, uncovered parking, driveway access from Walters and Petersen Road, bioretention areas and landscaping on 124.01 acres of the 159.21-acre parcel.

2.3 Climate

Climate at the site can be characterized as Mediterranean, with cool, wet winters and dry, hot summers typical of eastern Pacific coastal regions. Mean annual rainfall at the project site is on the order of 19.5 inches[1]. It is important to note that 19.5 inches is a statistical mean, and actual precipitation varies substantially due to regional and global weather patterns.

2.4 Soils

Mapping prepared by the Natural Resources Conservation Service (NRCS) shows that the Project is underlain by two dominant soil types: Antioch-San Ysidro complex with 0 to 2 percent slopes and Solano Loam. Approximately 71.7% is Antioch-San Ysidro complex and 28.3% is Solano Loam. Both soils are classified as Hydrologic Soil Group D, which has the highest runoff potential and restricted or very restricted infiltration rates. The low infiltration rates are reflected in the saturated hydraulic conductivity of these soils, where the weighted averages are 2.94 and 0.58 micrometers/second (0.42 and 0.08 inches/hour) respectively. The Web Soil Survey report from NRCS is included as **Appendix A**.

2.5 Drainage Areas and Patterns

2.5.1 Pre-project Conditions

The existing parcel has two man-made ditches oriented north-south running the length of the property. A typical cross section of the west ditch has a 9.8 ft bottom width, 4.1 ft channel depth, 2:1 side slopes, and 0.22% slope. A typical cross section of the east ditch has a 9.8 ft bottom width, 2.6 ft depth, 3:1 side slopes, and 0.23% slope. These ditches convey municipal stormwater from residential areas and open space north of Petersen Road and east of Walters Road before flowing onto the project through two culverts in Petersen Road (24" x 36" and 24" x 72" box culverts). At the southern end of the property the ditches terminate at two 48" x 72" box culverts at Hwy 12 allowing stormwater to exit to Suisun Marsh.

2.5.2 Post-project Conditions

Stormwater from the proposed development will be treated via bio-retention areas located along the perimeter of the developed areas and takes advantage of existing infrastructure including the existing western and eastern ditches south of the proposed

[1] Per Isohyetal map of Solano County: Mean Annual Precipitation provided in the Solano County Water Agency Hydrology Manual prepared by West Yost and Associates (1999)

development and culverts at the southern end of the parcel at Hwy 12. Run-on from the residential and open areas north of Petersen Road will be conveyed through a new perimeter ditch running along the eastern boundary of the proposed development before exiting to the existing eastern ditch south of the development.

2.6 Flood Hazard

The site is shown on FEMA Flood Insurance Rate Map (FIRM) Panel 06095C0476E - effective May 4, 2009 (**Appendix B**). The panel shows that most of the proposed development is in an unshaded Zone X, indicating areas of minimal flood hazard. The southern portion of the parcel includes FEMA Special Flood Hazard Areas (SFHAs) designated Zone AE (1% annual chance floodplain) with a Base Flood Elevation (BFE) of 10 ft[2] as well as shaded Zone X (0.2% annual chance floodplain). These SFHAs encroach slightly onto the proposed parking lots located to the south of the development, however, no inhabited buildings are being proposed within a FEMA floodplain.

2.7 Stormwater Management Constraints

The most important constraints with respect to stormwater management include:

- The proposed development is constrained by limited infiltration opportunities due to the underlying impermeable soil types (Hydrologic Soil Group D). Therefore, onsite stormwater runoff will pass through bio-retention areas before reconnecting with existing drainage ditches south of the development in lieu of the use of infiltration or rainwater harvesting.
- Additionally, the proposed project includes managing run-on from relatively large urban and open space watersheds. The Project proposes to relocate the existing drainage ditches within the developed areas and to convey all run-on through a new perimeter ditch that outfalls into the existing eastern ditch to the south of the site. On-site stormwater runoff will pass through bio-retention areas before draining to the existing western ditch.

[2] Unless otherwise noted, all elevations listed in this report are referenced to the North American Vertical Datum of 1988 (NAVD 88).

2.8 Stormwater Management Opportunities

Similar to identifying constraints, it is important to identify unique features of the site and proposed land plan that present opportunities with respect to stormwater management. The most significant of which are as follows:

- The relatively flat slopes are conducive to directing runoff to bioretention areas and allowing ponding and through the filter medium with minimal risk of erosion.
- While the Project proposes a new perimeter ditch along the eastern border of the proposed development, the Project will take advantage of existing infrastructure including culverts at Petersen Road to the north and Hwy 12 to the south along with the existing ditches south of the Project.

3 LOW IMPACT DEVELOPMENT DESIGN STRATEGIES

3.1 Optimization of Site Layout

3.1.1 Limitation of Development Envelope

The Project footprint has been designed to impact the smallest area possible. Landscaping and bioretention areas reduce project impacts to water quality.

3.1.2 Preservation of Natural Drainage Features

Due to the large size of the proposed industrial buildings, the Project cannot preserve the existing ditches within the development area. The impacted drainage ditches will be relocated to a newly constructed perimeter ditch that routes flows around the eastern side of the development. This newly constructed perimeter ditch will reconnect to the existing eastern ditch on the south end of the development. As described in detail in the following sections, runoff in excess of the 2-year storm event will be allowed to spill via overland release to the low-lying areas south of the project site between the east and west ditches that historically received flood waters.

3.1.3 Setbacks from Creeks, Wetlands, and Riparian Habitats

The existing project parcel includes two drainage ditches that are listed as 303(d) impaired waters due to nutrients, low dissolved oxygen, and salinity. Outside of the Project footprint, wetland areas and riparian habitat between the Project and Hwy 12 are to remain undisturbed.

3.1.4 Minimization of Imperviousness

As required by FSURMP, the Project provides compact car spaces and landscaped medians within the parking areas (**Appendix C**). Bioretention basins have been designed to treat all runoff from impervious surfaces (up to the 2-year storm) before being discharged off site.

3.1.5 Use of Drainage as a Design Element

The proposed industrial development area will have landscaping and bioretention areas to minimize the impacts of the impervious areas. The layout of the proposed drainage design can be seen on the Stormwater Management Plan (**Appendix C**).

3.2 Use of Permeable Pavements

This Project is limited by the underlying soil type (HSG D) which is characterized by limited infiltration rates and high runoff potentials. Additionally, the heavy traffic loads predicted for the shipping and receiving docks would exceed the structural capacity of permeable pavements. Therefore, the Project is not proposing permeable pavements as part of the site design.

3.3 Dispersal of Runoff to Pervious Areas

All runoff from impervious surfaces in the proposed development will drain to bioretention areas before flowing into the proposed perimeter ditch or to existing drainage ditches off-site. The exceptions are the entrance driveways where runoff drains directly to Walters Road and Petersen Road.

3.4 Infiltration and Rainwater Harvesting Feasibility

Infiltration and rainwater harvesting were considered as potential LID opportunities for this project. However, after completing the required feasibility screening worksheets it was apparent that site constraints would limit the utility of these treatment options. The worksheets are included in **Appendix D**. The results of the feasibility screening confirmed the need to achieve water quality compliance through the design of bioretention facilities.

4 DOCUMENTATION OF DRAINAGE DESIGN

4.1 Descriptions of Each Drainage Management Area

The Project has been divided into four drainage management areas (DMAs). Each DMA has been sloped so that all runoff flows to a common outlet, in this case a bioretention basin. The treated runoff is conveyed off-site to the existing west or east ditch through a series of underground storm drain pipes. The proposed DMAs and bioretention facilities are shown on **Figure 5-2** as well as the Stormwater Management Plan provided by RAK engineers **Appendix C**.

4.1.1 TABLE OF DRAINAGE MANAGEMENT AREAS

Table 4-1 shows the amount of impervious/pervious surface area, including bio-retention, as well as the total area for each DMA.

Table 4-1 Drainage Management Areas

	Impervious Area *(sq ft)*	**Pervious Area** *(sq ft)*	**Total Area** *(sq ft)*	**Impervious Area** *(acres)*	**Pervious Area** *(acres)*	**Total Area** *(acres)*
Drainage Area						
DMA-A	358,200	77,7340	435,940	8.22	1.78	10.01
DMA-B	263,550	35,500	299,050	6.05	0.81	6.87
DMA-C	700,000	61,850	761,850	16.07	1.42	17.49
DMA-D	2,872,400	648,300	3,520,700	65.94	14.88	80.82
Untreated/Self Treating Areas						
Pave-5	5,700	--	5,700	0.13	--	0.13
Pave-6	28,300	--	28,300	0.65	--	0.65
Land-5	--	350,500	350,500	--	8.05	8.05
		Total (sq ft)	**5,402,040**		**Total (acres)**	**124.01**

4.1.2 DRAINAGE MANAGEMENT AREA DESCRIPTIONS

DMA A, totaling 435,940 square feet, drains the building and parking areas located in the northwest corner of the site and includes Roof-1, Pave-1, and Land-1. DMA A drains to Bio-A via surface drainage. Bio-A drains to the proposed perimeter ditch.

DMA B, totaling 299,051 square feet, includes a single building and parking stalls located to the west of the project site and drains Roof-2, Pave-2, and Land-2. DMA B drains to Bio-B, which drains to the existing western ditch.

DMA C, totaling 761,850 square feet, drains Roof-3, Pave-3, and Land-3. DMA C drains to Bio-C, which drains to the existing western ditch.

DMA D, totaling 3,520,700 square feet, is the largest drainage management area. DMA D includes several buildings and parking stalls and drains Roofs-4,5,6,7, Pave-4, and Land-4. DMA D drains to Bio-D, which drains to the existing western drainage ditch.

4.1.3 Areas Draining to Non-LID treatment

PAVE-5, totaling 5,700 square feet, are driveways and drains directly to Walters Road via surface drainage.

PAVE-6, totaling 28,300 square feet, are driveways and drains directly to Petersen Road via surface drainage.

LAND-5, totaling 350,500 square feet, is the newly constructed drainage ditch and is self-treating.

4.2 Tabulation and Sizing Calculations

4.2.1 Information Summary for Bioretention Facility Design

Bioretention facilities were designed to meet the requirements of the Fairfield-Suisun Urban Runoff Management Program Stormwater C.3 Guidebook (2012). A cross section of the typical bioretention facility is shown in the **Figure 4-1** below.

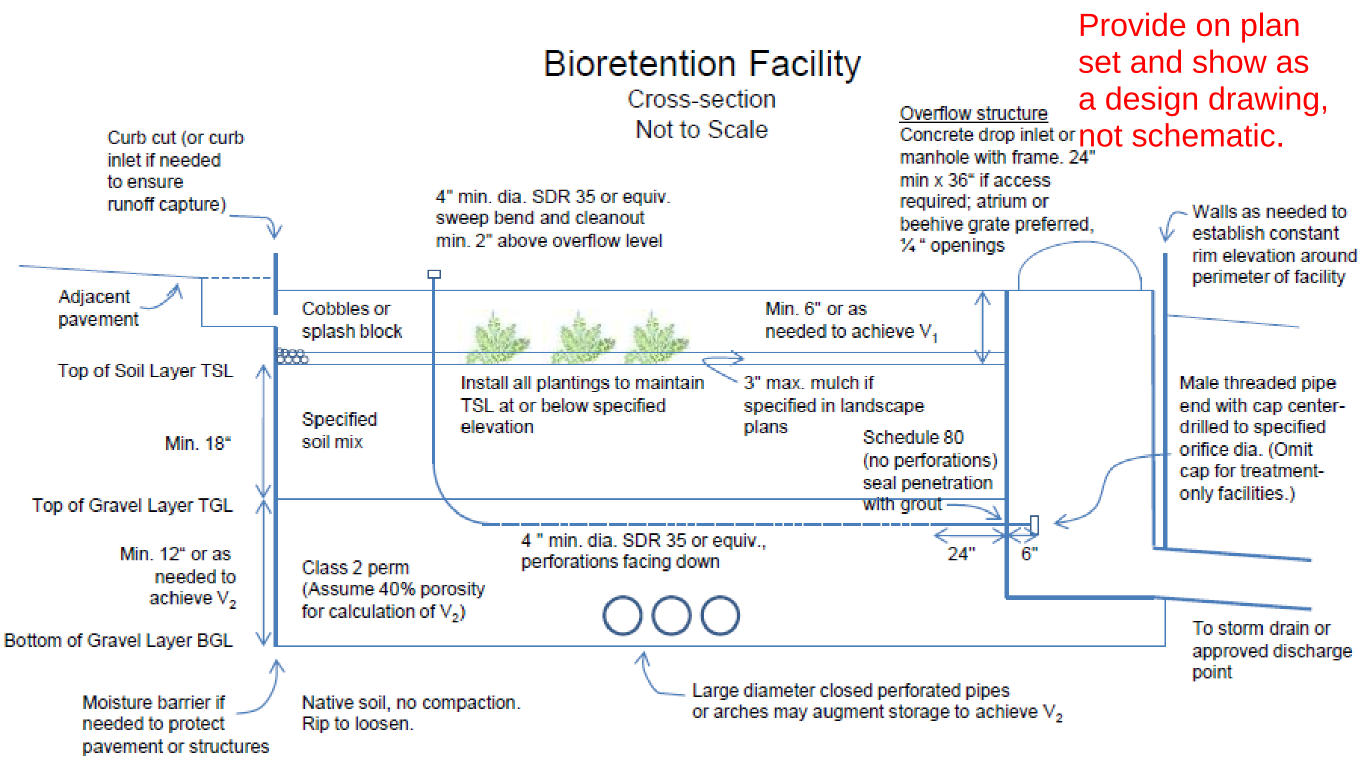


Figure 4-1 Typical Bioretention Facility

The proposed bioretention facility cross section is shown on **Sheet C-1, Appendix C**. The proposed design allows flow to percolate through the bioretention facility and into the native soils below. Runoff is filtered through the 18 inches of soil mix layer and 12 inches of drain rock layer before flowing off-site through a perforated pipe near the top of the drain rock layer or infiltrating into the ground. A minimum ponding depth of 6 inches is specified before flow spills into an overflow inlet and flows offsite without treatment. Side slopes between 2:1 and 3:1 are specified for the proposed basins, however, only the flat bottom area of the bioretention facility is counted towards the treatment area. The proposed curb cuts have at least 3 inches of freeboard above the overflow inlet.

A slightly modified design is specified for the bioretention facility draining DMA-D. Rather than the typical drop inlet placed 6 inches above the soil mix, a perimeter berm with notches at 6 inches above the top of soil mix and 12 inches above the top of soil mix is specified. The intent of this design feature is to allow overland release of runoff in excess of the 2-year storm event into the depression areas to the south of the project site that currently function as wetland areas.

4.2.2 BIORETENTION FACILITY SIZING

Bioretention facility sizing is based on a sizing factor of 0.04 (4%), which allows treatment of a rainfall intensity of 0.2 inches/hour by allowing runoff to filter through the soil mix at a rate of 5 inches/hour. A table of the runoff factors for bioretention facility sizing was adapted from FSURMP Stormwater C.3 Guidebook (2012) is shown in **Table 4-2**.

Table 4-2 Runoff Factors for Bioretention Facility Sizing

Surface	Runoff Factor
Roof	1
Concrete or Asphalt	1
Landscaping	0.1

Detailed sizing calculations for the four proposed bioretention facilities are shown in **Table 4-3**. The proposed bioretention footprints include only the flat bottom area of the bioretention facilities and do not include any side slopes.

Table 4-3 Bioretention sizing calculations

DMA-A							
Name	DMA Area (square feet)	Post-project surface type	DMA Runoff factor	DMA Area x runoff factor	Facility Name		
					Bio-A		
					Sizing factor	Minimum Facility Size	Proposed Facility Size
Roof -1	199,600	Developed - Roof	1	199,600			
Pave-1	158,600	Developed – Concrete/Asphalt	1	158,600			
Land-1	58,500	Landscaped	0.1	5,850			
Total>				364,050	0.04	14,562	19,240

DMA-B							
Name	DMA Area (square feet)	Post-project surface type	DMA Runoff factor	DMA Area x runoff factor	Facility Name		
					Bio-B		
					Sizing factor	Minimum Facility Size	Proposed Facility Size
Roof-2	212,000	Developed - Roof	1	212,000			
Pave-2	51,550	Developed – Concrete/Asphalt	1	51,550			
land-2	24,400	Landscaped	0.1	2,440			
Total>				265,990	0.04	10,640	11,100

DMA-C							
Name	DMA Area (square feet)	Post-project surface type	DMA Runoff factor	DMA Area x runoff factor	Facility Name		
					Bio-C		
					Sizing factor	Minimum Facility Size	Proposed Facility Size
Roof-3	323,800	Developed - Roof	1	323,800			
Pave-3	376,200	Developed – Concrete/Asphalt	1	376,200			
Land-3	33,700	Landscaped	0.1	3,370			
Total>				703,370	0.04	28,135	28,150

<table>
<tr><th colspan="8">DMA-D</th></tr>
<tr><th rowspan="2">DMA Name</th><th rowspan="2">DMA Area (square feet)</th><th rowspan="2">Post-project surface type</th><th rowspan="2">DMA Runoff factor</th><th rowspan="2">DMA Area x runoff factor</th><th colspan="3">Facility Name</th></tr>
<tr><th colspan="3">Bio-D</th></tr>
<tr><td>Roof-4</td><td>199,600</td><td>Developed - Roof</td><td>1</td><td>199,600</td><td colspan="3" rowspan="4"></td></tr>
<tr><td>Roof-5</td><td>145,300</td><td>Developed - Roof</td><td>1</td><td>145,300</td></tr>
<tr><td>Roof-6</td><td>644,500</td><td>Developed - Roof</td><td>1</td><td>644,500</td></tr>
<tr><td>Roof-7</td><td>322,300</td><td>Developed - Roof</td><td>1</td><td>322,300</td></tr>
<tr><td>Pave-4</td><td>1,560,700</td><td>Developed – Concrete/Asphalt</td><td>1</td><td>1,560,700</td><td rowspan="2">Sizing factor</td><td rowspan="2">Minimum Facility Size</td><td rowspan="2">Proposed Facility Size</td></tr>
<tr><td>Land-4</td><td>531,200</td><td>Landscaped</td><td>0.1</td><td>53,120</td></tr>
<tr><td colspan="4">Total></td><td>2,925,520</td><td>0.04</td><td>117,021</td><td>117,100</td></tr>
</table>

<table>
<tr><th colspan="3">Untreated/Self Treating Areas</th></tr>
<tr><th>Name</th><th>DMA Area (square feet)</th><th>Post-project surface type</th></tr>
<tr><td>Pave-5</td><td>5,700</td><td>Untreated, Developed-Concrete/Asphalt</td></tr>
<tr><td>Pave-6</td><td>28,300</td><td>Untreated, Developed – Concrete/Asphalt</td></tr>
<tr><td>Land-5</td><td>350,500</td><td>Self treating, Vegetated</td></tr>
</table>

5 HYDROLOGIC MODELING

A series of hydrologic models were developed to guide the selection and sizing of stormwater facilities at the site, demonstrate compliance with the goals and objectives of the site, and to provide a quantitative basis for assessing impacts to hydrology and water quality. The Suisun City Design Standards (1996) stipulates that for projects between 640 acres and 3,200 acres in size, and for detention basin modeling, the SCWA Hydrology Manual (1999) should be used for unit hydrograph-based modeling. The following analysis uses the unit hydrograph method as outlined by the SCWA Hydrology Manual (1999).

5.1 Stormwater Management Objectives and Model Selection

Hydrologic model selection was framed by the need to consider three concurrent stormwater management objectives: runoff water quality, flow-duration control (hydromodification management), and peak flow control. The water quality requirement is satisfied using bioretention areas. The flow-duration and hydromodification requirements were evaluated using the U.S. Army Corps of Engineers HEC-HMS hydrologic modeling software.

- *Water quality*. The overarching regulatory objective here is embodied in the Fairfield-Suisun Urban Runoff Management Program Stormwater C.3 Guidebook (2012), which stipulates water quality requirements are met if the site implements bioretention areas equivalent to approximately 4% of the impervious area.
- *Hydromodification management and flood control*.
    - As per the Hydromodification Management Plan (Balance, 2009), the Project does not drain to a susceptible stream channel and therefore is exempt from the hydromodification management requirements. Additionally, due to the Project's location at the downstream end of a watershed which drains to a tidally influenced channel, we know that hydromodification should not adversely affect peak flow timing and the modeling presented below is intended to quantify that.
    - As per Section 4 of the Suisun City Standards, which identifies "the peak discharge from a detention basin shall not exceed 95% of the predevelopment peak or the capacity of the downstream system". The modeling presented below is intended to demonstrate compliance with the 95% requirement or show no downstream impacts.

5.1.1 Modeled Scenarios

Two model scenarios were developed to better understand the stormwater management objectives.

- The Pre-Project scenario models the existing site conditions and establishes a benchmark for selecting and designing stormwater infrastructure.
- The Post-Project scenario represents the proposed conditions as shown in the attached improvement plans (**Appendix C**) and the effects of detention storage within the bioretention basins on controlling peak flow rates for large storm events at or below Pre-Project levels.

5.2 Model Parameters

Hydrologic model parameters were compiled from project design information provided by RAK engineers and the 2018 USGS LiDAR. Baseline topography, proposed grading, and planned improvements guided the definition of the DMAs and run-on watersheds that served as the subbasins for the analysis. Collectively run-on watersheds and DMAs account for all runoff from the Post-Project condition. Per the Solano County Hydrology Manual, the HEC-HMS modeling was developed using the recommend input parameters as described below.

5.2.1 Design Storms

For the peak flow modeling in HEC-HMS, the 24-hour design storm rainfall depths were derived from the Solano County Isohyetal Map and the Solano County Design Rainfall for San Francisco Bay Drainage Region as shown in **Table 5-1** below (adapted from Table 3-4a in the Hydrology Manual). The Project is located halfway between the 19 and 20-inch isohyetal lines and therefore the averages were used for the modeling design rainfall events. For example, the 2-year, 24-hour rainfall total is predicted to be 2.08 inches, while the 100-year is predicted to be 5.17 inches.

Table 5-1 Design Rainfall Events

Return Period	MAP	1 Day
2yr	19	2.02
	20	2.13
	Average	**2.08**
25yr	19	4.06
	20	4.27
	Average	**4.17**
100yr	19	5.04
	20	5.30
	Average	**5.17**

5.2.2 Infiltration Losses

Rainfall losses due to interception and infiltration were calculated using the parameters in **Table 5-2**, **Table 5-3** and **Table 5-4** below (adapted from Table 3-5, 3-6, and 3-7 from the Hydrology Manual).

Table 5-2 Initial Losses

Land Use	Initial Loss *(inches)*
Paved Areas	0.0
Sloped Roofs	0.0
Flat Roofs	0.0
Lawn Grass	0.3
Open Fields with Minimal Vegetation	0.2
Open Field with Cover Crop	0.3
Wooded Areas	0.4

Table 5-3 Constant Loss Rates

NRCS Hydrologic Soil Group	Constant Loss Rate *(in./hr.)*
A	0.35
B	0.2
C	0.1
D	0.02

Table 5-4 Impervious Percentages for Common Land Uses

Land Use Type	Impervious Percentage
Highways, Parking Areas	95
Commercial, Industrial, Office	85-95
Apartments, Condos	70-80
Single Family Residential	
6-10 units/acre	50-60
3-6 units/acre	30-50
1-3 units/acre	15-30
<1 unit/acre	5-15
Parks	5-10
Open Space (fields, wooded areas)	1-5

5.2.3 Lag Time

To transform excess rainfall to a runoff hydrograph, the Snyder Standard Lag equation was used as per the Solano County Hydrology Manual and is shown in equation 1. L is the lag time in hours, P is the percent urbanization, A is the area of the watershed in acres, S is the slope of the main channel in ft/ft.

$$L = 0.34 * (0.728 - 0.00546 * P) * \left(\frac{A}{S^{0.5}}\right)^{0.2} \quad (1)$$

5.2.4 Run-on Parameterization

All surface run-on from upstream residential and open space watersheds is conveyed through the west and east ditch north of Petersen Road before flowing onto the Project through two culverts. These run-on watersheds were calculated using information published on the Solano County storm drain GIS viewer website and 2018 LiDAR, and were modeled as five subbasins as shown on **Figure 5-1**. Model inputs for the run-on basins are shown below in **Table 5-5** and **Table 5-6.** Subbasin A contributes to the western ditch and subbasins B, C, D, and E contribute to the eastern ditch. Subbasin A, B, C are predominantly residential while subbasin D and E are open space located between Travis Air Force Base (AFB) and the residential development. It is noted that subbasins D and E are currently undeveloped and our assumption is that they will remain so throughout the life of the project. There are currently development restrictions in place for the land around Travis AFB and any potential new development would be required to limit post-development flows to at or below pre-project levels.

Subbasins B and D flow into an open channel which drains to a depression area before being piped into 2- 54" storm drain pipes at Hickam Cr., which reduces to 1-60" storm drain at the eastern ditch. Flows exiting at the storage area at Hickam Cr. were modeled using an elevation-storage-discharge relationship calculated from Federal Highway Administration Chart 2B (**Table 5-7**). The main storm drain line was modeled as a piped reach, and both ditches north of Petersen Road were modeled as trapezoidal open channel reaches. Based on the 2016 and 2021 topographic surveys, Petersen Road has less than 2 ft of freeboard from the top of road to the top of the culverts. Based on estimated run-on quantities along with culvert capacity calculations and anecdotal observations, Petersen Road is assumed to overtop during heavy rainfall events.

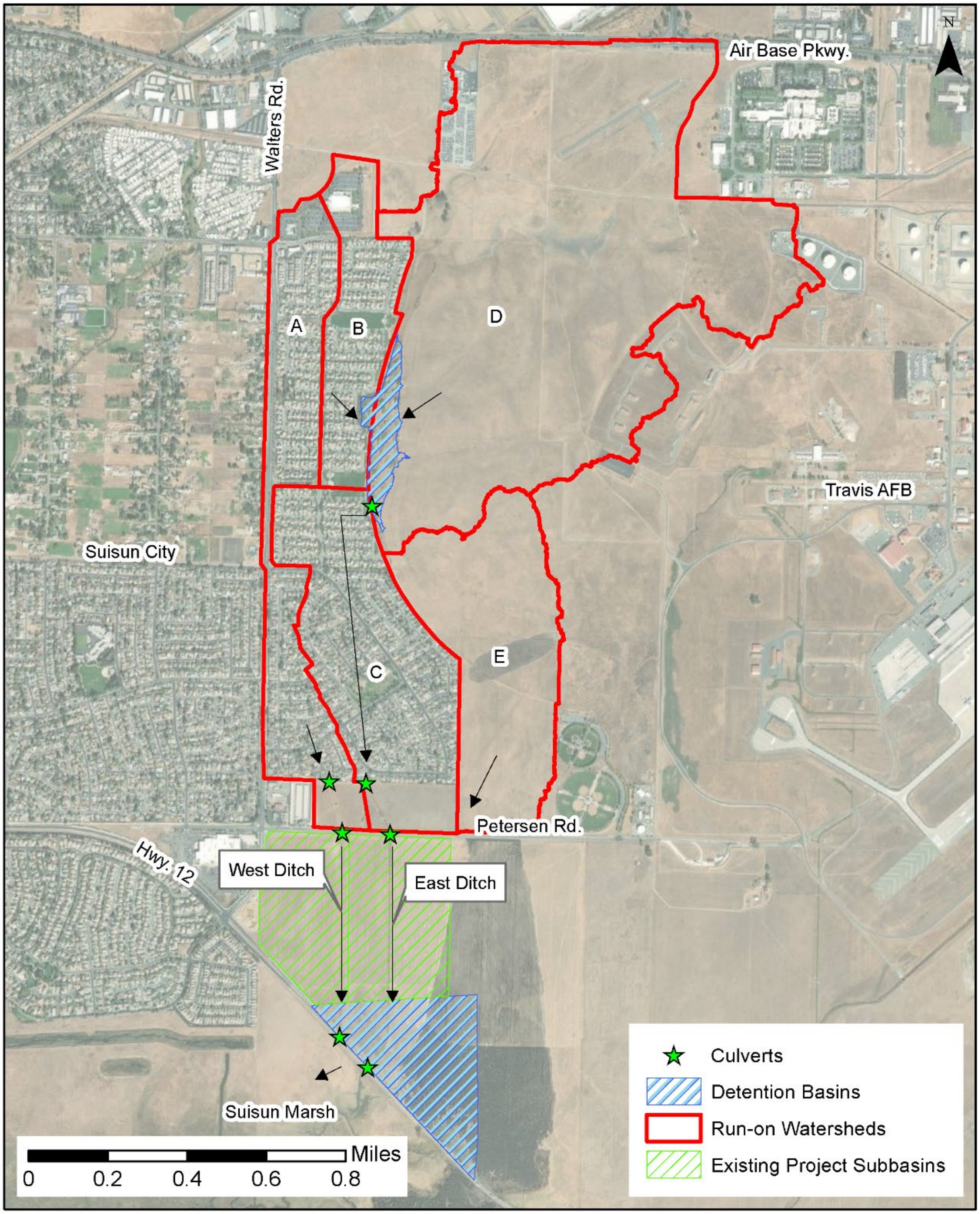


Figure 5-1 Pre-Project Schematic, Suisun Logistics Center, Solano County, California

Table 5-5 Run-on Watersheds: HEC-HMS Model Inputs

Run-on	Description	Land Use	Area	Soils	Initial Loss Rate		Constant Loss Rate	Impervious	
Watershed			*(ac)*		*(in)*	*Weighted*	*(in/hr)*	*(%)*	*Weighted*
A	Residential	0.2 ac res.	121.49	D	0.00	0.00	0.02	50	46.88
		church	8.09	D	0.00	0.00	0.02	95	5.93
		Composite Total	**129.59**			**0.00**	**0.02**		**52.81**
B	Residential	0.2 ac res.	54.09	D	0.00	0.00	0.02	50	34.94
		church	9.28	D	0.00	0.00	0.02	95	11.39
		park	14.03	D	0.30	0.05	0.02	10	1.81
		Composite Total	**77.40**			**0.05**	**0.02**		**48.14**
C	Residential	0.2 ac res.	152.31	D	0.00	0.00	0.02	50	48.00
		park	6.35	D	0.30	0.01	0.02	10	0.40
		Composite Total	**158.66**			**0.01**	**0.02**		**48.40**
D	Open Space	grassland	546.70	D	0.30	0.29	0.02	5	4.90
		pick n pull	11.40	D	0.00	0.00	0.02	95	1.94
		Composite Total	**558.10**			**0.29**	**0.02**		**6.84**
E	Open Space	grassland	148.90	D	0.3	0.3	0.02	5	5.00
		Composite Total	**148.90**			**0.3**	**0.02**		**5.00**

Table 5-6 Run-on Watersheds: Snyder Lag Time Calculation

Run-on Watershed	Urbanization (%)	Area (ac)	Slope (ft/ft)	L (hrs)
A	100	129.59	0.004	0.28
B	96	77.40	0.011	0.26
C	96	158.66	0.002	0.36
D	2	558.10	0.002	1.60
E	2	148.90	0.011	1.04

Table 5-7 Hickam Circle Detention Basin Elevation-Storage-Discharge Relationship

Hickam Detention		
Elev. (ft)	Storage (ac ft)	Discharge (cfs)
30.00	0.00	0.00
32.50	1.82	40.00
33.00	3.41	62.50
34.00	8.18	90.00
35.00	15.36	125.00
36.00	24.13	160.00
37.00	34.00	190.00
38.00	45.52	210.00
39.00	58.42	235.00
40.00	73.10	255.00

5.2.5 Pre-project Hydrologic Parameters

Runoff from the Project area in the Pre-Project condition flows to the east and west ditch before exiting the site via two culverts under Hwy 12 and outflows to Suisun Marsh (see **Figure 5-1**). Pre-Project model inputs are shown in **Table 5-8** and **Table 5-9**. Therefore, the Pre-Project condition was modeled as two subbasins flowing to the western and eastern ditches, represented as trapezoidal open channel reaches. Two additional downstream subbasins representing the southern portion of the parcel downstream of the proposed development were also added to the model. The existing east and west ditches flow into a depression area upstream of Hwy 12 which was modeled as a storage reservoir with an elevation-storage relationship (**Table 5-10**) before exiting through the two 48 x 72" box culverts. Based on survey information and the assumed high tailwater due to tidal conditions, outlet control was assumed for these Hwy 12 culverts and the program HY-8 was used to calculate an elevation-discharge relationship for each culvert.

Table 5-8 Pre-Project: HEC-HMS Model Inputs

Subbasin	Initial Losses *(in)*	Constant Loss Rate *(in/hr)*	Impervious *(%)*
West	0.3	0.02	5
East	0.3	0.02	5

Table 5-9 Pre-Project: Snyder Lag Time Calculation

Subbasin	Urbanization *(%)*	Area *(ac)*	Slope *(ft/ft)*	L *(hrs)*
West	0	54.29	0.002	1.01
East	0	70.41	0.003	1.04
West Downstream	0	2.58	0.001	0.60
East Downstream	0	29.49	0.002	0.90

Table 5-10 Hwy 12 Detention Elevation-Storage and Culvert Capacities [3]

Hwy 12 Detention		Hwy 12 West Culvert		Hwy 12 East Culvert	
Elev. *(ft)*	**Storage** *(ac ft)*	**Elev.** *(ft)*	**Discharge** *(cfs)*	**Elev.** *(ft)*	**Discharge** *(cfs)*
5.50	0.00	6.18	0	6.3	0
6.50	0.00	7.76	25	7.9	25
7.00	0.00	8.54	50	8.7	50
7.50	0.10	9.74	100	9.9	100
8.00	0.79	10.64	150	10.68	150
8.50	3.42	11.66	200	11.7	200
9.00	11.52	12.52	225	12.68	225
9.50	24.95	12.80	250	13.20	250
10.00	43.13	12.81	Uncontrolled	13.21	Uncontrolled
10.50	65.24				
11.00	90.70				
11.50	118.73				
12.00	148.46				
12.50	179.18				
13.00	210.76				
13.20	223.57				

5.2.6 Post-project Hydrologic Parameters

Four DMAs were defined in HEC-HMS for the Post-Project condition(**Figure 5-2**). The model inputs are summarized in **Table 5-11**. Each DMA flows to a bioretention basin, which is represented in the HEC-HMS model as a storage reservoir. All reaches were connected in a downstream fashion according to the project plans. Runoff from run-on watersheds and Bio-A were routed to the new perimeter ditch defined as a trapezoidal open channel reach and exits to the east ditch downstream of the development. Due to the large size of the proposed perimeter ditch (~8 acres) it was also modeled as a drainage area. Runoff from Bio-B, C and D were routed to the west ditch downstream of the development. The west and east ditch are combined into a single point of concentration at the ponded area north of Hwy 12.

[3] The overtopping elevation of Hwy 12 was assumed to be 12.8 ft for the western culvert and 13.2 ft for the eastern culvert based on the 2018 LiDAR

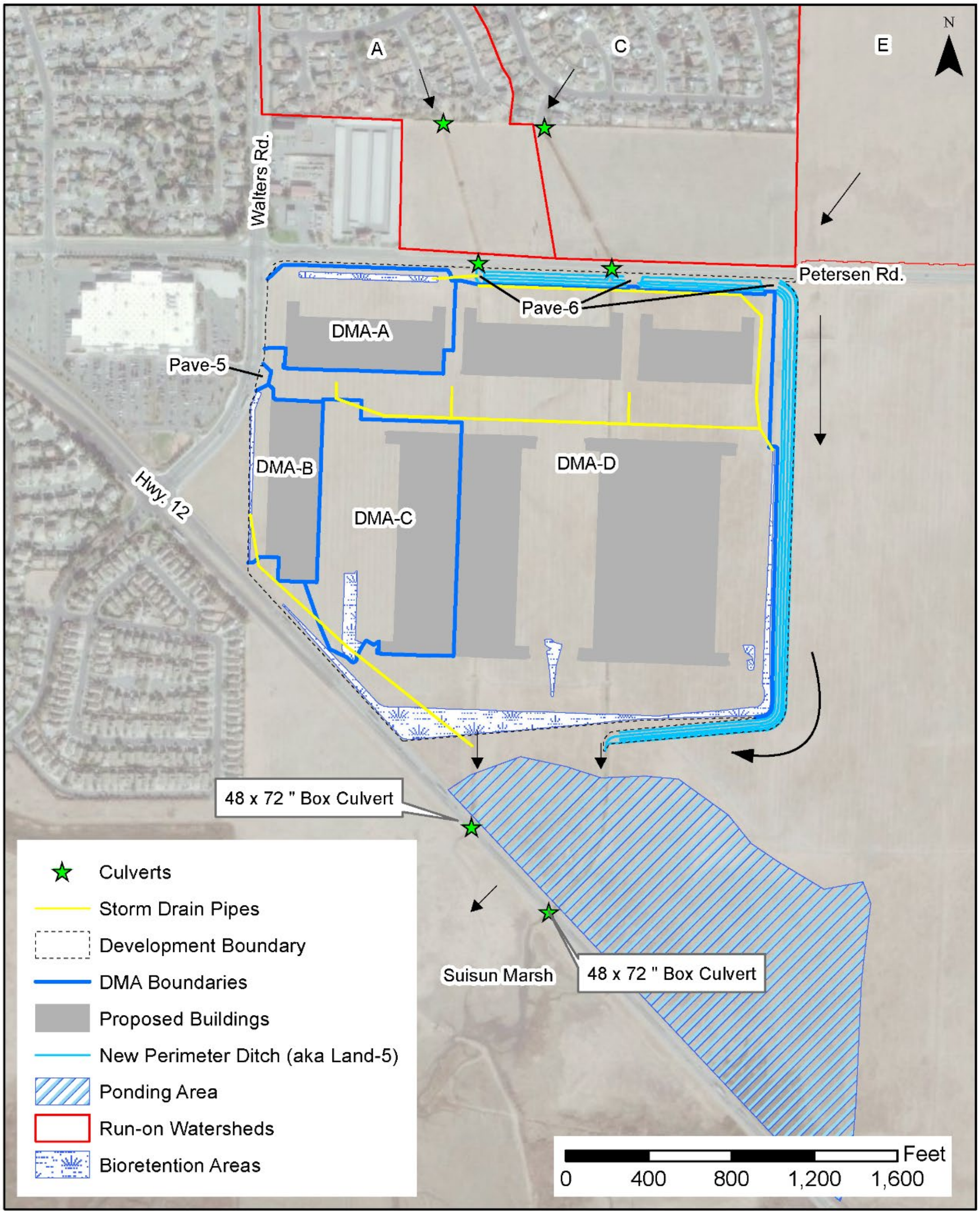


Figure 5-2 Post-Project Schematic, Suisun, Logistics Center, Solano County, California

Table 5-11 Post-Project: HEC-HMS Model Inputs

DMA	Land Use	Soils	Area (sq ft)	Area (ac)	Initial Losses (in)	Initial Losses weighted	Constant Loss Rate (in/hr)	Impervious (%)	Impervious weighted
A	Developed	D	358,200	8.22	0	0.000	0.02	95	78.06
	Landscaped	D	58,500	1.34	0.3	0.040	0.02	10	1.34
	Bioretention	D	19,240	0.44	0.3	0.013	0.02	2	0.09
		Composite Total	**435,940**	**10.01**		**0.053**	**0.02**		**79.49**
B	Developed	D	263,550	6.05	0	0.000	0.02	95	83.73
	Landscaped	D	24,400	0.56	0.3	0.024	0.02	10	0.82
	Bioretention	D	11,100	0.25	0.3	0.011	0.02	2	0.07
		Composite Total	**299,050**	**6.87**		**0.036**	**0.02**		**84.62**
C	Developed	D	700,000	16.07	0	0.000	0.02	95	87.32
	Landscaped	D	33,700	0.77	0.3	0.013	0.02	10	0.44
	Bioretention	D	28,150	0.65	0.3	0.011	0.02	2	0.1
		Composite Total	**761,850**	**17.49**		**0.024**	**0.02**		**87.81**
D	Developed	D	2,872,400	65.94	0	0.000	0.02	95	76.12
	Landscaped	D	531,200	12.19	0.3	0.044	0.02	10	1.48
	Bioretention	D	117,100	2.69	0.3	0.015	0.02	2	0.10
		Composite Total	**3,520,700**	**80.82**		**0.044**	**0.02**		**77.60**
Pave-5	Untreated, Developed	D	5,700	0.13					
Pave-6	Untreated, Developed	D	28,300	**0.65**					
Perimeter Ditch (aka Land-5)	Landscaped	D	350,500	**8.05**		**0.3**	**0.02**		**1**
		Total Project Area	**5,402,040**	**124.01**					

Lag time for the Post-Project condition was calculated using the same method as the Pre-Project condition. The lag time calculations for each DMA are shown in **Table 5-12**.

Table 5-12 Post-Project: Snyder Lag Time Calculation

DMA	Urbanization *(%)*	Area *(ac)*	Slope *(ft/ft)*	L *(hrs)*
A	83.9	10.01	0.008	0.24
B	92.3	6.87	0.022	0.16
C	95.5	17.49	0.006	0.21
D	73.5	80.82	0.006	0.45
Perimeter Ditch	0.0	8.05	0.001	0.75

5.2.7 Bioretention Basin Parameters

Bioretention facilities were added to the HEC-HMS model as storage reservoirs using the dimensions and outlet controls specified in the typical bioretention cross-section in **Section 4.2.1**. For the storage calculations, the permeable drain rock layer (12" thickness) and the soil mix layer (18" thickness) were assumed to have a porosity of 0.4. Therefore, the storage volume in those layers was assumed to be 40% of the "open-air" storage volume. Between the top of the soil mix layer and the top of the overflow inlet, each bioretention basin has a minimum of 6" of open storage volume. The elevation-storage tables for each bioretention basin are shown in **Table 5-13**.

Table 5-13 Bioretention Basin Elevation-Storage Relationships

Bio-A						Bio-B					
Elev.	**Area**	**Porosity**	**Storage**	**Outlet**	**Fill**	**Elev.**	**Area**	**Porosity**	**Storage**	**Outlet**	**Fill**
(ft)	*(sq ft)*		*(cu ft)*			*(ft)*	*(sq ft)*		*(cu ft)*		
11.7	19,240	0.4	0		Class 2 Permeable Base	12.8	11,100	0.4	0		Class 2 Permeable Base
12.0	19,240	0.4	2,309		Class 2 Permeable Base	13.1	11,100	0.4	1,110		Class 2 Permeable Base
12.2	19,240	0.4	3,848		Class 2 Permeable Base	13.3	11,100	0.4	2,220		Class 2 Permeable Base
12.7	19,240	0.4	7,696	Perforated Pipe (Min. discharge = 2.23 cfs)	Class 2 Permeable Base	13.8	11,100	0.4	4,440	Perforated Pipe (Min. discharge = 1.29 cfs)	Class 2 Permeable Base
13.2	19,240	0.4	11,544		Soil Mix	14.3	11,100	0.4	6,660		Soil Mix
13.7	19,240	0.4	15,392		Soil Mix	14.8	11,100	0.4	8,880		Soil Mix
14.2	19,240	0.4	19,240		Soil Mix	15.3	11,100	0.4	11,100		Soil Mix
14.5	19,240	1	25,012		Open	15.6	11,100	1	13,875		Open
14.7	19,240	1	28,860	Drop Inlet 24" Square Atrium Grate (4)	Open	15.8	11,100	1	16,650	Drop Inlet 24" Square Atrium Grate (5)	Open
15.0	19,240	1	33,670	Spillway	Open	16.1	11,100	1	19,425	Spillway	Open
Bio-C						**Bio-D**					
Elev.	**Area**	**Porosity**	**Storage**	**Outlet**	**Fill**	**Elev.**	**Area**	**Porosity**	**Storage**	**Outlet**	**Fill**
(ft)	*(sq ft)*		*(cu ft)*			*(ft)*	*(sq ft)*		*(cu ft)*		
7.3	28,150	0.4	0		Class 2 Permeable Base	6.7	117,100	0.4	0		Class 2 Permeable Base
7.5	28,150	0.4	2,252		Class 2 Permeable Base	7.2	117,100	0.4	23,420		Class 2 Permeable Base
7.8	28,150	0.4	5,630		Class 2 Permeable Base	7.7	117,100	0.4	46,840		Class 2 Permeable Base
8.3	28,150	0.4	11,260	Perforated Pipe (Min. discharge = 3.26 cfs)	Class 2 Permeable Base	8.2	117,100	0.4	70,260	Perforated Pipe (Min. discharge = 13.55 cfs)	Class 2 Permeable Base
8.8	28,150	0.4	16,890		Soil Mix	8.7	117,100	0.4	93,680		Soil Mix
9.3	28,150	0.4	22,520		Soil Mix	9.2	117,100	0.4	175,650		Soil Mix
9.8	28,150	0.4	28,150		Soil Mix	9.5	117,100	0.4	199,070		Open
10.0	28,150	1	33,780		Open	9.7	117,100	1	210,780	150' Spillway	Open
10.3	28,150	1	42,225	Drop Inlet 24" Square Atrium Grate (8)	Open	10.2	117,100	1	234,200	150' Spillway	Open
10.6	28,150	1	49,263	Spillway	Open	10.5	117,100	1	269,330	Top of Berm	Open

Bioretention basins A, B, and C, were modeled with two outlets, one being the perforated pipe towards the top of the drain rock layer of the bioretention basin, and the other being the overflow inlet. For the perforated pipe, the maximum outflow is controlled by the design soil infiltration rate of 5 inches/hour. The outflow for each perforated pipe was modeled as a constant flowrate of Q = (5 inches/hour) x (bioretention footprint) that is activated once the depth in the bioretention exceeds 1 ft, i.e. top of the drain rock layer. For the overflow inlets, the flowrate is controlled by the specified inlet grate, and increases proportionally to the head above the inlet. Elevation-discharge curves for the overflow inlets were developed using the orifice equation and the open surface area listed on the manufacturer's specifications. In lieu of overflow inlets in bioretention D, two spillways control outflow into the wetland areas south of the project site. One 150 ft spillway is set at 9.7 ft in elevation, 6 inches above the top of the soil layer, and is activated at roughly the 2-year storm event. The second 150 ft spillway is set at 10.2 ft in elevation and is activated during larger storm events.

5.3 Hydrologic Model Results

The HEC-HMS model results for the 100-yr design storm are visualized in **Figure 5-3**. Peak flows for the west and east ditches downstream of the proposed development are summarized in **Table 5-14**. The combined inflow to the ponded area at Hwy 12 is also represented by a model node which accounts for the different timing of subbasin runoff. Additionally, the peak water surface elevation at Hwy 12 was calculated using the elevation-storage-discharge tables and is shown in **Table 5-15.** Detailed HEC-HMS output is included in **Appendix E**.

By design, the majority of runoff from the proposed development exits to the west ditch while the run-on from the upstream watersheds is routed through the new perimeter ditch before discharging to the east ditch. Therefore, when comparing the Pre-Project and Post-Project scenarios, it is expected that the west ditch peak flows decrease while the east ditch peak flows increase. However, when accounting for runoff timing, the combined flows at Hwy 12 are reduced in the Post-Project scenario for all but the 100-year event, which is roughly equivalent to the Pre-Project discharge.

Table 5-14 HEC-HMS Peak Flow Summary

	2-year	
	Pre-Project	Post-Project
West Ditch	88.9	18.1
East Ditch	187.2	222.0
Inflow to Hwy 12 Basin	263.4	240.1
	25-year	
	Pre-Project	Post-Project
West Ditch	180	74.3
East Ditch	364.3	444.2
Inflow to Hwy 12 Basin	531.7	518.5
	100-year	
	Pre-Project	Post-Project
West Ditch	224.3	116.3
East Ditch	450.2	553.3
Inflow to Hwy 12 Basin	660.2	660.7

Hydromodification Management. Peak flow from the site for the 2-year, 24-hour storm under Pre-Project conditions is predicted to be 263.4 cfs. This is reduced to 240.1 cfs in the Post-Project case, due to the storage volume provided in the bioretention basins and new perimeter ditch.

Peak Flow Control (flood control). The HEC-HMS modeling predicts reductions in peak flow rates for the larger design storms as well. The combined peak flow rate at Hwy 12 for the 25-year, 24-hour storm is predicted to decrease from 531.7 cfs to 518.5 cfs in Post-Project conditions. For the 100-year, 24-hour storm, the modeling predicts almost equivalent peak flow into the Hwy 12 basin from 660.2 cfs to 660.7 cfs in the Post-Project condition. However, when taking into account the timing of the various inflows to the basin upstream of Hwy 12, the peak volume into the basin is actually reduced in the 100-year Post-Project condition, and thus the peak WSE is reduced. In all scenarios, water will pond north of Hwy 12 before flowing through the two culverts under Hwy 12 to Suisun Marsh. The predicted Post-Project flows through the culverts are within the capacity of the culverts and do not come near to overtopping the road. Further, the actual depth of ponded water upstream of Hwy 12 is reduced in the Post-Project condition across all modeled flows. Therefore, the implementation of the project presents no downstream impacts and does not exceed the capacity of the existing system. Water surface elevations (WSEs) are shown in **Table 5-15** and are visualized in a typical cross section in **Figure 5-4.**

Table 5-15 HEC-HMS Water Surface Elevation at Hwy 12

	2-yr	25-yr	100-yr
Pre-Project	9.39	10.58	11.05
Post-Project	9.36	10.54	11.00

WSE at Hwy 12. Hwy 12 road elevation ranges in elevation from 12.8 ft at the western culvert to 13.2 ft at the eastern culvert. The HEC-HMS modeling predicts reductions in WSEs at Hwy 12 for all modeled flows. The peak flow rate for the 25-year, 24-hour storm is predicted to decrease from 10.58 ft to 10.54 ft in Post-Project conditions. For the 100-year, 24-hour storm, the modeling predicts a reduction in peak flow at the outlet from 11.05 ft to 11.00 ft in the Post-Project condition. While the 100-year peak flows are roughly equivalent for the Pre- and Post-Project scenarios, both the inflow and outflow volumes to the ponded area north of Hwy 12 are reduced in the Post-Project condition. This indicates that the timing and duration of the peak flows of the Post-Project scenario are favorable in reducing WSE at Hwy 12. Ultimately, the Post-Project scenario demonstrates compliance with no adverse impacts to downstream infrastructure.

Perimeter Ditch Sizing. Per the Suisun City Standards Manual, open channels within Suisun City's jurisdiction are required to maintain 1 ft of freeboard above the 100-year discharge and channel velocity ranging between 2-5 ft/sec in unlined channels. Based on the run-on model results, the perimeter ditch will need to be sized to convey the combined peak flow from both the east and west ditches north of Petersen Rd. (approximately 611 cfs). Assuming a 30 ft wide channel bottom with 2:1 side slopes, a slope of 0.1%, and a manning's n of 0.035, as shown in the project plans, the channel will need to contain a flow depth of at least 4.8 ft, not accounting for freeboard. The proposed perimeter ditch shown on **Sheet C-1, Appendix C** is 5.8 feet deep and includes the required freeboard. The average velocity is in the proposed perimeter ditch is 3.2 ft/sec. The hydraulic grade line (HGL) of the 100-year flow in the ditch is also shown in **Appendix C**.

The existing ditches have an average bottom width of 9.8 ft, channel slope of 0.22-0.23%, and 2 to 3:1 side slopes. Under current conditions, the average western ditch depth is 4.1 ft which conveys the estimated 224 cfs 100-yr pre-project runoff with 0.4 ft of freeboard and an average velocity of 3.6 ft/sec. The average eastern ditch depth is 2.6 ft which would not contain the 100-yr pre-project runoff estimated at 450 cfs.

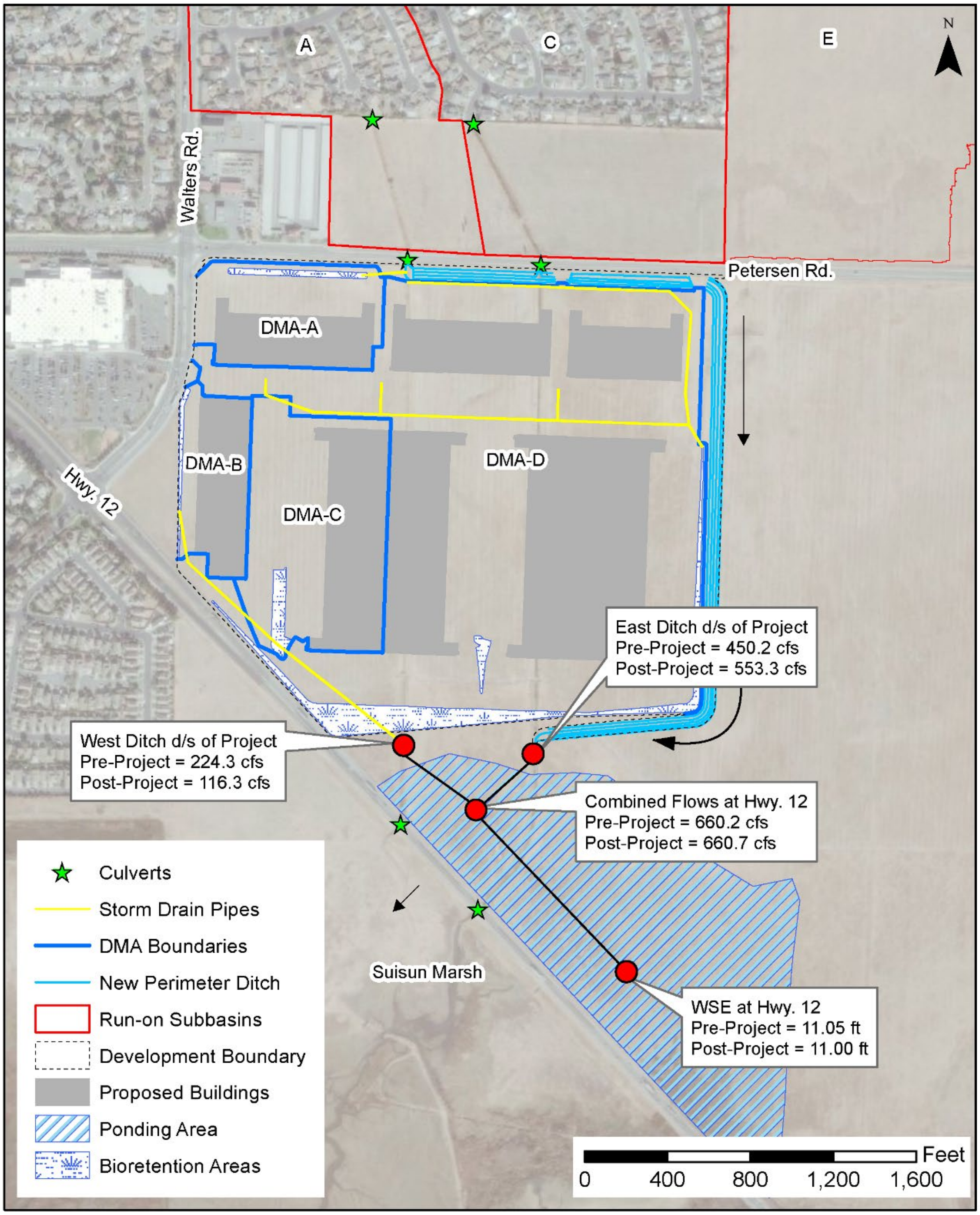


Figure 5-3 100-yr Model Results, Suisun Logistics Center, Solano County, California

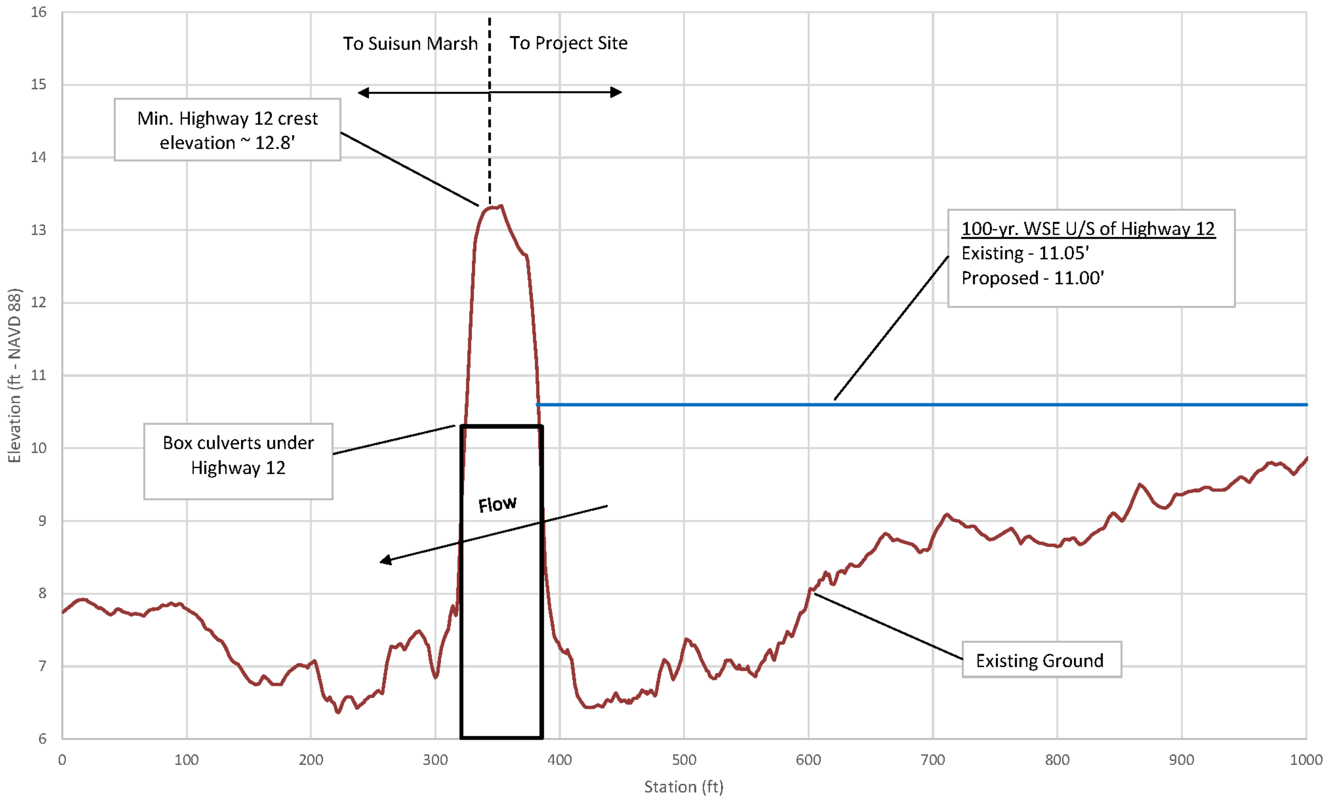


Figure 5-4 Hwy 12 Cross Section, Suisun Logistics Center, Solano County, California

6 SOURCE CONTROL MEASURES

6.1 Site Activities and Potential Sources of Pollutants

As an industrial development, Balance expects the Project to have relatively few sources of stormwater pollutants. Anticipated potential sources of runoff pollutants and recommended source control BMPs are listed in the table in **Section 6.2**.

6.2 Source Control Table

Potential Source of Runoff Pollutants	**Permanent Source Control BMPs**	**Operational Source Control BMPs**
On-site storm drain inlets	Mark all inlets with the words "No Dumping! Drains to Bay" or similar.	• Maintain and periodically repaint or replace inlet markings. • Distribute stormwater pollution prevention info to Owner
Landscape/ Outdoor Pesticide Use/Building and Grounds Maintenance	• Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution • Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. • Consider using pest-resistant plants, especially adjacent to hardscape	• Maintain landscaping using minimum or no pesticides. • Provide IPM information to new Owner.

Potential Source of Runoff Pollutants	**Permanent Source Control BMPs**	**Operational Source Control BMPs**
Vehicle washing	Driveways and parking areas drain to bioretention areas	Distribute stormwater pollution prevention information to Owner.
Loading Docks	• Loading docks will be covered and/or graded to minimize run-on to and runoff from loading area. Roof downspouts shall be positioned to direct stormwater away from the load area. • When loading docks are not covered, door skirts between the trailers and the building shall be installed to prevent exposure of loading activities to rain.	• Loading docks will be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation, subject to approval by the Fairfield-Suisun Sewer District
Refuse areas	• Signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar. • Provide adequate number of receptacles and trash enclosures will be covered. Inspect regular basis, repair, or replace leaky receptacles. • Inspect and pick up littler daily and clean up spills immediately. • Runoff from trash enclosures, recycling areas, and/or food	• Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site.

Potential Source of Runoff Pollutants	Permanent Source Control BMPs	Operational Source Control BMPs
	compactor enclosures, or similar facilities shall not discharge to the storm drain system. • Trash enclosure areas shall be designed to avoid run-on to the trash enclosure area. If any drains are installed in or beneath dumpsters, the drains shall be connected to a properly sized grease removal device and/or treatment devices prior to discharging to the sanitary sewer. • The area will be designed to prevent water run-on to the area and runoff from the area and to contain litter and trash, so that it is not dispersed by the wind or runoff during waste removal.	

6.3 Features, Materials, and Methods of Construction of Source Control BMPs

No special features, materials, or construction methods are required for the source control BMPs listed above.

7 STORMWATER FACILITY MAINTENANCE

7.1 Ownership and Responsibility for Maintenance in Perpetuity

The applicant commits to execute any necessary agreements and/or annex into a fee mechanism in accordance with local requirements. The applicant will accept responsibility for operation and maintenance of facilities until that responsibility is formally transferred. Storm water treatment and flow-control facilities described in this report will be owned and maintained in perpetuity by the owner of the subject property. The applicant will accept responsibility for interim operation and maintenance of the facilities until such time as this responsibility is formally transferred to subsequent owners.

The operation and maintenance (O&M) agreement will be recorded with the Solano County Assessor's Office prior to final approval of the project building permits as per FSURMP C3.3 Manual. This O&M agreement transfers to subsequent owners of the property including annual reporting of the Project's post construction controls.

7.2 Summary of Maintenance Requirements for Bioretention Facilities

For the bioretention basins to successfully filter pollutants from runoff, they must remain clear of obstructions and clogging. Routine maintenance is needed to ensure that flow is unobstructed, that erosion is prevented, and that soils are held together by plant roots and are biologically active. Typical bioretention facility maintenance consists of the following:

- Maintain vegetation and the irrigation system. Prune and weed, as needed, to keep the bioretention area neat and orderly in appearance.
- On a monthly basis, remove obstructions, debris, accumulated sediment, and trash.
- On a biannual basis (pre- and post-wet season) evaluate the health of plants, remove and replace any dead or diseased vegetation, and till or replace soil (using specified biotreatment soil mixtures) as needed to maintain the design elevation of the soil.
- Before and after the wet season, and monthly during the wet season, conduct inspections to assure proper functioning of bioretention area. Items to be inspected include:

- Inspect and, if needed, replace mulch before the wet season begins and when erosion is evident or when the bioretention area begins to look unattractive. The entire area may need mulch replacement every two or three years, although spot mulching may be sufficient when there are random void areas.

- Inspect bioretention area for ponded water. If ponded water does not drain within 72 hours, remove surface soils, and replace with biotreatment soil. If mosquito larvae are observed, contact the Solano County Mosquito Abatement District at (707) 437-1116. Inspect inlets for channels, exposure of soils, or other evidence of erosion. Clear any obstructions and remove any accumulation of sediment.

- On an ongoing basis, treat diseased vegetation, as needed using preventative and low-toxic measures to the extent possible, and replace any dead plants.
- The use of pesticides and quick-release synthesizers shall be minimized, and the principles of integrated pest management followed. Check the local jurisdiction for any local policies regarding the use of pesticides and fertilizers.

8 CONSTRUCTION CHECKLIST

Stormwater Control Plan Page #	**Source Control or Treatment Control Measure**	**See Plan Sheet #s**
Section 4 and **Appendix C**	Runoff from roof, pavement, landscaped and graded areas drains to bioretention areas.	C-2

9 CERTIFICATIONS

The design of stormwater treatment facilities and other stormwater pollution control measures in this plan are in accordance with the current edition of the BASMAA *Post-Construction Manual (2019), Regional Water Quality Control Board Order R2-2015-0049, and the FSURMP Stormwater C.3 Guidebook*.

10 REFERENCES

Bay Area Stormwater Management Agencies Association, 2019, Design guidance for stormwater treatment and control for projects in Marin, Sonoma, Napa, and Solano Counties, 33 p. + appendices.

California Stormwater Quality Association (CASQA), 2003, Stormwater best management practice handbook-new development and redevelopment, 378 p. inc. appendices.

Fairfield and Suisun Cities, 2012, Fairfield-Suisun Urban Runoff Management Program Stormwater C.3 Guidebook.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture, Web Soil Survey, available online at http://websoilsurvey.nrcs.usda.gov/ Accessed May 1, 2021.

Suisun City, 1996, Suisun City Design Standards, Standard Specifications, and Details (Standards) Manual.

Suisun City, 2019, Solano Permittees Green Stormwater Infrastructure Plan.

Suisun Solano Water Authority, 2008, Suisun Solano Water Authority Design Standards and Standard Specifications Standard Details.

U.S. Department of Transportation, Federal Highway Administration, 2012, Hydraulic Design of Highway Culverts: 3rd Edition.

West Yost and Associates, 1999, Solano County Water Agency Hydrology Manual.

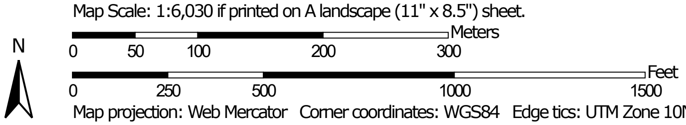
APPENDICES

APPENDIX A

USDA Web Soil Survey Data

Hydrologic Soil Group—Solano County, California
(site_bndy_poly2)

Map Scale: 1:6,030 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Solano County, California
Survey Area Data: Version 14, May 29, 2020

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

Date(s) aerial images were photographed: Mar 30, 2019—Apr 17, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AoA	Antioch-San Ysidro complex, 0 to 2 percent slopes	D	91.1	71.7%
Sh	Solano loam	D	35.9	28.3%
Totals for Area of Interest			**127.0**	**100.0%**

Description

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

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

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

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

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

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

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

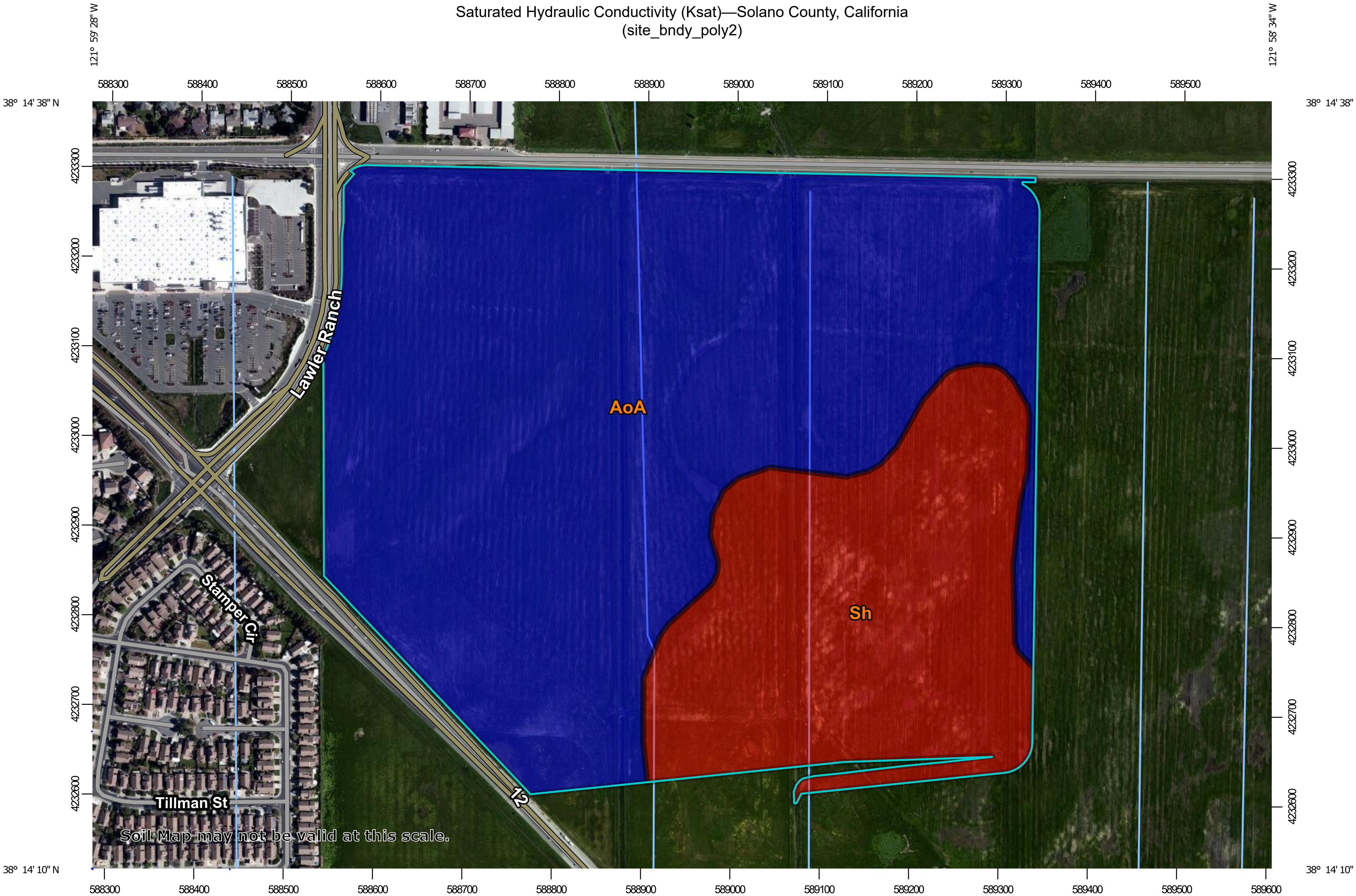
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Saturated Hydraulic Conductivity (Ksat)—Solano County, California
(site_bndy_poly2)



Map Scale: 1:6,030 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- <= 0.5790
- > 0.5790 and <= 2.9402
- Not rated or not available

Soil Rating Lines

- <= 0.5790
- > 0.5790 and <= 2.9402
- Not rated or not available

Soil Rating Points

- <= 0.5790
- > 0.5790 and <= 2.9402
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Solano County, California
Survey Area Data: Version 14, May 29, 2020

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

Date(s) aerial images were photographed: Mar 30, 2019—Apr 17, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Saturated Hydraulic Conductivity (Ksat)

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
AoA	Antioch-San Ysidro complex, 0 to 2 percent slopes	2.9402	91.1	71.7%
Sh	Solano loam	0.5790	35.9	28.3%
Totals for Area of Interest			**127.0**	**100.0%**

Description

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Rating Options

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

APPENDIX B

FEMA FIRMette

National Flood Hazard Layer FIRMette

FEMA

121°59'20"W 38°14'38"N

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

1:6,000

121°58'42"W 38°14'10"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

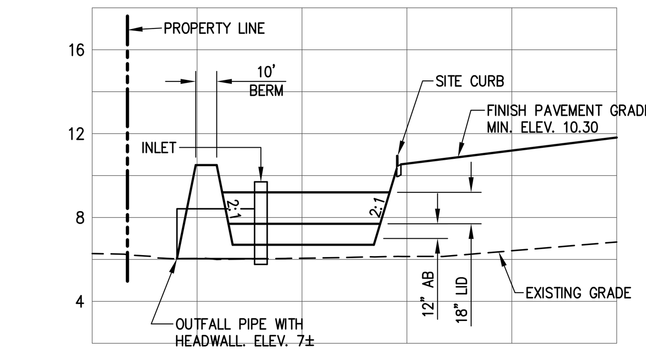
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/11/2021 at 2:48 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

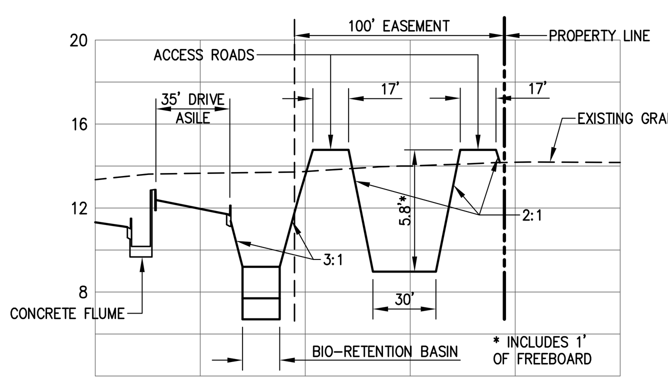
APPENDIX C

RAK Plan Sheets



SECTION "A"-"A"

SCALES:
1"=60' HORIZONTAL
1"=6' VERTICAL



SECTION "B"-"B"

SCALES:
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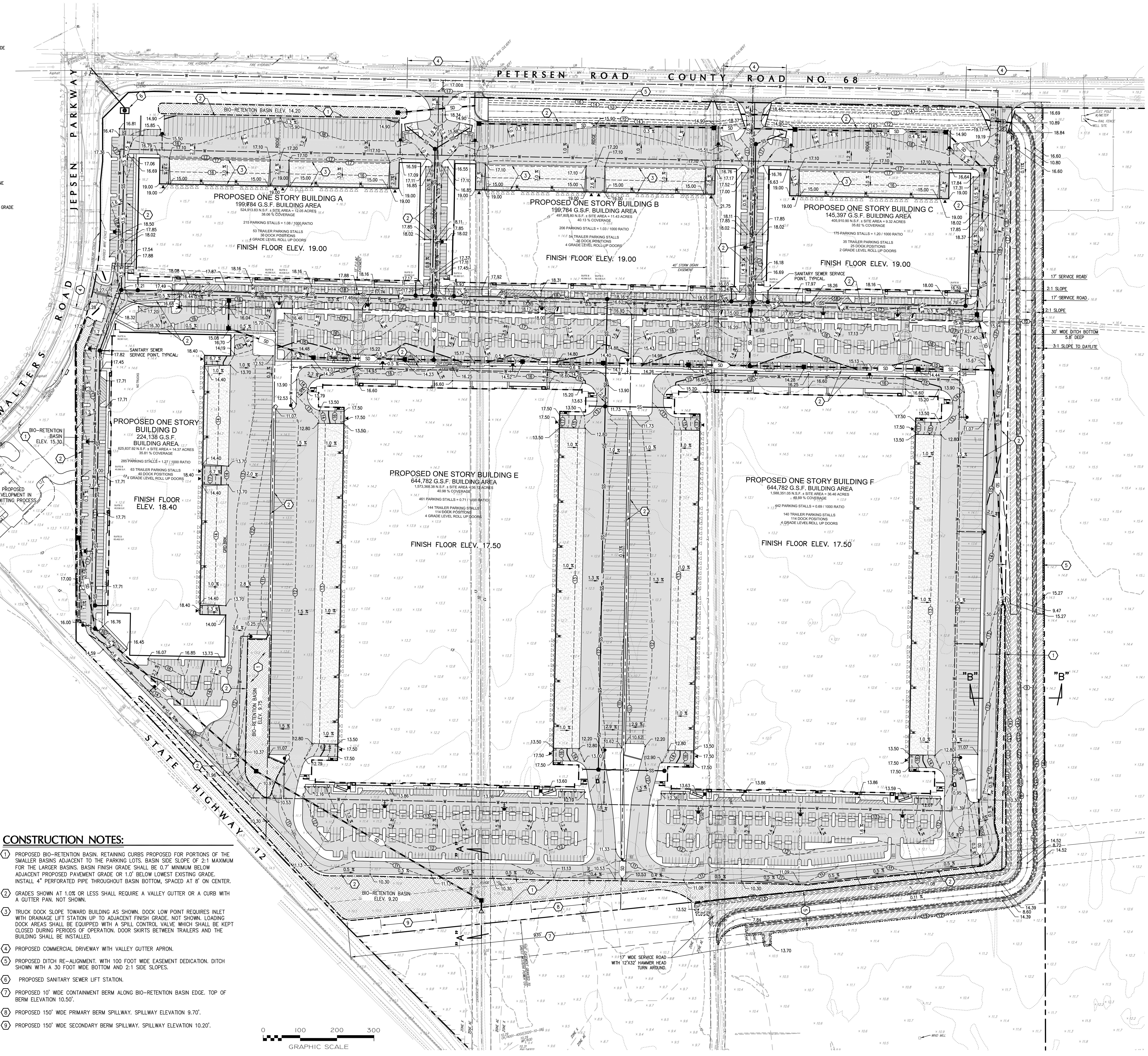


LEGEND:

	PROPOSED	EXISTING
BOUNDARY LINE		
PARCEL LINE		
STREET CENTERLINE		
EASEMENT LINE		
FENCE		
STORM DRAIN PIPE	SD	SD
SANITARY SEWER PIPE	SS	SS
WATER LINE	W	W
GAS MAIN		GAS
DRAINAGE INLET		
MANHOLE		
CURB		
CURB & GUTTER		
PAVEMENT EDGE		
ELEVATION CONTOUR	14	15
GRADE BREAK OR RIDGE		
FLOW LINE VALLEY GUTTER OR DITCH		
GRADING DAYLITE		
SPOT ELEVATION		
FINISH GRADE ELEVATION	14.50	× 14.5
FINISH GRADE OR SLOPE	2.1 %	
CONCRETE		
NEW ASPHALT PAVING		
BIO-RETENTION PLANTER		
SERVICE ROAD		

CONSTRUCTION NOTES:

1. PROPOSED BIO-RETENTION BASIN. RETAINING CURBS PROPOSED FOR PORTIONS OF THE SMALLER BASINS ADJACENT TO THE PARKING LOTS. BASIN SIDE SLOPE OF 2:1 MAXIMUM FOR THE LARGER BASINS. BASIN FINISH GRADE SHALL BE 0.7' MINIMUM BELOW ADJACENT PROPOSED PAVEMENT GRADE OR 1.0' BELOW LOWEST EXISTING GRADE. INSTALL 4" PERFORATED PIPE THROUGHOUT BASIN BOTTOM, SPACED AT 8' ON CENTER.
2. GRADES SHOWN AT 1.0% OR LESS SHALL REQUIRE A VALLEY GUTTER OR A CURB WITH A GUTTER PAN. NOT SHOWN.
3. TRUCK DOCK SLOPE TOWARD BUILDING AS SHOWN. DOCK LOW POINT REQUIRES INLET WITH DRAINAGE LIFT STATION UP TO ADJACENT FINISH GRADE. NOT SHOWN. LOADING DOCK AREAS SHALL BE EQUIPPED WITH A SPILL CONTROL VALVE WHICH SHALL BE KEPT CLOSED DURING PERIODS OF OPERATION. DOOR SKIRTS BETWEEN TRAILERS AND THE BUILDING SHALL BE INSTALLED.
4. PROPOSED COMMERCIAL DRIVEWAY WITH VALLEY GUTTER APRON.
5. PROPOSED DITCH RE-ALIGNMENT. WITH 100 FOOT WIDE EASEMENT DEDICATION. DITCH SHOWN WITH A 30 FOOT WIDE BOTTOM AND 2:1 SIDE SLOPES.
6. PROPOSED SANITARY SEWER LIFT STATION.
7. PROPOSED 10' WIDE CONTAINMENT BERM ALONG BIO-RETENTION BASIN EDGE. TOP OF BERM ELEVATION 10.50'.
8. PROPOSED 150' WIDE PRIMARY BERM SPILLWAY. SPILLWAY ELEVATION 9.70'.
9. PROPOSED 150' WIDE SECONDARY BERM SPILLWAY. SPILLWAY ELEVATION 10.20'.

RMW
Architecture
Interiors

1718 Third Street
Suite 101
Sacramento
California 95811

Office
916 449-1400

rmw.com

OWNER / DEVELOPER:

BUZZ OATES
555 CAPITOL MALL SUITE 900
SACRAMENTO, CA 95814
PHONE: 916.379.3800

PRELIMINARY DESIGN DOCUMENTS FOR:

SUISUN LOGISTICS CENTER

WALTERS ROAD & PETERSON ROAD
SUISUN CITY, CA

approved for the owner by :

approved for the architect by :

issue :	description :	date :
A	PLANNING SUBMITTAL - INITIAL DESIGN REVIEW	11-20-2020
B	DITCH BYPASS & SERVICE ROADS	6-21-2021

RAK
CIVIL ENGINEERS
ROBERT A. KARN & ASSOCIATES, Inc.
707 BECK AVENUE
FAIRFIELD, CALIFORNIA 94533
Phone (707) 435-9999
e-mail: rak@rakengineers.com

drawn by : A.B.L. plot date : 6-30-2021

checked by : T.W.P.

stamp

scale : 1"=100'

project number : A20026

PRELIMINARY GRADING AND UTILITY PLAN

sheet no. : C1

Project Name: **Suisun Logistics, Suisun**
Project Type: **Treatment Only**
Drainage Area: **124.0 acres**
Mean Annual Precipitation: **19.5 inches**
Soil Group: **Type D**
C.3. Compliance Required?: **YES**

IMP Name: **IMP-1 (BR-A)**
IMP Type: Bioretention Facility

DMA Name	DMA Area (SF)	Post-Project Surface Type	DMA Runoff Factor	DMA Area X Runoff Factor
ROOF-1	199,600	Roof	1.00	199,600
PAVE-1	158,600	Asphalt/Concrete	1.00	158,600
LAND-1	58,500	Landscaping	0.10	5,850
			Total	364,050

IMP Sizing Factor	Rain Adjust. Factor	Minimum Area	Proposed Area
0.04	1.000	14,562	19,240

IMP Name: **IMP-2 (BR-B)**
IMP Type: Bioretention Facility

DMA Name	DMA Area (SF)	Post-Project Surface Type	DMA Runoff Factor	DMA Area X Runoff Factor
ROOF-2	212,000	Roof	1.00	212,000
PAVE-2	51,550	Asphalt/Concrete	1.00	51,550
LAND-2	24,400	Landscaping	0.10	2,440
			Total	265,990

IMP Sizing Factor	Rain Adjust. Factor	Minimum Area	Proposed Area
0.04	1.000	10,640	11,100

IMP Name: **IMP-3 (BR-C)**
IMP Type: Bioretention Facility

DMA Name	DMA Area (SF)	Post-Project Surface Type	DMA Runoff Factor	DMA Area X Runoff Factor
ROOF-3	323,800	Roof	1.00	323,800
PAVE-3	376,200	Asphalt/Concrete	1.00	376,200
LAND-3	33,700	Landscaping	0.10	3,370
			Total	703,370

IMP Sizing Factor	Rain Adjust. Factor	Minimum Area	Proposed Area
0.04	1.000	28,135	28,150

IMP Name: **IMP-4 (BR-D)**
IMP Type: Bioretention Facility

DMA Name	DMA Area (SF)	Post-Project Surface Type	DMA Runoff Factor	DMA Area X Runoff Factor
ROOF-4	199,600	Roof	1.00	199,600
ROOF-5	145,300	Roof	1.00	145,300
ROOF-6	644,500	Roof	1.00	644,500
ROOF-7	322,300	Roof	1.00	322,300
PAVE-4	1,560,700	Asphalt/Concrete	1.00	1,560,700
LAND-4	531,200	Landscaping	0.10	53,120
			Total	2,925,520

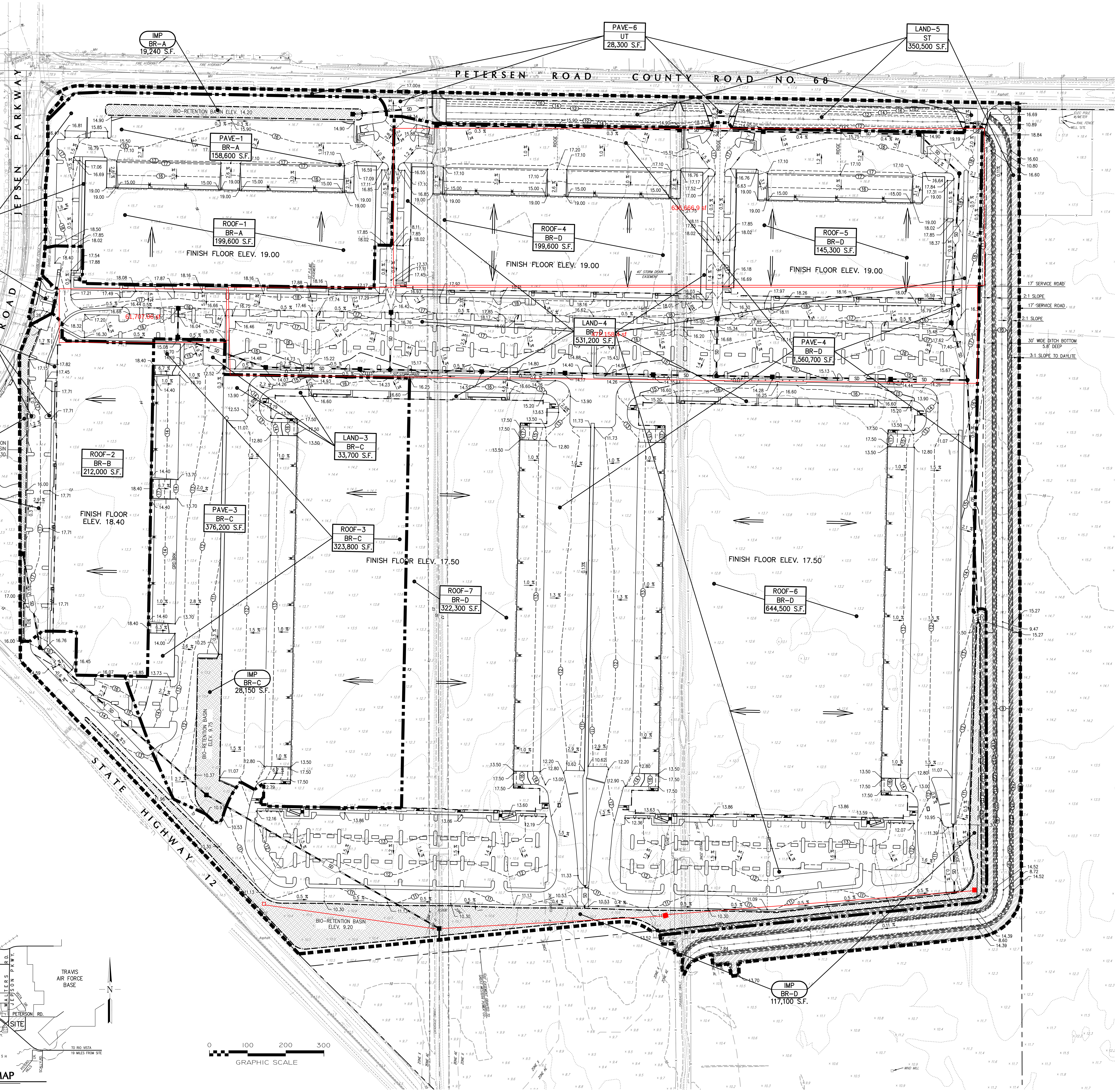
IMP Sizing Factor	Rain Adjust. Factor	Minimum Area	Proposed Area
0.04	1.000	117,021	117,100

Untreated

DMA Name	DMA Area (SF)
PAVE-5	5,700
PAVE-6	28,300

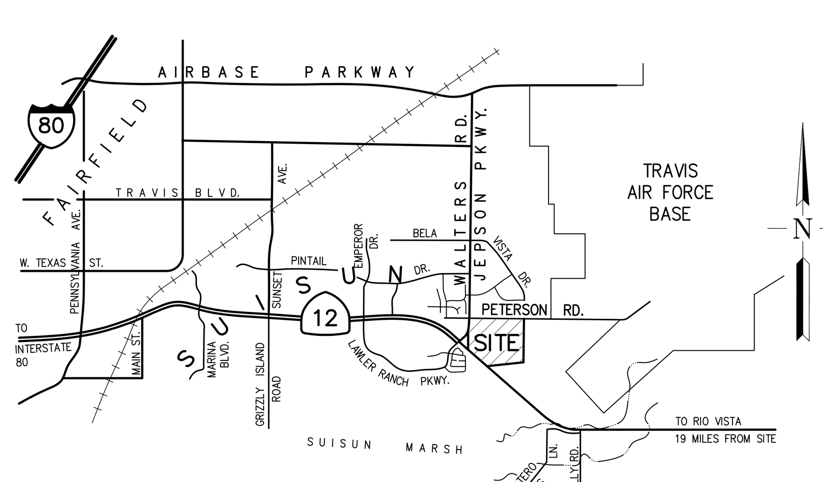
Self-Treating

DMA Name	DMA Area (SF)
LAND-5	350,500



LEGEND:

	PROPOSED	EXISTING
LIMIT OF IMPROVEMENTS		
DRAINAGE AREA BOUNDARY		
BIO-RETENTION TREATMENT AREA		
DRAINAGE MANAGEMENT AREA (DMA) ID	PAVE 1	
TREATMENT DEVICE ID: BIO-RETENTION BASIN (BR), UNTREATED (UT), SELF TREATED (ST)	BR-A	
	S.F.	
INTEGRATED MANAGEMENT PRACTICE (IMP)	IMP	
BIO-RETENTION BASIN (BR)	BR-C	
	S.F.	
BOUNDARY LINE		
PROPOSED PARCEL LINE		
STORM DRAIN PIPE		
DRAINAGE INLET		
VERTICAL CURB		
CURB AND GUTTER		
CONTOUR	17	
GRADE BREAK		
FLOW LINE SWALE OR GUTTER		
ROOF DRAINAGE DIRECTION		



VICINITY MAP
NO SCALE

RMW
RMW Architecture Interiors
1718 Third Street Suite 101 Sacramento California 95811
Office 916 449-1400
rmw.com

OWNER / DEVELOPER:

BUZZ OATES
555 CAPITOL MALL SUITE 900
SACRAMENTO, CA 95814
PHONE: 916.379.3800

PRELIMINARY DESIGN DOCUMENTS FOR:

SUISUN LOGISTICS CENTER

WALTERS ROAD & PETERSON ROAD
SUISUN CITY, CA

approved for the owner by :

approved for the architect by :

issue :	description :	date :
A	PLANNING SUBMITTAL - INITIAL DESIGN REVIEW	11-20-2020
B	DITCH BYPASS & SERVICE ROADS	6-21-2021

RAK CIVIL ENGINEERS
ROBERT A. KARN & ASSOCIATES, Inc.
707 BECK AVENUE
FAIRFIELD, CALIFORNIA 94533

drawn by : A.B.L. plot date : 6-30-2021

checked by : T.W.P.

stamp

scale : 1"=100'

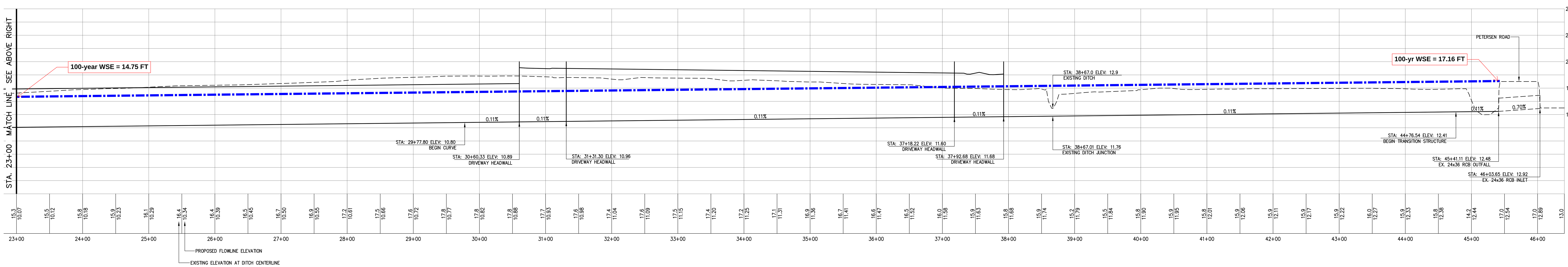
project number : A20026

PRELIMINARY STORM WATER CONTROL PLAN

sheet no. : C2

DITCH PROFILE AT CENTERLINE

SCALES:
1"=60' HORIZONTAL
1"=6' VERTICAL



0 6 12 18
GRAPHIC SCALE
1"=6' VERTICAL

0 60 120 180
GRAPHIC SCALE
1"=60' HORIZONTAL

APPENDIX D

Infiltration and Rainwater Harvesting Forms

FAIRFIELD-SUISUN
URBAN RUNOFF MANAGEMENT PROGRAM

STAFF ONLY		
Application	Submittal Date	Initials
Initial	________	________
Final	________	________
Application Approval Date ________		

NEW AND REDEVELOPMENT
POST CONSTRUCTION STORMWATER REQUIREMENTS APPLICATION

WHICH PROJECTS APPLY?

Beginning December 1, 2011, all projects that are required to treat stormwater will need to treat the permit-specified amount of stormwater runoff with one or more of the following low impact development methods: rainwater harvest and use, infiltration, evapotranspiration, or biotreatment. Biotreatment will be allowed only where harvesting and reuse, infiltration, and evapotranspiration are shown to be infeasible at the project site. Vault-based treatment will not be allowed as a stand-alone treatment measure. Where stormwater harvesting and reuse, infiltration, or evapotranspiration are infeasible, vault based treatment measures may be used in series with biotreatment, for example, to remove trash or other large solids.

WHAT IS AN IMPERVIOUS SURFACE?

An impervious surface prevents the infiltration or passage of water into the soil. Onsite impervious surfaces include building rooftops, paved patios, covered patios, driveways, parking lots, paved walkways, sidewalks and streets.

Project Name: Suisun Logistics Center APN # 0174 - 190 - 140

Project Description: Commerical Warehouses

Applicant Name: Buzz Oates Enterprises

Project Location: Peterson Road, Suisun CIty, CA
(address)

Marsh #1 Suisun Marsh
(watershed) (receiving water)

LID FEASIBILITY EVALUATION ATTACHED? ☒ Yes ☐ No *(See Appendix E. Must be attached)*

CERTIFICATION:

I hereby certify under penalty of perjury that the information presented in this application and attachments is true and complete:

________________________________ ________________
(Signature of Property Owner or Other Responsible Party) (Date)

________________________________ ________________
(Type or Print Name) (E-mail)

________________________________ ________________
(Mailing Address) (Phone)

1. PROJECT TYPE (CHECK ONE):

☒ New Development ☐ Redevelopment

2. PROJECT USE (CHECK ONE):

☐ Residential ☐ Commercial ☒ Industrial ☐ Public ☐ Road
☐ Multi-use ☐ Other: ______________________

If Residential, does the project consist of a single-family home that is not part of a larger common plan of development? ☐ Yes ☐ No

If yes, no numeric sizing criteria or Operation and Maintenance Agreement is required and the project will be considered in compliance with stormwater requirements with the incorporation of appropriate pollutant source control and low impact development site design measures.

3. PROJECT SIZE:

a. Site size 6,935,187.6 sq. ft. or 159.21 acres

b. Existing impervious surface area (includes land covered by buildings, sheds, patios/covers, parking lots, streets, sidewalks, paved walkways and driveways onsite) 0 sq. ft.

c. New impervious surface area created 4,228,150 sq. ft.

d. Impervious surface area replaced 0 sq. ft.

e. Impervious surface area created or replaced (c + d) 4,228,150 sq. ft.

f. Percent increase/replacement of impervious surface area ______________ %
e/b X 100

g. Estimated area of land disturbance during construction (including clearing, grading, or excavating). 5,531,000 sq. ft.

4. TYPE OF PESTICIDE REDUCTION MEASURES USED (to be checked by City staff):

☐ Education (e.g., fact sheet, plant list) ☐ Conditions of Approval
☐ Does not Apply (Project has no landscape element) ☐ Other (Describe:________________)

5. TYPES OF STORMWATER CONTROLS USED (check all that apply, using lists on page 3 of this application):

☒ Treatment Measures ☐ Source Control Measures ☐ Site Design Measures

6. HYDROMODIFICATION MANAGEMENT PLAN APPLICABILITY:

a. Direct Discharge Point of Project:

☐ Municipal Storm Drain System ☒ Creek ☒ Suisun Bay

b. Receiving Body Exempt? ☐ Yes ☐ No*

**PROJECTS LOCATED IN THE MID TO UPPER WATERSHEDS OF LAUREL AND LEDGEWOOD CREEKS SHALL REFER TO THE THE ATTACHED FIGURES 2 AND 3 FROM THE PROGRAM'S HYDROMODIFICATION MANGEMENT PLAN (HMP) FOR PROJECT'S HMP APPLICABILITY. FOR FURTHER DETAIL PLEASE SEE THE PROGRAM'S HMP.*

7. SPECIFIC STORMWATER TREATMENT AND CONTROL MEASURES:

Check **all** site design, source control and stormwater treatment control measures that will be incorporated into the project.

SITE DESIGN

- [x] Minimize land disturbance
- [x] Minimize impervious surfaces
- [ ] Minimum-impact street design (narrow residential streets, roadside swales)
- [ ] Minimum-impact parking lot design
- [ ] Cluster structures/ pavement
- [ ] Porous/Permeable pavement
- [ ] Alternative driveway design
- [ ] Disconnect downspouts
- [ ] Microdetention in landscape
- [ ] Preserve open space: _______ ac. or sq.ft. (circle one)
- [x] Protect riparian and wetland areas, riparian buffers (Setback from top of bank: _______ft.)
- [ ] Other _______________

SOURCE CONTROLS

- [ ] Alternative Building Materials
- [ ] Wash area/racks, drain to sanitary sewer
- [x] Covered dumpster area, drain to sanitary sewer
- [ ] Swimming pool/fountain drain to sanitary sewer
- [ ] Beneficial landscaping (minimizes irrigation, runoff, pesticides and fertilizers; promotes treatment)
- [ ] Outdoor material storage protection
- [x] Covers, drains for loading docks, maintenance bays, fueling areas
- [x] Maintenance (street sweeping, catch basin cleaning)
- [x] Storm Drain Signage
- [ ] Green or Blue Roofs
- [ ] Other _______________

STORMWATER TREATMENT

- [ ] Vegetated Swale
- [ ] Vegetated Buffer Strip
- [x] Bioretention
- [ ] Extended Detention basin (dry)
- [ ] Wet Pond/Constructed wetland (basin or channel) (retention)
- [ ] Underground detention (e.g. Porous Pavement Recharge Bed)
- [ ] Media filter (sand, organic matter, manufactured)
- [ ] Hydrodynamic Separator Device (commercially available in-line treatment unit e.g., CDS, wet vault, vortex separator)
- [ ] Retention/Irrigation
- [ ] Water Quality Inlet/ Oil/Water Separators
- [ ] Roof Garden/Green Roofs (rooftop vegetation)
- [ ] Planter Boxes
- [ ] Exfiltration Trench
- [ ] Other ______________

8. TREATMENT CONTROL DETAILS

For each treatment control measure included as part of your project, provide the name and the sizing method used. Use additional sheets if necessary

NOTE: **All** numeric sizing calculations shall be submitted as part of the final application, and **must** include a signed certification, from a licensed civil engineer registered in the state of California, that the plan meets the criteria established in Order No. R2-2009-0074. A final *New and Redevelopment Post Construction Stormwater Requirements Application* must be submitted with the final construction drawings.

	TREATMENT CONTROL BMP	SIZING METHOD USED (VOLUME, FLOW, COMBINATION OF FLOW & VOLUME)
1.	Bioretention A	Flow and Volume
2.	Bioretention B	Flow and Volume
3.	Bioretention C	Flow and Volume
4.	Bioretention D	Flow and Volume
5.		

A. Property Owners Name Buzz Oates Enterprises

B. Responsible Party—Stormwater Treatment Measure Owner or Operator's Information:

a. Name: ______________________

b. Address: ______________________

c. Phone/Fax/E-mail: ______________________

THIS PAGE TO BE COMPLETED BY PROGRAM STAFF *ONLY*:

MORE DETAILED INFORMATION ABOUT ACCESS ASSURANCE AND O&M RESPONSIBILITIES:

Describe how access permission is assured for O&M verification by public agencies or their representatives (e.g., City, Fairfield-Suisun Sewer District, Regional Water Quality Control Board, and Solano County Mosquito Abatement District):

____

____

Indicate how responsibility for O&M is assured. Check all that apply:

- ☐ Signed statement from private entity accepting responsibility for O&M until responsibility is legally transferred.
- ☐ Signed statement from public entity assuming O&M and that the treatment measures meet all local design standards.
- ☐ Written conditions in the sales or lease agreement requiring the buyer or lessee to assume O&M (in the case of purchase and sale agreements, conditions shall survive the close of escrow).
- ☐ Written text in project conditions, covenants and restrictions for residential properties assigning O&M responsibilities to the homeowners association.
- ☐ Any other legally enforceable agreement or mechanism that assigns responsibility and describe below.

____

LOCAL AGENCY O&M VERIFICATION PROGRAM

Name of municipality or Flood Control District responsible under the NPDES permit for verifying O&M.

____

Describe where information documenting responsibility for O&M is kept and updated.

____

____

APPLICATION REVIEWED BY (PLEASE INITIAL EACH LINE):

Planning and Development Department
Planning Division: ________

Public Works Department
Engineering Division: ________

Infiltration/Harvesting and Use Feasibility Screening Worksheet

FAIRFIELD-SUISUN
URBAN RUNOFF MANAGEMENT PROGRAM

Apply these screening criteria for C.3 Regulated Projects required to implement Provision C.3 stormwater treatment requirements. Contact municipal staff to determine whether the project meets Special Project criteria. If the project meets Special Project criteria, it will receive LID treatment reduction credits.

1. Applicant Info

Site Address: Suisun Logistics Center, CA APN: 0174190140

Applicant Name: Buzz Oates Enterprises Phone No.: 916.379.8874

Mailing Address: 555 Capitol Mall, Suite 900, Sacramento, CA 95814

2. Feasibility Screening for Infiltration

Do site soils either (a) have a saturated hydraulic conductivity (Ksat) that will NOT allow infiltration of 80% of the annual runoff (that is, the Ksat is LESS than 1.6 inches/hour), or, if the Ksat rate is not available, (b) consist of Type C or D soils?[1]

☒ Yes (continue) ☐ No – complete the Infiltration Feasibility Worksheet. If infiltration of the C.3.d amount of runoff is found to be feasible, there is no need to complete the rest of this screening worksheet.

3. Recycled Water Use

Check the box if the project is installing and using a recycled water plumbing system for non-potable water use.

☐ The project is installing a recycled water plumbing system, and the installation of a second non-potable water system for harvested rainwater is impractical, and considered infeasible due to cost considerations. Skip to Section 6.

4. Calculate the Potential Rainwater Capture Area for Screening of Harvesting and Use

Complete this section for the entire project area. If completing this form shows that rainwater harvesting and use is infeasible for the entire project, and the project includes one or more buildings that each have an individual roof area of 10,000 sq. ft. or more, then complete Sections 4 and 5 of this form for each of these buildings. For special projects that receive < 100% LID treatment reduction, skip Sections 4 through 6 of this form and use the Rainwater Harvesting and Use Feasibility Worksheet to determine feasibility of harvest and use.

4.1 Table 1 for (check one): ☒ The whole project ☐ Area of 1 building roof (10,000 sq.ft. min.)

Table 1: Calculation of the Potential Rainwater Capture Area
The Potential Rainwater Capture Area may consist of either the entire project area or one building with a roof area of 10,000 sq. ft. or more.

	1	2	3	4
	Pre-Project Impervious surface[2] (sq.ft.), if applicable	Proposed Impervious Surface[2] (IS), in sq. ft.		Post-project landscaping (sq.ft.), if applicable
		Replaced[3] IS	Created[4] IS	
a. Enter the totals for the area to be evaluated:	0		4,228,150	998,300
b. Sum of replaced and created impervious surface:	N/A	4,228,150		N/A
c. Area of existing impervious surface that will NOT be replaced by the project.	0	N/A		N/A

4.2 Answer this question ONLY if you are completing this section for the entire project area. If existing impervious surface will be replaced by the project, does the area to be replaced equal at least 50%, but less than 100%, of the

[1] Base this response on the site-specific soil report, if available. If this is not available, consult soil hydraulic conductivity maps in Attachment 3.
[2], Enter the total of all impervious surfaces, including the building footprint, driveway(s), patio(s), impervious deck(s), unroofed porch(es), uncovered parking lot (including top deck of parking structure), impervious trails, miscellaneous paving or structures, and off-lot impervious surface (new, contiguous impervious surface created from road projects, including sidewalks and/or bike lanes built as part of new street). Impervious surfaces do NOT include vegetated roofs or pervious pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding, unpaved landscaped areas, or that stores and infiltrates the C.3.d amount of runoff.
[3] "Replaced" means that the project will install impervious surface where existing impervious surface is removed.
[4] "Created" means the project will install new impervious surface where there is currently no impervious surface.

existing area of impervious surface? *(Refer to Table 1, Row "a". Is the area in Column 2 $\geq$ 50%, but < 100%, of Column 1?)*

☐ Yes, C.3. stormwater treatment requirements apply to areas of impervious surface that will remain in place as well as the area created and/or replaced. This is known as the 50% rule.

☒ No, C.3. requirements apply only to the impervious area created and/or replaced.

4.3 Enter the square footage of the Potential Rainwater Capture Area. If you are evaluating only the roof area of a building, or you answered "no" to Question 4.2, this amount is from Row "b" in Table 1. If you answered "yes" to Question 4.2, this amount is the sum of Rows "b" and "c" in Table 1.:

4,228,150 square feet.

4.4 Convert the measurement of the Potential Rainwater Capture Area from square feet to acres (divide the amount in Item 4.3 by 43,560):

97.06 acres.

5. Feasibility Screening for Rainwater Harvesting and Use

5.1 Use of harvested rainwater for landscape irrigation:

Is the onsite landscaping LESS than 3.2 times the size of the Potential Rainwater Capture Area (Item 4.3)? (Note that the landscape area(s) would have to be contiguous and within the same Drainage Management Area to use harvested rainwater for irrigation via gravity flow.)

☒ Yes (continue) ☐ No – direct runoff from impervious areas to self-retaining areas OR refer to Table 11 and the curves in Appendix F of the LID Feasibility Report to evaluate feasibility of harvesting and using the C.3.d amount of runoff for irrigation.

5.2 Use of harvested rainwater for toilet flushing or non-potable industrial use:

a. Residential Projects: Proposed number of dwelling units:________________

Calculate the dwelling units per impervious acre by dividing the number of dwelling units by the acres of the Potential Rainwater Capture Area in Item 4.4. Enter the result here:

________________)

Is the number of dwelling units per impervious acre LESS than 124 (assuming 2.7 occupants/unit)?

☐ Yes (continue) ☐ No – complete the Harvest/Use Feasibility Worksheet.

b. Commercial/Industrial Projects: Proposed interior floor area: 2,047,100 (sq. ft.)

Calculate the proposed interior floor area (sq.ft.) per acre of impervious surface by *dividing the interior floor area (sq.ft.) by the acres of the Potential Rainwater Capture Area in Item 4.4. Enter the result here:*

21,090

Does square footage of the interior floor space per impervious acre equal LESS than 84,000?)

☒ Yes (continue) ☐ No – complete the Harvest/Use Feasibility Worksheet

c. School Projects: Proposed interior floor area:________________ (sq. ft.)

Calculate the proposed interior floor area per acre of impervious surface by *dividing the interior floor area (sq.ft.) by the acres of the Potential Rainwater Capture Area in Item 4.4 . Enter the result here:*

________________.

Does square footage of the interior floor space per impervious acre equal LESS than 27,000?)

☐ Yes (continue) ☐ No – complete the Harvest/Use Feasibility Worksheet

d. Mixed Commercial and Residential Use Projects

- Evaluate the residential toilet flushing demand based on the dwelling units per impervious acre for the residential portion of the project, following the instructions in Item 5.2.a, except you will use a prorated acreage of impervious surface, based on the percentage of the project dedicated to residential use.
- Evaluate the commercial toilet flushing demand per impervious acre for the commercial portion of the project, following the instructions in Item 5.2.b, except you will use a prorated acreage of impervious surface, based on the percentage of the project dedicated to commercial use.

e. Industrial Projects: Estimated non-potable water demand (gal/day): ____________________________

Is the non-potable demand LESS than 2,900 gal/day per acre of the Potential Rainwater Capture Area?

☐ Yes (continue) ☐ No – refer to the curves in Appendix F of the LID Feasibility Report to evaluate feasibility of harvesting and using the C.3.d amount of runoff for industrial use.

6. Use of Biotreatment

If only the "Yes" boxes were checked for all questions in Sections 2 and 5, or the project will have a recycled water system for non-potable use (Section 3), then the applicant may use appropriately designed bioretention facilities for compliance with C.3 treatment requirements. The applicant is encouraged to maximize infiltration of stormwater if site conditions allow.

7. Results of Screening Analysis

Based on this screening analysis, the following steps will be taken for the project (If biotreatment is allowed, check the biotreatment option only. If further analysis is needed, check all that apply):

☒ Implement biotreatment measures (such as an appropriately designed bioretention area).

☐ Conduct further analysis of infiltration feasibility by completing the Infiltration Feasibility Worksheet.

☐ Conduct further analysis of rainwater harvesting and use by (check one):

☐ Completing the Rainwater Harvesting and Use Feasibility Worksheet for:

☐ The entire project

☐ Individual building(s), if applicable, describe:__________________________________

☐ Evaluating the feasibility of harvesting and using the C.3.d amount of runoff for irrigation, based on Table 11 and the curves in Appendix F of the LID Feasibility Report

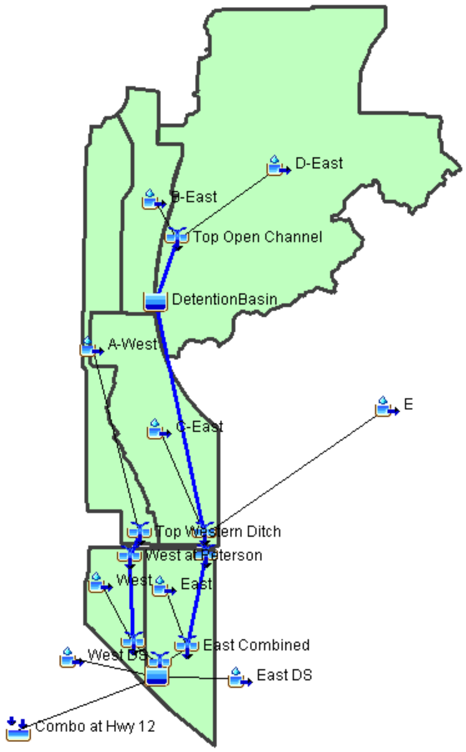
☐ Evaluating the feasibility of harvesting and using the C.3.d amount of runoff for non-potable industrial use, based on the curves in Appendix F of the LID Feasibility Report.

APPENDIX E

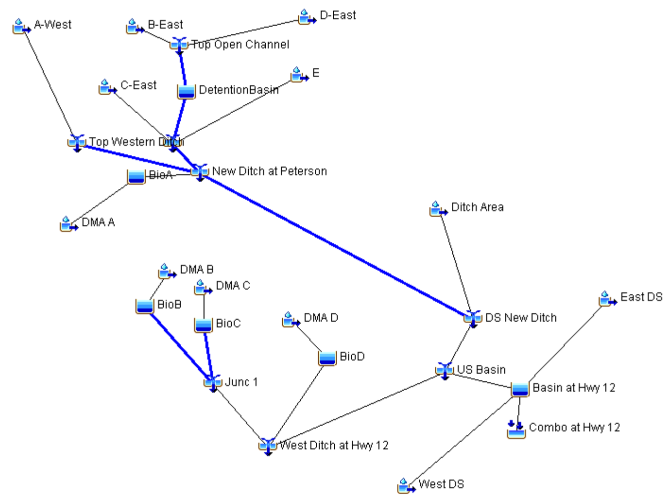
HEC-HMS Model Output

HEC-HMS Model Output

Pre-Project HEC-HMS Schematic



Post-Project HEC-HMS Schematic



2-Year Pre-Project Results

Global Summary Results for Run "EC wE - 2-yr"

Project: Suisun Logistics Center   Simulation Run: EC wE - 2-yr

Start of Run: 01Jan2050, 00:00   Basin Model: EC - ProjectSite - with E
End of Run: 02Jan2050, 00:00   Meteorologic Model: 2-yr
Compute Time: DATA CHANGED, RECOMPUTE   Control Specifications: 24 h control

Show Elements: All Elements   Volume Units: IN / ACRE-FT (selected)   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
A-West	0.2025	82.3	01Jan2050, 12:18	19.8
Top Western Ditch	0.2025	82.3	01Jan2050, 12:18	19.8
Western Open Ditch	0.2025	81.2	01Jan2050, 12:21	19.8
West at Peterson	0.2025	81.2	01Jan2050, 12:21	19.8
W Ditch on Property	0.2025	76.5	01Jan2050, 12:33	19.7
West	0.0848281	15.8	01Jan2050, 13:01	6.4
B-East	0.1209	51.1	01Jan2050, 12:17	11.6
D-East	0.8720	121.6	01Jan2050, 13:36	64.4
Top Open Channel	0.9929	134.4	01Jan2050, 13:29	76.0
Open Channel	0.9929	134.4	01Jan2050, 13:31	75.9
Main Storm Drain	0.9929	101.2	01Jan2050, 15:15	75.3
C-East	0.2479	87.1	01Jan2050, 12:22	23.8
E	0.23	42.1	01Jan2050, 13:03	17.3
Top Eastern Ditch	1.4708	167.7	01Jan2050, 12:46	116.4
Eastern Open Ditch	1.4708	167.6	01Jan2050, 12:49	116.3
DetentionBasin	0.9929	101.3	01Jan2050, 15:04	75.8
East at Peterson	1.4708	167.6	01Jan2050, 12:49	116.3
E Ditch on Property	1.4708	167.1	01Jan2050, 13:00	115.5
East	0.110016	20.1	01Jan2050, 13:03	8.3
East Combined	1.580816	187.2	01Jan2050, 13:01	123.7
West Combined	0.2873281	88.9	01Jan2050, 12:35	26.0
US Basin	1.8681441	263.4	01Jan2050, 12:44	149.8
East DS	0.0460852	9.2	01Jan2050, 12:54	3.5
West DS	0.0040333	1.0	01Jan2050, 12:36	0.3
Basin at Hwy 12	1.9182626	164.6	01Jan2050, 15:37	153.2
Combo at Hwy 12	1.9182626	164.6	01Jan2050, 15:37	153.2

2-Year Post-Project Results

Global Summary Results for Run "Proposed wE - 2-yr"

Project: Suisun Logistics Center   Simulation Run: Proposed wE - 2-yr

Start of Run: 01Jan2050, 00:00   Basin Model: Proposed - Project Site - wE
End of Run: 02Jan2050, 00:00   Meteorologic Model: 2-yr
Compute Time: DATA CHANGED, RECOMPUTE   Control Specifications: 24 h control

Show Elements: All Elements   Volume Units: IN / ACRE-FT (selected)   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
DMA A	0.0156370	7.0	01Jan2050, 12:15	1.6
BioA	0.0156370	2.2	01Jan2050, 12:07	1.6
New Ditch at Peterson	1.6889370	236.6	01Jan2050, 12:26	137.6
New East Ditch	1.6889370	219.4	01Jan2050, 13:04	134.6
DMA B	0.0107266	6.0	01Jan2050, 12:11	1.1
BioB	0.0107266	1.3	01Jan2050, 11:55	1.1
Reach BioB-J1	0.0107266	1.3	01Jan2050, 11:58	1.1
DMA C	0.0273185	13.1	01Jan2050, 12:14	2.9
BioC	0.0273185	3.3	01Jan2050, 11:59	2.9
Reach BioC-J1	0.0273185	3.3	01Jan2050, 12:09	2.9
Junc 1	0.0380451	4.5	01Jan2050, 12:06	4.0
DMA D	0.12859	40.2	01Jan2050, 12:28	13.2
BioD	0.12859	13.6	01Jan2050, 12:08	13.1
A-West	0.2025	82.3	01Jan2050, 12:18	19.8
Top Western Ditch	0.2025	82.3	01Jan2050, 12:18	19.8
Western Open Ditch	0.2025	81.2	01Jan2050, 12:21	19.8
B-East	0.1209	51.1	01Jan2050, 12:17	11.6
D-East	0.8720	121.6	01Jan2050, 13:36	64.4
Top Open Channel	0.9929	134.4	01Jan2050, 13:29	76.0
Open Channel	0.9929	134.4	01Jan2050, 13:31	75.9
Main Storm Drain	0.9929	101.2	01Jan2050, 15:15	75.3
C-East	0.2479	87.1	01Jan2050, 12:22	23.8
Top Eastern Ditch	1.4708	167.7	01Jan2050, 12:46	116.4
Eastern Open Ditch	1.4708	167.6	01Jan2050, 12:49	116.3
DetentionBasin	0.9929	101.3	01Jan2050, 15:04	75.8
West Ditch at Hwy 12	0.1666351	18.1	01Jan2050, 12:08	17.1
Basin at Hwy 12	1.9182626	162.5	01Jan2050, 16:17	155.7
Combo at Hwy 12	1.9182626	162.5	01Jan2050, 16:17	155.7
DS New Ditch	1.7015090	222.0	01Jan2050, 13:04	135.6
Ditch Area	0.012572	2.8	01Jan2050, 12:45	0.9
US Basin	1.8681441	240.1	01Jan2050, 13:04	152.7
West DS	0.0040333	1.0	01Jan2050, 12:36	0.3
East DS	0.0460852	9.2	01Jan2050, 12:54	3.5
E	0.23	42.1	01Jan2050, 13:03	17.3

25-Year Pre-Project Results

Global Summary Results for Run "EC wE - 25-yr"

Project: Suisun Logistics Center   Simulation Run: EC wE - 25-yr

Start of Run: 01Jan2050, 00:00   Basin Model: EC - ProjectSite - with E
End of Run: 02Jan2050, 00:00   Meteorologic Model: 25-yr
Compute Time: DATA CHANGED, RECOMPUTE   Control Specifications: 24 h control

Show Elements: All Elements   Volume Units: IN ACRE-FT   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
A-West	0.2025	166.3	01Jan2050, 12:18	42.1
Top Western Ditch	0.2025	166.3	01Jan2050, 12:18	42.1
Western Open Ditch	0.2025	164.1	01Jan2050, 12:20	42.1
West at Peterson	0.2025	164.1	01Jan2050, 12:20	42.1
W Ditch on Property	0.2025	155.0	01Jan2050, 12:31	41.8
West	0.0848281	32.7	01Jan2050, 13:01	15.2
B-East	0.1209	103.3	01Jan2050, 12:17	24.9
D-East	0.8720	254.6	01Jan2050, 13:35	152.2
Top Open Channel	0.9929	282.2	01Jan2050, 13:30	177.0
Open Channel	0.9929	282.2	01Jan2050, 13:32	176.8
Main Storm Drain	0.9929	187.7	01Jan2050, 15:57	169.8
C-East	0.2479	176.2	01Jan2050, 12:22	51.1
E	0.23	87.1	01Jan2050, 13:02	41.2
Top Eastern Ditch	1.4708	326.6	01Jan2050, 12:32	262.1
Eastern Open Ditch	1.4708	326.5	01Jan2050, 12:34	261.7
DetentionBasin	0.9929	187.7	01Jan2050, 15:47	171.2
East at Peterson	1.4708	326.5	01Jan2050, 12:34	261.7
E Ditch on Property	1.4708	324.9	01Jan2050, 12:46	259.8
East	0.110016	41.7	01Jan2050, 13:02	19.7
East Combined	1.580816	364.3	01Jan2050, 12:52	279.5
West Combined	0.2873281	180.0	01Jan2050, 12:32	57.0
US Basin	1.8681441	531.7	01Jan2050, 12:38	336.5
East DS	0.0460852	19.0	01Jan2050, 12:54	8.3
West DS	0.0040333	2.1	01Jan2050, 12:36	0.7
Basin at Hwy 12	1.9182626	290.2	01Jan2050, 16:41	310.5
Combo at Hwy 12	1.9182626	290.2	01Jan2050, 16:41	310.5

25-Year Post-Project Results

Global Summary Results for Run "Proposed wE - 25-yr"

Project: Suisun Logistics Center   Simulation Run: Proposed wE - 25-yr

Start of Run: 01Jan2050, 00:00   Basin Model: Proposed - Project Site - wE
End of Run: 02Jan2050, 00:00   Meteorologic Model: 25-yr
Compute Time: DATA CHANGED, RECOMPUTE   Control Specifications: 24 h control

Show Elements: All Elements   Volume Units: IN ACRE-FT   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
DMA A	0.0156370	14.0	01Jan2050, 12:16	3.4
BioA	0.0156370	9.2	01Jan2050, 12:37	3.3
New Ditch at Peterson	1.6889370	483.1	01Jan2050, 12:24	307.1
New East Ditch	1.6889370	438.6	01Jan2050, 12:55	300.5
DMA B	0.0107266	12.0	01Jan2050, 12:11	2.3
BioB	0.0107266	10.3	01Jan2050, 12:18	2.3
Reach BioB-J1	0.0107266	10.3	01Jan2050, 12:20	2.3
DMA C	0.0273185	26.4	01Jan2050, 12:14	5.9
BioC	0.0273185	21.6	01Jan2050, 12:25	5.9
Reach BioC-J1	0.0273185	21.5	01Jan2050, 12:27	5.9
Junc 1	0.0380451	30.6	01Jan2050, 12:25	8.2
DMA D	0.12859	81.0	01Jan2050, 12:28	27.3
BioD	0.12859	59.8	01Jan2050, 12:59	27.0
A-West	0.2025	166.3	01Jan2050, 12:18	42.1
Top Western Ditch	0.2025	166.3	01Jan2050, 12:18	42.1
Western Open Ditch	0.2025	164.1	01Jan2050, 12:20	42.1
B-East	0.1209	103.3	01Jan2050, 12:17	24.9
D-East	0.8720	254.6	01Jan2050, 13:35	152.2
Top Open Channel	0.9929	282.2	01Jan2050, 13:30	177.0
Open Channel	0.9929	282.2	01Jan2050, 13:32	176.8
Main Storm Drain	0.9929	187.7	01Jan2050, 15:57	169.8
C-East	0.2479	176.2	01Jan2050, 12:22	51.1
Top Eastern Ditch	1.4708	326.6	01Jan2050, 12:32	262.1
Eastern Open Ditch	1.4708	326.5	01Jan2050, 12:34	261.7
DetentionBasin	0.9929	187.7	01Jan2050, 15:47	171.2
West Ditch at Hwy 12	0.1666351	74.3	01Jan2050, 12:54	35.2
Basin at Hwy 12	1.9182626	285.4	01Jan2050, 16:55	308.9
Combo at Hwy 12	1.9182626	285.4	01Jan2050, 16:55	308.9
DS New Ditch	1.7015090	444.2	01Jan2050, 12:55	302.7
Ditch Area	0.012572	5.8	01Jan2050, 12:45	2.3
US Basin	1.8681441	518.5	01Jan2050, 12:54	337.9
West DS	0.0040333	2.1	01Jan2050, 12:36	0.7
East DS	0.0460852	19.0	01Jan2050, 12:54	8.3
E	0.23	87.1	01Jan2050, 13:02	41.2

100-Year Pre-Project Results

Global Summary Results for Run "EC wE - 100-yr"

Project: Suisun Logistics Center   Simulation Run: EC wE - 100-yr

Start of Run: 01Jan2050, 00:00   Basin Model: EC - ProjectSite - with E
End of Run: 02Jan2050, 00:00   Meteorologic Model: 100-yr
Compute Time: DATA CHANGED, RECOMPUTE   Control Specifications: 24 h control

Show Elements: All Elements   Volume Units: IN ACRE-FT   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
A-West	0.2025	207.1	01Jan2050, 12:18	52.9
Top Western Ditch	0.2025	207.1	01Jan2050, 12:18	52.9
Western Open Ditch	0.2025	204.5	01Jan2050, 12:20	52.8
West at Peterson	0.2025	204.5	01Jan2050, 12:20	52.8
W Ditch on Property	0.2025	193.3	01Jan2050, 12:31	52.5
West	0.0848281	40.9	01Jan2050, 13:01	19.5
B-East	0.1209	128.7	01Jan2050, 12:17	31.3
D-East	0.8720	318.8	01Jan2050, 13:35	194.9
Top Open Channel	0.9929	353.2	01Jan2050, 13:30	226.2
Open Channel	0.9929	353.1	01Jan2050, 13:32	226.0
Main Storm Drain	0.9929	215.2	01Jan2050, 16:24	212.3
C-East	0.2479	219.5	01Jan2050, 12:22	64.2
E	0.23	108.8	01Jan2050, 13:02	52.9
Top Eastern Ditch	1.4708	404.8	01Jan2050, 12:31	329.3
Eastern Open Ditch	1.4708	404.7	01Jan2050, 12:32	328.8
DetentionBasin	0.9929	215.3	01Jan2050, 16:14	214.1
East at Peterson	1.4708	404.7	01Jan2050, 12:32	328.8
E Ditch on Property	1.4708	401.9	01Jan2050, 12:44	326.3
East	0.110016	52.1	01Jan2050, 13:02	25.3
East Combined	1.580816	450.2	01Jan2050, 12:50	351.6
West Combined	0.2873281	224.3	01Jan2050, 12:32	72.0
US Basin	1.8681441	660.2	01Jan2050, 12:37	423.6
East DS	0.0460852	23.7	01Jan2050, 12:54	10.7
West DS	0.0040333	2.6	01Jan2050, 12:36	0.9
Basin at Hwy 12	1.9182626	337.7	01Jan2050, 16:59	377.2
Combo at Hwy 12	1.9182626	337.7	01Jan2050, 16:59	377.2

100-Year Post-Project Results

Global Summary Results for Run "Proposed wE - 100-yr"

Project: Suisun Logistics Center   Simulation Run: Proposed wE - 100-yr

Start of Run: 01Jan2050, 00:00   Basin Model: Proposed - Project Site - wE
End of Run: 02Jan2050, 00:00   Meteorologic Model: 100-yr
Compute Time: DATA CHANGED, RECOMPUTE   Control Specifications: 24 h control

Show Elements: All Elements   Volume Units: IN ACRE-FT   Sorting: Hydrologic

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
DMA A	0.0156370	17.4	01Jan2050, 12:16	4.2
BioA	0.0156370	13.8	01Jan2050, 12:29	4.1
New Ditch at Peterson	1.6889370	610.8	01Jan2050, 12:25	385.7
New East Ditch	1.6889370	546.2	01Jan2050, 12:52	377.4
DMA B	0.0107266	15.0	01Jan2050, 12:11	2.9
BioB	0.0107266	14.1	01Jan2050, 12:14	2.9
Reach BioB-J1	0.0107266	14.1	01Jan2050, 12:16	2.8
DMA C	0.0273185	32.8	01Jan2050, 12:14	7.4
BioC	0.0273185	29.6	01Jan2050, 12:21	7.3
Reach BioC-J1	0.0273185	29.5	01Jan2050, 12:22	7.3
Junc 1	0.0380451	42.7	01Jan2050, 12:20	10.1
DMA D	0.12859	100.8	01Jan2050, 12:28	34.1
BioD	0.12859	88.7	01Jan2050, 12:43	32.9
A-West	0.2025	207.1	01Jan2050, 12:18	52.9
Top Western Ditch	0.2025	207.1	01Jan2050, 12:18	52.9
Western Open Ditch	0.2025	204.5	01Jan2050, 12:20	52.8
B-East	0.1209	128.7	01Jan2050, 12:17	31.3
D-East	0.8720	318.8	01Jan2050, 13:35	194.9
Top Open Channel	0.9929	353.2	01Jan2050, 13:30	226.2
Open Channel	0.9929	353.1	01Jan2050, 13:32	226.0
Main Storm Drain	0.9929	215.2	01Jan2050, 16:24	212.3
C-East	0.2479	219.5	01Jan2050, 12:22	64.2
Top Eastern Ditch	1.4708	404.8	01Jan2050, 12:31	329.3
Eastern Open Ditch	1.4708	404.7	01Jan2050, 12:32	328.8
DetentionBasin	0.9929	215.3	01Jan2050, 16:14	214.1
West Ditch at Hwy 12	0.1666351	116.3	01Jan2050, 12:40	43.0
Basin at Hwy 12	1.9182626	333.4	01Jan2050, 17:03	374.1
Combo at Hwy 12	1.9182626	333.4	01Jan2050, 17:03	374.1
DS New Ditch	1.7015090	553.3	01Jan2050, 12:52	380.3
Ditch Area	0.012572	7.2	01Jan2050, 12:45	2.9
US Basin	1.8681441	660.7	01Jan2050, 12:48	423.3
West DS	0.0040333	2.6	01Jan2050, 12:36	0.9
East DS	0.0460852	23.7	01Jan2050, 12:54	10.7
E	0.23	108.8	01Jan2050, 13:02	52.9

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