

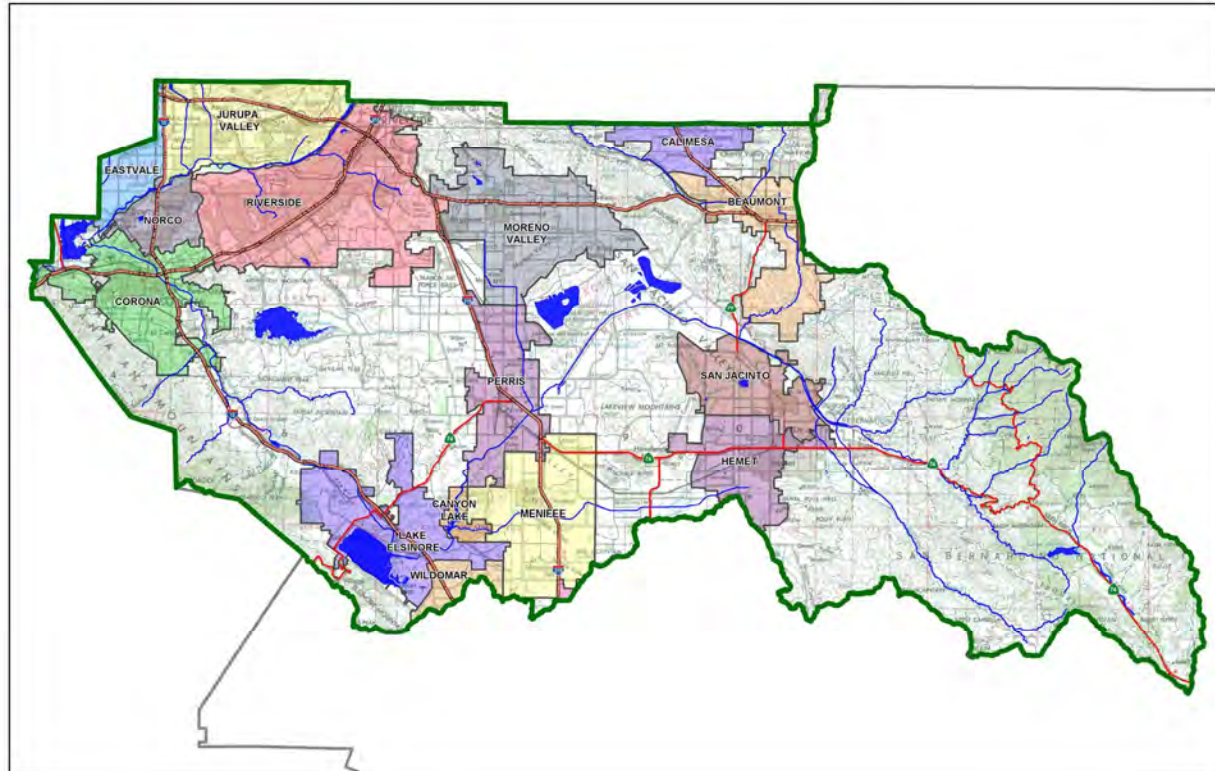
Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Vernola Ranch Specific Plan No. 22-001/Tract Map 38504

Development No:

Design Review/Case No: Parcel Map 37624-1/Tract Map 38504



☒ Preliminary
☐ Final

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July 11, 2023

*Prepared for Compliance with
Regional Board Order No. **R8-2010-0033***

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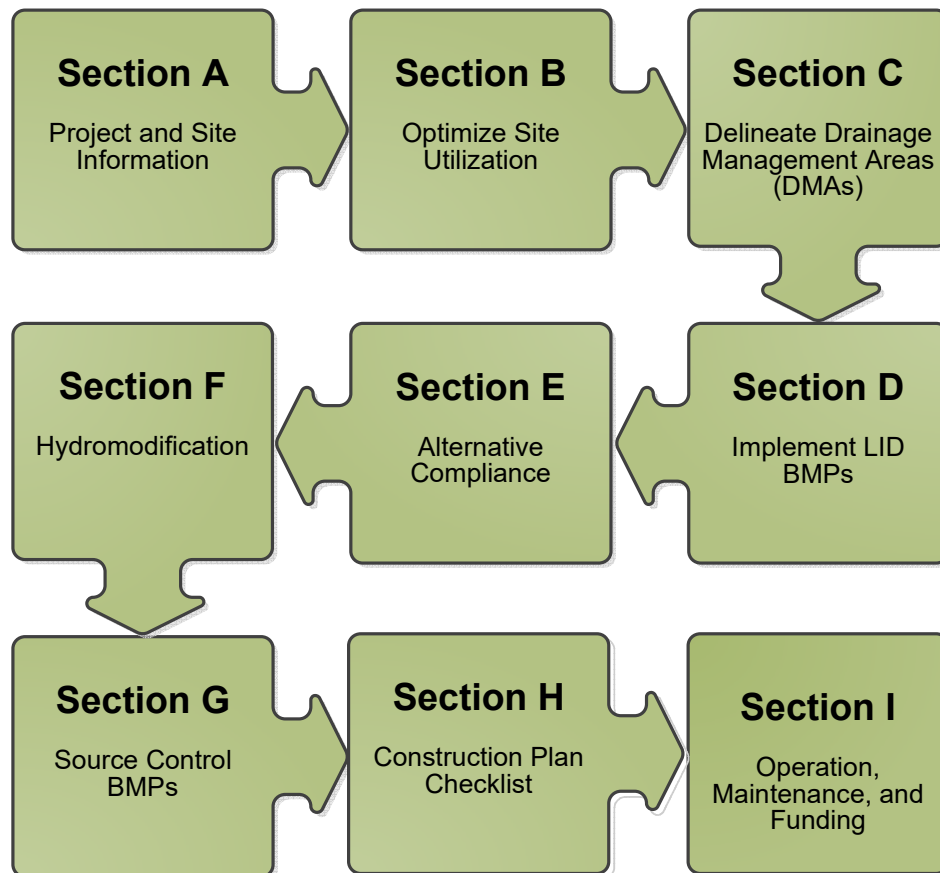
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A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your “how-to” manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for the Vernola Project by JLC Engineering & Consulting to complement the processing of the Vernola Specific Plan/Tract 38504.

This WQMP is intended to comply with the requirements of City of Jurupa Valley for Ordinance Number 2012-07 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under City of Jurupa Valley Water Quality Ordinance (Municipal Code Section 6.05).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature

Date

Owner's Printed Name

Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature

Date

Preparer's Printed Name

Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information °°

PROJECT INFORMATION	
Type of Project:	Residential
Planning Area:	N/A
Community Name:	City of Jurupa Valley
Development Name:	Vernola Ranch Specific Plan No. 22-001
PROJECT LOCATION	
Latitude & Longitude (DMS): 33° 98' 58" & 117° 54' 63"	
Project Watershed and Sub-Watershed: Santa Ana Watershed	
Gross Acres: 160	
APN(s): 160-050- 005 ,021, 023, 063, 067, 068, 070, 072, 073, 074	
Map Book and Page No.: Map Book F4, Page No. 683	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Residential
Proposed or Potential SIC Code(s)	N/A
Area of Project Footprint (SF)	6,969,600 SF
Total Area of <u>proposed</u> Impervious Surfaces within the Project Footprint (SF)/or Replacement ¹	4,892,272 SF
Does the project consist of offsite road improvements? ²	☐ Y ☒ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of <u>existing</u> Impervious Surfaces within the Project limits Footprint (SF)	0 SF
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☒ Y ☐ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	SoilsType A and C
What is the Water Quality Design Storm Depth for the project?	0.85 Inches
¹ Impervious area calculated from Rational Method impervious ratio.	
² The project will improve parts of the northerly and easterly halves of Bellegrave Ave and Pats Ranch Road	

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Santa Ana River Salt Marsh	N/A	REC1, REC2, BIOL, WILD, RARE, MAR, EST	RARE-designated water body
Tidal Prism of Santa Ana River	N/A	REC1, REC2, COMM, WILD, RARE, MAR	RARE-designated water body
Santa Ana River – Reach 1	N/A	REC1, REC2, WARM, WILD	Not a RARE-designated water body
Santa Ana River – Reach 2	N/A	AGR, GWR, REC1, REC2, WARM, WILD, RARE, SPWN	RARE-designated water body
Santa Ana River – Reach 3	Metals (Copper), Pathogens (Indicator Bacteria), Metals (Lead)	AGR, GWR, REC1, REC2, WARM, WILD, RARE, SPWN	RARE-designated water body

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☐ Y	☒ N
Statewide Industrial General Permit Coverage	☐ Y	☒ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other (please list in the space below as required) No other applicable permits required.	☐ Y	☒ N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Consideration of "highest and best use" of the discharge should also be considered. For example, Lake Elsinore is evaporating faster than runoff from natural precipitation can recharge it. Requiring infiltration of 85% of runoff events for projects tributary to Lake Elsinore would only exacerbate current water quality problems associated with Pollutant concentration due to lake water evaporation. In cases where rainfall events have low potential to recharge Lake Elsinore (i.e. no hydraulic connection between groundwater to Lake Elsinore, or other factors), requiring infiltration of Urban Runoff from projects is counterproductive to the overall watershed goals. Project proponents, in these cases, would be allowed to discharge Urban Runoff, provided they used equally effective filtration-based BMPs.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

The project includes existing storm drain Line J, defined in the Riverside County Flood Control District Day Creek Area Drainage Plan (ADP). The Line J Storm Drain systems is part of RCFC&WCD Project Number 1-272. The Line J storm drain has been designed to receive 255 CFS for the 160 acres of the project site or 1.6 CFS per acre. The project will maintain this flow capacity and implement water quality, detention basins to store runoff and maintain the 1.6 CFS per acre maximum.

Did you identify and protect existing vegetation? If so, how? If not, why?

The project was existing farm land and will be developed for residential housing. The project will incorporate landscaping with the housing.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

The project site has developed a subsurface basin and multiple water quality, detention basins to promote infiltration. As a residential development, the project will incorporate landscaping which will promote natural infiltration on the project site.

Did you identify and minimize impervious area? If so, how? If not, why?

The project site includes a mixture of very high density, high density, medium-high density, and medium density housing units. The project includes landscaped areas in order to minimize impervious area.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

Runoff will flow into a subsurface basin and water quality, detention basins. Water will flow from the basins and into the existing Line J storm drain system. The storage volume of the basins will prevent flow rates from exceeding the allowable flow of 1.6 CFS/acre into Line J.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s) ¹²	Area (Sq. Ft.)	DMA Type
DMA B	Concrete, Asphalt, Landscaping,	1,089,000	Type D
DMA C	Concrete, Asphalt, Landscaping	1,637,856	Type D
DMA D	Concrete, Asphalt, Landscaping	2,487,276	Type D
DMA E	Concrete, Asphalt, Landscaping	1,285,020	Type D
DMA F	Concrete, Asphalt, Landscaping	470,448	Type D

¹Reference Table 2-1 in the WQMP Guidance Document to populate this column, ²If multi-surface provide back-up

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				Type 'C' DMAs that are draining to the Self-Retaining Area		
DMA Name/ ID	Post-project surface type	Area (square feet)	Storm Depth (inches)	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches)
		[A]	[B]			

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet)	Post-project surface type	Impervious fraction	Product		Area (square feet)	Ratio
	[A]		[B]			[D]	
				[C] = [A] x [B]			[C]/[D]

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
DMA B	Subsurface Basin B – Underground Infiltration Trench ^(A)
DMA C	WQ Detention Basin C
DMA D	WQ Detention Basin D
DMA E	WQ Detention Basin E
DMA F	WQ Detention Basin F

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

(A) Infiltration Trench for Subsurface System B must be broken down into 3 systems with a drainage area not to exceed 10 acres. This will be done during final engineering when a more defined site plans is provided.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site; proceed to section D.3

If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermitttee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site...	YES	NO
...have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
...have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
...have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
...have measured in-situ infiltration rates of less than 1.6 inches / hour?		X
If Yes, list affected DMAs: See comment #1 below		
...have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?	X	
If Yes, list affected DMAs:		
...geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here:		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

(#1) Geotek prepared an Infiltration Evaluation of the project site dated July 7, 2023. The rates show infiltration rates that range from 0.38 to 14.05 in/hr, see Figure 3 in Appendix 3. The project must drain towards Line J storm drain, as a result, the BMPs must be located along Pat Ranch Road. Figure 3 defines infiltration rate and basin locations. Basin B and Basin C are the only areas viable to use infiltration BMPs.

D.2 Harvest and Use Assessment

Please check what applies:

- ☒ Reclaimed water will be used for the non-potable water demands for the project.
- ☐ Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).
- ☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If none of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: Insert Area (Acres)

Type of Landscaping (Conservation Design or Active Turf): List Landscaping Type

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: Insert Area (Acres)

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: EIATIA Factor

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: Insert Area (Acres)

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
Insert Area (Acres)	Insert Area (Acres)

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

- Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: Number of daily Toilet Users

Project Type: Enter 'Residential', 'Commercial', 'Industrial' or 'Schools'

- Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: Insert Area (Acres)

- Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-2 in Chapter 2 to determine the minimum number of toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: TUTIA Factor

- Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: Required number of toilet users

- Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
Insert Area (Acres)	Insert Area (Acres)

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

Insert narrative description here.

- Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: Projected Average Daily Use (gpd)

- Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: Insert Area (Acres)

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-4: Enter Value

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: Minimum use required (gpd)

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the projected average daily use (Step 1) to the minimum required non-potable use (Step 4).

Minimum required non-potable use (Step 4)	Projected average daily use (Step 1)
Minimum use required (gpd)	Projected Average Daily Use (gpd)

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment per Section 3.4.2 of the WQMP Guidance Document.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

Note: Basin B and Basin C will be infiltration BMPs. Basin D, Basin E, and Basin F will be a bio-retention BMP since the infiltration rate is greater than 0.3 in/hr.

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
DMA B	☒	☐	☐	☐	☐
DMA C	☒	☐	☐	☐	☐
DMA D	☐	☐	☒	☐	☐
DMA E	☐	☐	☒	☐	☐
DMA F	☐	☐	☒	☐	☐

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

Note: Basin B and Basin C will be infiltration BMPs. Basin D, Basin E, and Basin F will be a bio-retention BMP since the infiltration rate is greater than 0.3 in/hr.

Basin D, Basin E, and Basin F have been designed as treatment trains using bioretention and drywells. The design is based on using the bottom area of the basin and determine the maximum water quality volume treatment that is feasible. The residual volume (Total water quality volume minus treated volume) will be treated with the use of drywells. The client will be performing extensive infiltration testing during final engineering for the drywells. Drywells are currently being used within the existing development east of Pat Ranch Road.

Treatment Train Effectiveness:

BMP	WQ Volume (cf)	Bioretention Basin Component		Drywell Component
		Basin Bottom (sf)	WQ Treatment (cf)	Drywell Treatment Volume (cf)
D	109,650.1	42,259	76,000	33,650
E	59,851	15,310	27,000	32,851
F	22,589	7,893	13,500	9,089

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First, calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second, design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	<i>Subsurface Basin B</i>		
	[A]		[B]	[C]	[A] x [C]			
B	210177	Ornamental Landscaping	0.1	0.11	23215.7	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
B	878823	Concrete or Asphalt	1.0	0.89	783910.1			
	1089000				807125.8	0.85	57,171	57,171

Table D.4 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	<i>WQ Infiltration Detention Basin C</i>		
	[A]		[B]	[C]	[A] x [C]			
C	494633	Ornamental Landscaping	0.1	0.11	54636.2	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
C	1143223	Concrete or Asphalt	1.0	0.89	1019754.9			
	1637856				1074391.1	0.85	76,103	76,103

Table D.5 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	WQ Infiltration Detention Basin D		
	[A]		[B]	[C]	[A] x [C]			
D	858110	Ornamental Landscaping	0.1	0.11	94785.1	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
D	1629166	Concrete or Asphalt	1.0	0.89	1453216.1			
	2487276				1548001.2	0.85	109,650	109,650

Table D.6 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	WQ Infiltration Detention Basin E		
	[A]		[B]	[C]	[A] x [C]			
E	385506	Ornamental Landscaping	0.1	0.11	42582.2	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
E	899514	Concrete or Asphalt	1.0	0.89	802366.5			
	1285020				844948.7	0.85	59,851	59,851

Table D.6 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	WQ Infiltration Detention Basin F		
	[A]		[B]	[C]	[A] x [C]			
F	128903	Ornamental Landscaping	0.1	0.11	14238.4	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
F	341545	Concrete or Asphalt	1.0	0.89	304658.1			
	470448				318897	0.85	22,589	22,589

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Proposed basin volume calculated for above ground storage only. Basin volume calculations are shown in Appendix 6. Basins were sized to account for the water quality volume and the mitigation volume. The mitigation volume was necessary to ensure that the existing Line J storm drain, responsible for the project site was not overflowed. The Line J system is designed to receive 255 CFS for the 160 acres of the project site. This equates to 1.6 CFS per acre and thus was a control that the basin must be sized for to moderate the 100 YR peak flow into the Line J system. The stacking of the water quality volume and mitigation volume will ensure that the water will be treated for water quality, with the assumption that previous runoff remained in the basin from a previous storm.

The mitigation volume was calculated using data from the Unit Hydrograph. A summarization of the calculations is shown in Appendix 6: Mitigation Volume Calculations – Small Unit Hydrograph. The figure provides a depiction of the volume of runoff stored and the flow rates mitigated from flowing into the Line J storm drain system. The basin design volume spreadsheets provide a quantification of the water quality, and mitigation volumes and the elevation that each ponds at within the basin. These sheets provide the total basin volume at each contour elevation within the basin.

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☒ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- Or -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

List DMAs here.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☒ Detached Residential Development	P	N	P	P	N	P	P	P
☒ Attached Residential Development	P	N	P	P	N	P	P	P ⁽²⁾
☐ Commercial/Industrial Development	P ⁽³⁾	P	P ⁽¹⁾	P ⁽¹⁾	P ⁽⁵⁾	P ⁽¹⁾	P	P
☐ Automotive Repair Shops	N	P	N	N	P ^(4, 5)	N	P	P
☐ Restaurants (>5,000 ft ²)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft ²)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft ²)	P ⁽⁶⁾	P	P ⁽¹⁾	P ⁽¹⁾	P ⁽⁴⁾	P ⁽¹⁾	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☐	☐	☐	☒	☐	☐	☐	☐

P = Potential

N = Not Potential

⁽¹⁾ A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

⁽²⁾ A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

⁽³⁾ A potential Pollutant is land use involving animal waste

⁽⁴⁾ Specifically petroleum hydrocarbons

⁽⁵⁾ Specifically solvents

⁽⁶⁾ Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage ²
<i>Total Credit Percentage¹</i>	

¹Cannot Exceed 50%

²Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I _f	DMA Runoff Factor	DMA Area x Runoff Factor	Enter BMP Name / Identifier Here			
	[A]		[B]	[C]	[A] x [C]				
						Design Storm Depth (in)	Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)	Total Storm Water Credit % Reduction	Proposed Volume or Flow on Plans (cubic feet or cfs)
	$A_T = \sum [A]$				$\sum = [D]$	[E]	$[F] = \frac{[D] \times [E]}{[G]}$	$[F] \times (1-[H])$	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High:** equal to or greater than 80% removal efficiency
- **Medium:** between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID ¹	Priority Pollutant(s) of Concern to Mitigate ²	Removal Efficiency Percentage ³

¹ Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.

² Cross Reference Table E.1 above to populate this column.

³ As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration¹ of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	Post-condition	% Difference
Time of Concentration	INSERT VALUE	INSERT VALUE	INSERT VALUE
Volume (Cubic Feet)	INSERT VALUE	INSERT VALUE	INSERT VALUE

¹ Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Susceptibility Maps.

Does the project qualify for this HCOC Exemption? ☒ Y ☐ N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

Project discharges into Line J, an MS4 facility which conveys the runoff into an existing concrete channel located south of 68th street. The concrete channel then conveys the runoff directly into the Santa Ana River.

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

- a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.
- b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.
- c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and “housekeeping”, that must be implemented by the site’s occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. **Identify Pollutant Sources:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.
2. **Note Locations on Project-Specific WQMP Exhibit:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.
3. **Prepare a Table and Narrative:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.
4. **Identify Operational Source Control BMPs:** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
Source Control checklist will be included during future engineering.		

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Construction Plan Checklist will be included during future engineering.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Various financing mechanism – Property owner until transferred or annexed to an HOA or CFD

Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☒ Y ☐ N

(See Comment #2 below)

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Comment #2: The infiltration trenches in DMA B will be privately maintained by a Property Owner's Association. All other basins will be maintained by an HOA unless a maintenance agreement is developed with the City of Jurupa Valley that underlines that the maintenance responsibility will be transferred to the City. Prior to transferring maintenance responsibilities to the City, the development may be required to annex into a Community Facilities District that's the City to collect fee for the maintenance and operation of the basins.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

Figure 1 – Vicinity Map

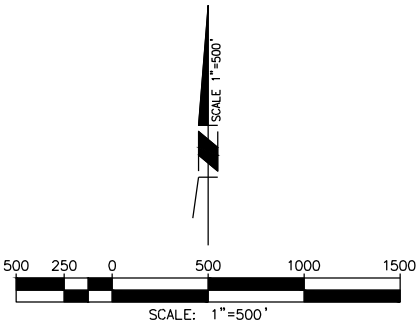
VERNOLA RANCH SPECIFIC PLAN NO. 22-001
CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
VICINITY MAP



FIGURE 1

VRSP NO. 22-001

VICINITY MAP



JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

Figure 2 – Receiving Waters Map

VERNOLA RANCH SPECIFIC PLAN NO. 22-001

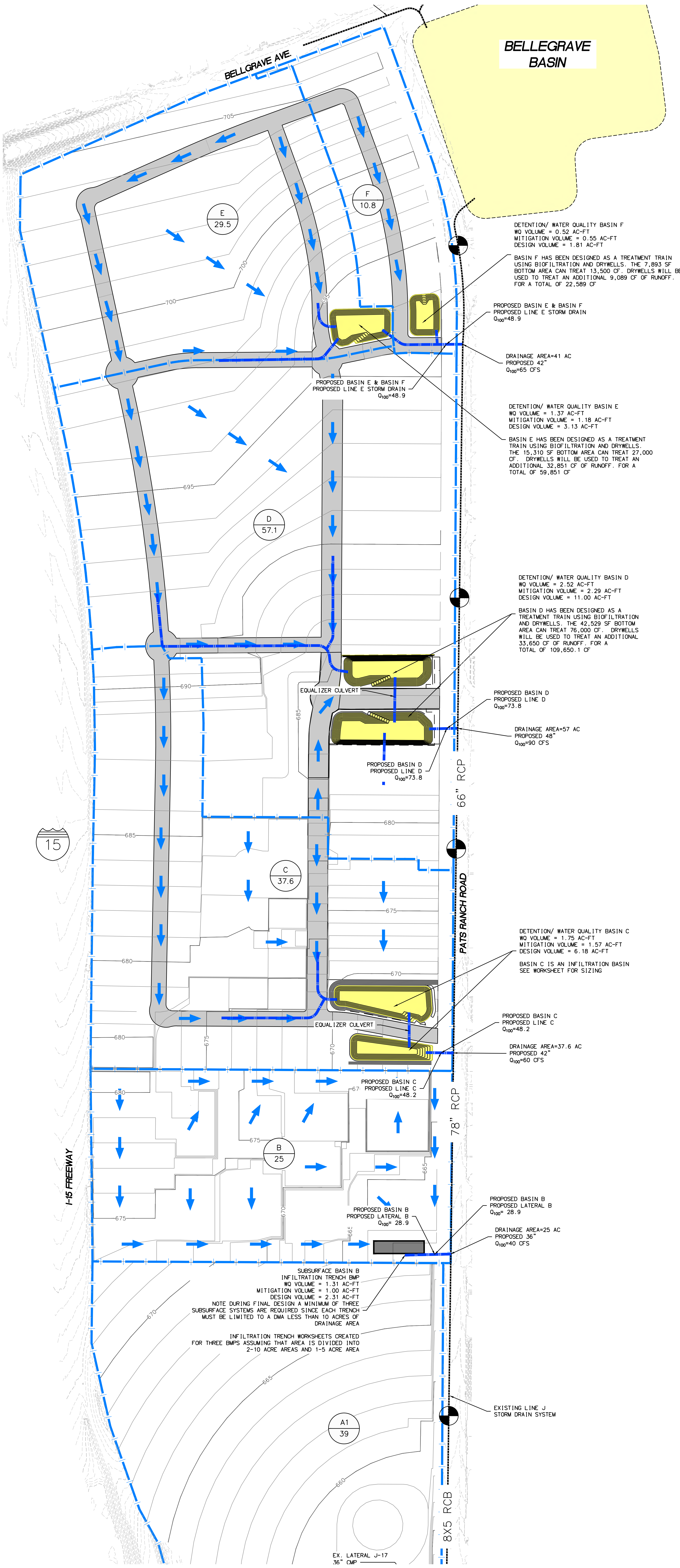


FIGURE 2 - RECEIVING WATERS MAP



Figure 3 – WQMP Site Plan

VERNOLA RANCH SPECIFIC PLAN NO. 22-001
IN THE CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA
WQMP SITE PLAN



BELLEGRIVE BASIN

DETENTION/ WATER QUALITY BASIN F
NO VOLUME = 0.52 AC-FT
MITIGATION VOLUME = 0.55 AC-FT
DESIGN VOLUME = 1.81 AC-FT

BASIN F HAS BEEN DESIGNED AS A TREATMENT TRAIN USING BIOFILTRATION AND DRYWELLS. THE 7,893 SF BOTTOM AREA CAN TREAT 13,500 CF. DRYWELLS WILL BE USED TO TREAT AN ADDITIONAL 9,089 CF OF RUNOFF. FOR A TOTAL OF 22,589 CF

PROPOSED BASIN E & BASIN F
PROPOSED LINE E STORM DRAIN
 $Q_{100}=48.9$

DRAINAGE AREA=41 AC
PROPOSED 42"
 $Q_{100}=65$ CFS

DETENTION/ WATER QUALITY BASIN E
NO VOLUME = 1.37 AC-FT
MITIGATION VOLUME = 1.18 AC-FT
DESIGN VOLUME = 3.13 AC-FT

BASIN E HAS BEEN DESIGNED AS A TREATMENT TRAIN USING BIOFILTRATION AND DRYWELLS. THE 15,310 SF BOTTOM AREA CAN TREAT 27,000 CF. DRYWELLS WILL BE USED TO TREAT AN ADDITIONAL 32,851 CF OF RUNOFF. FOR A TOTAL OF 59,851 CF

DETENTION/ WATER QUALITY BASIN D
NO VOLUME = 2.52 AC-FT
MITIGATION VOLUME = 2.29 AC-FT
DESIGN VOLUME = 11.00 AC-FT

BASIN D HAS BEEN DESIGNED AS A TREATMENT TRAIN USING BIOFILTRATION AND DRYWELLS. THE 42,529 SF BOTTOM AREA CAN TREAT 76,000 CF. DRYWELLS WILL BE USED TO TREAT AN ADDITIONAL 33,650 CF OF RUNOFF. FOR A TOTAL OF 109,650.1 CF

PROPOSED BASIN D
PROPOSED LINE D
 $Q_{100}=73.8$

DRAINAGE AREA=57 AC
PROPOSED 48"
 $Q_{100}=90$ CFS

DETENTION/ WATER QUALITY BASIN C
NO VOLUME = 1.75 AC-FT
MITIGATION VOLUME = 1.57 AC-FT
DESIGN VOLUME = 6.18 AC-FT

BASIN C IS AN INFILTRATION BASIN
SEE WORKSHEET FOR SIZING

PROPOSED BASIN C
PROPOSED LINE C
 $Q_{100}=48.2$

DRAINAGE AREA=37.6 AC
PROPOSED 42"
 $Q_{100}=60$ CFS

PROPOSED BASIN B
PROPOSED LATERAL B
 $Q_{100}=28.9$

DRAINAGE AREA=25 AC
PROPOSED 36"
 $Q_{100}=40$ CFS

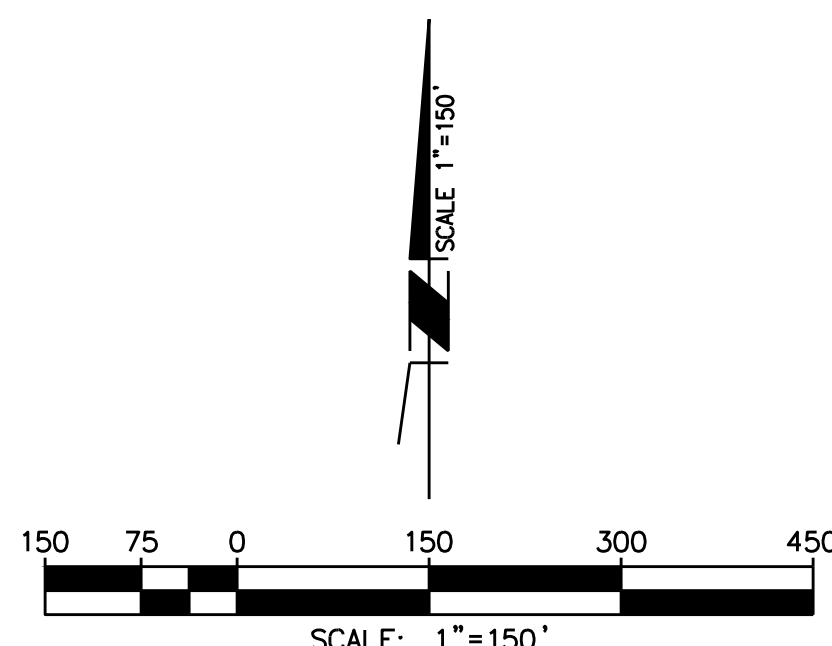
SUBSURFACE BASIN B
INFILTRATION TRENCH BMP
NO VOLUME = 1.31 AC-FT
MITIGATION VOLUME = 1.00 AC-FT
DESIGN VOLUME = 2.31 AC-FT

NOTE DURING FINAL DESIGN A MINIMUM OF THREE SUBSURFACE SYSTEMS ARE REQUIRED SINCE EACH TRENCH MUST BE LIMITED TO A DMA LESS THAN 10 ACRES OF DRAINAGE AREA

INFILTRATION TRENCH WORKSHEETS CREATED FOR THREE BMPS ASSUMING THAT AREA IS DIVIDED INTO 2-10 ACRE AREAS AND 1-5 ACRE AREA

LEGEND:

- XXX
X.X DMA AREA ACRES
- DRAINAGE MANAGEMENT AREA BOUNDARY
- STORM DRAIN FACILITY
- PROPOSED BASIN AREA
- PROPOSED STREETS
- FLOW PATH
- LINE J STORM DRAIN TRANSITION
- PROPOSED STORM DRAIN



EXHIBIT

VRSP NO. 22-001

WQMP SITE
PLAN

JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

Drawing Name: 0:\7\12\21\Engineering\WQMP\Appendix 1 - Maps & Site Plan\WQMP Site Plan.dwg
Last Updated: 04/11/2023 10:58am by jpc

Figure D1 – Day Creek ADP Storm Drain Infrastructure

DAY CREEK ADP STORM DRAIN
INFRASTRUCTURE



FIGURE D1
VERNOLA RANCH
DAY CREEK ADP
STORM DRAIN
INFRASTRUCTURE

Figure D2 – Conceptual Drainage Plan

CONCEPTUAL DRAINAGE PLAN

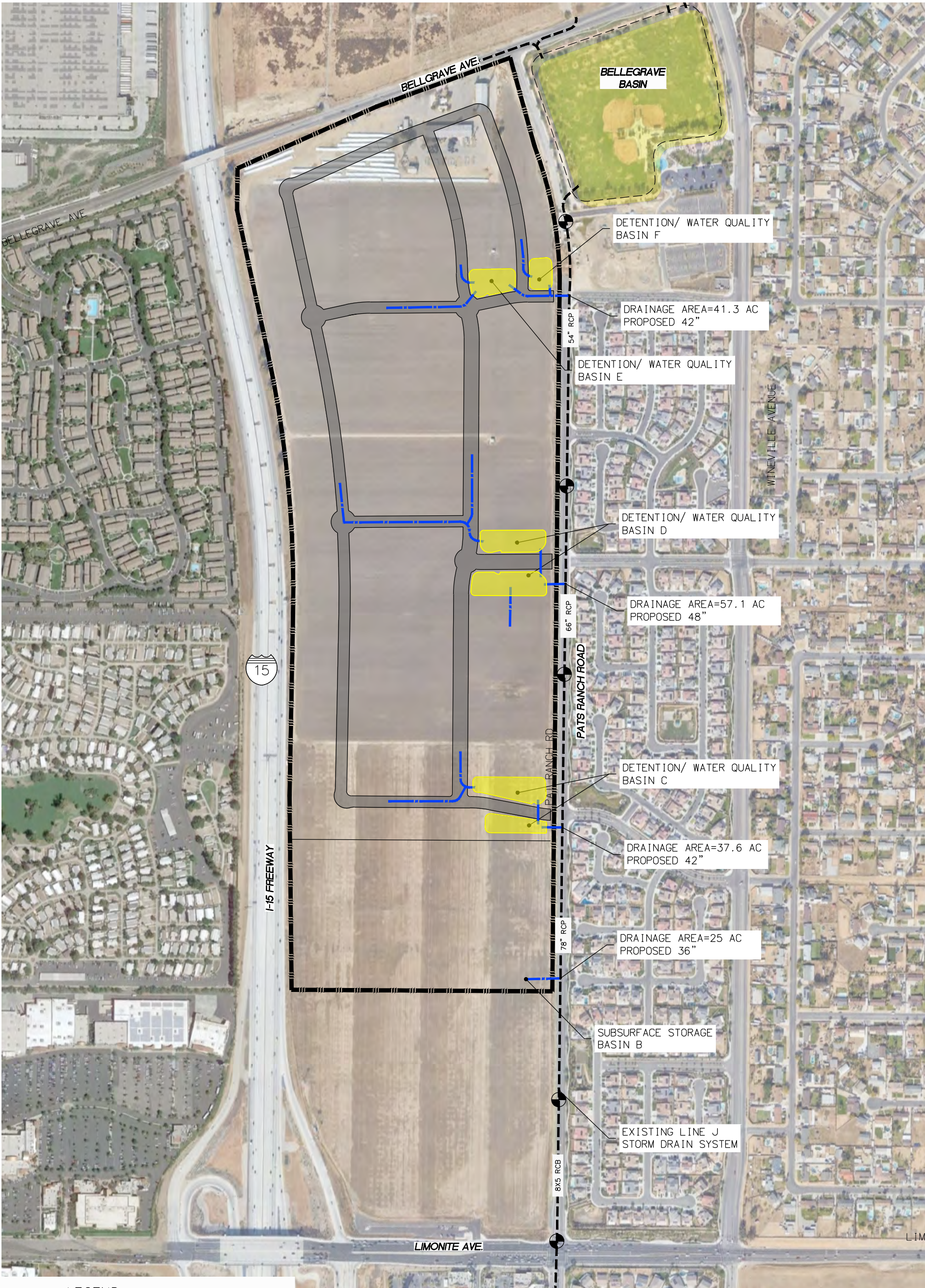


FIGURE D2
VERNOLA RANCH
CONCEPTUAL
DRAINAGE PLAN

NOTE 1: PROPOSED STORM DRAIN SHOWN ARE MAJOR FACILITIES. PROPOSED STORM DRAIN SYSTEMS WILL BE STUDIED IN GREATER DETAIL DURING THE TENTATIVE TRACT MAP PROCESS TO DETERMINE EXTENT OF LOCAL STORM DRAIN SYSTEMS.

Figure D3 – Basins and Area Drainage Map

BASINS AND DRINAGE AREA MAP



SCALE 1"=500'

LEGEND

DRAINAGE BOUNDARY

PROPOSED STORM DRAIN

EXISTING STORM DRAIN

FIGURE D3

VERNOLA RANCH

BASINS AND

DRAINAGE AREA MAP

Figure G1 – Existing Topography

EXISTING TOPORRAPHY



LEGEND

- PROJECT BOUNDARY
- GRADING LIMITS BEYOND PROJECT BOUNDARY
- 5 FT CONTOUR INTERVAL
- 1 FT CONTOUR INTERVAL

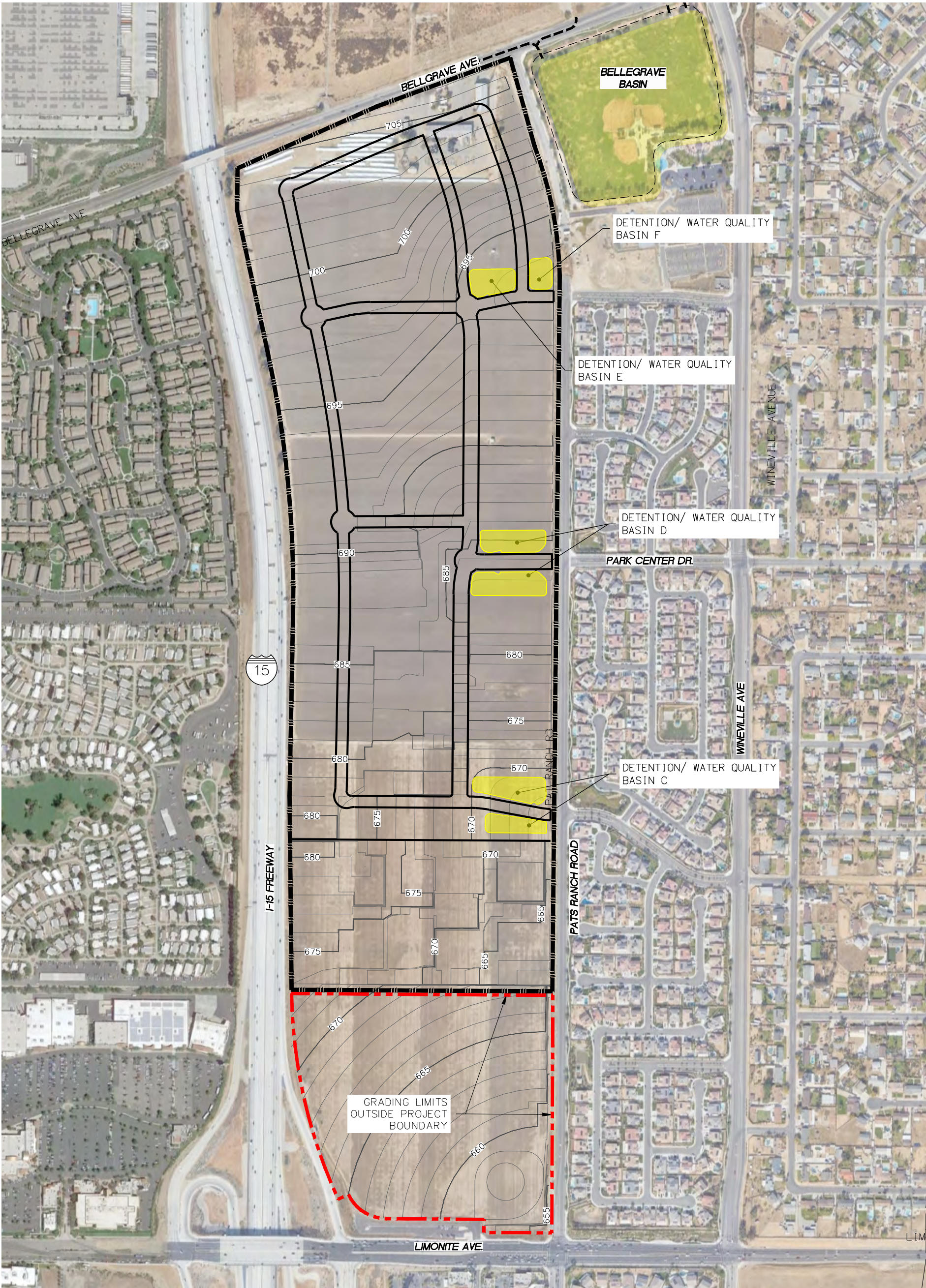
FIGURE G1
VERNOLA RANCH
EXISTING
TOPOGRAPHY

SCALE 1"=500'

LTM

Figure G2 – Conceptual Grading Plan

CONCEPTUAL GRADING PLAN



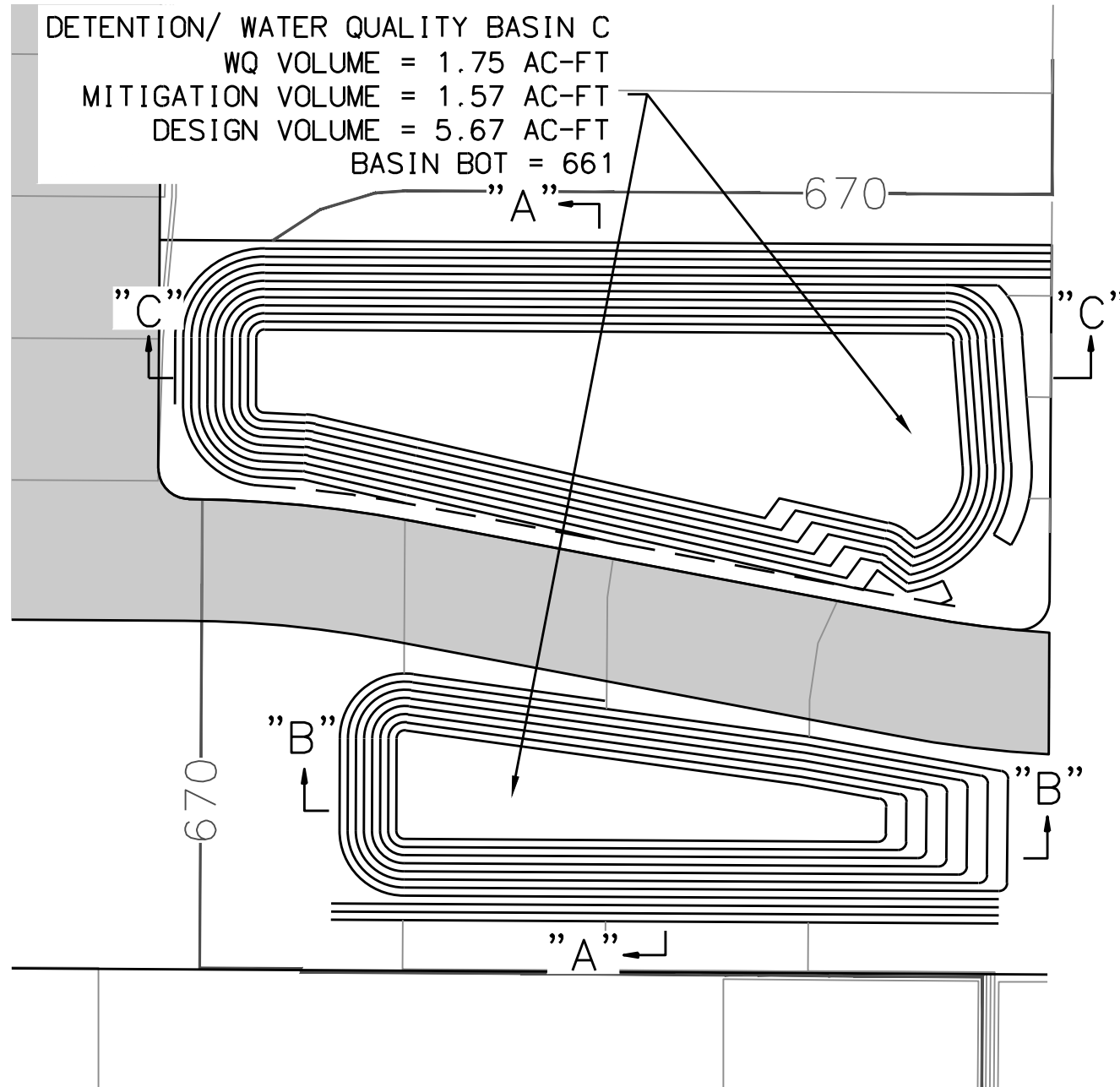
LEGEND

- PROJECT BOUNDARY
- DETENTION/WATER QUALITY BASINS
- GRADING LIMITS BEYOND PROJECT BOUNDARY
- 5 FT CONTOUR INTERVAL
- 1 FT CONTOUR INTERVAL

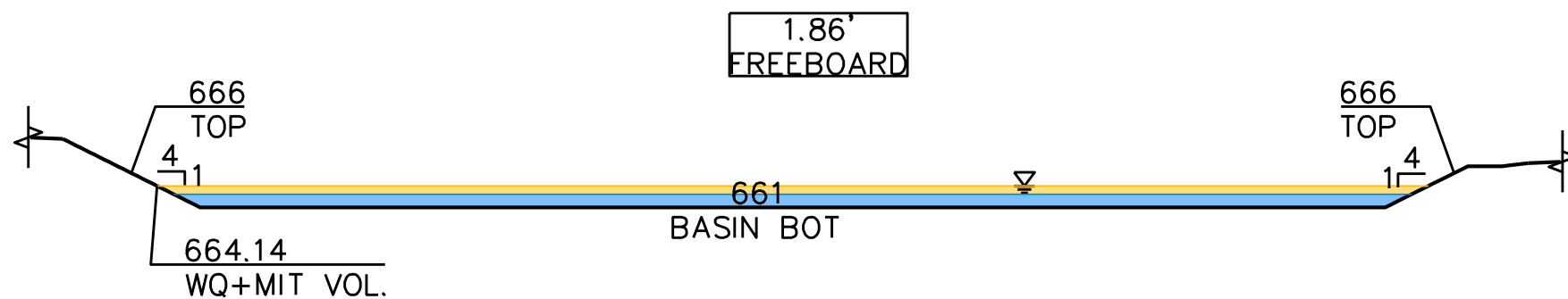
FIGURE G2
VERNOLA RANCH
CONCEPTUAL
GRADING PLAN

Figure H1 – DMA C - Basin C

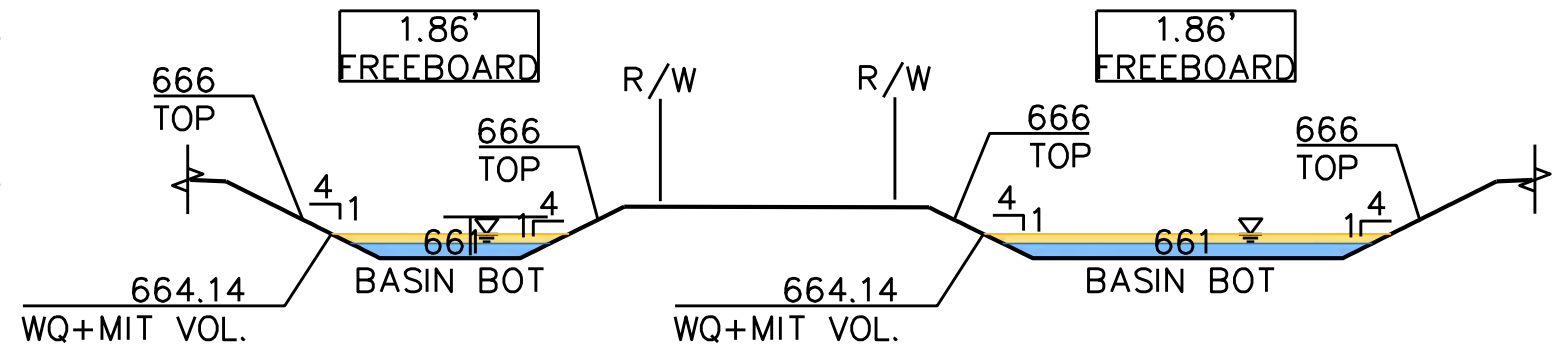
DETENTION/ WATER QUALITY BASIN C
WQ VOLUME = 1.75 AC-FT
MITIGATION VOLUME = 1.57 AC-FT
DESIGN VOLUME = 5.67 AC-FT
BASIN BOT = 661



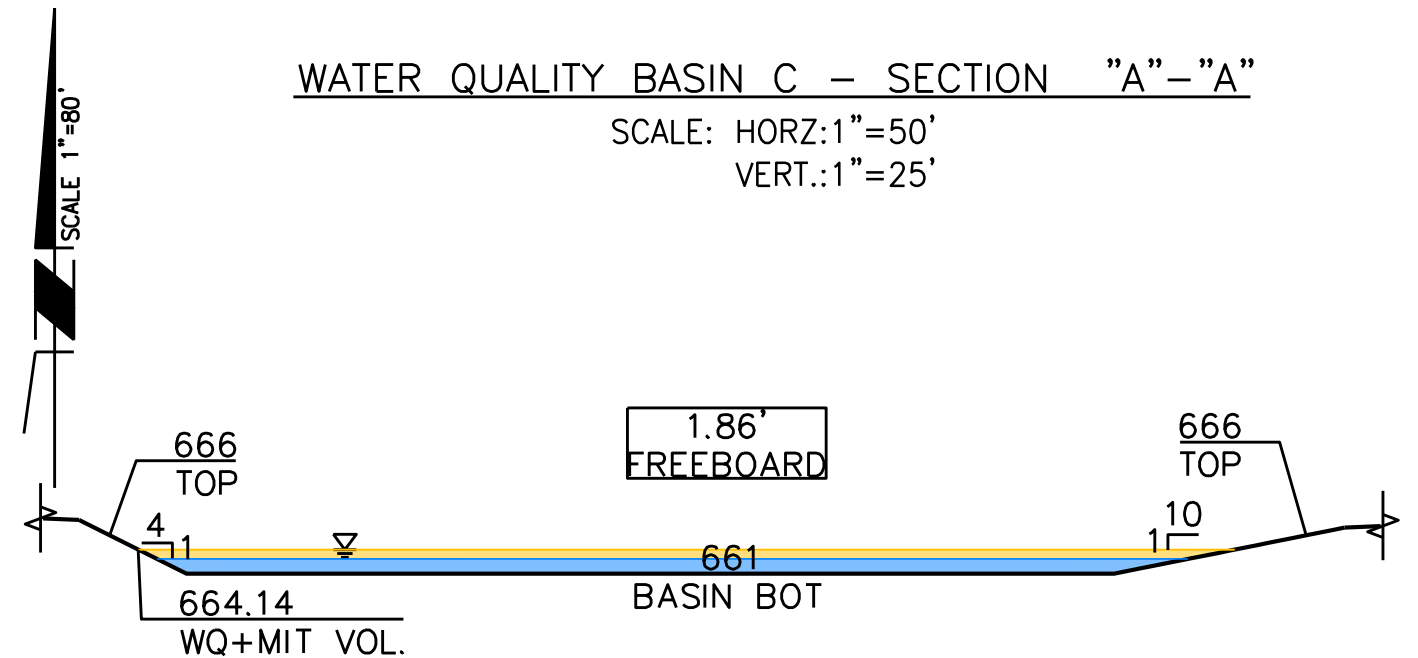
DMA C - BASIN C
SCALE: 1"=80'



WATER QUALITY BASIN C - SECTION "C"- "C"
SCALE: HORZ: 1"=50'
VERT.: 1"=25'



WATER QUALITY BASIN C - SECTION "A"- "A"
SCALE: HORZ: 1"=50'
VERT.: 1"=25'



WATER QUALITY BASIN C - SECTION "B"- "B"
SCALE: HORZ: 1"=50'
VERT.: 1"=25'

LEGEND:



WATER QUALITY VOLUME: 1.75 AC-FT

MITIGATION VOLUME: 1.57 AC-FT

FIGURE H1

VRSP NO. 22-001

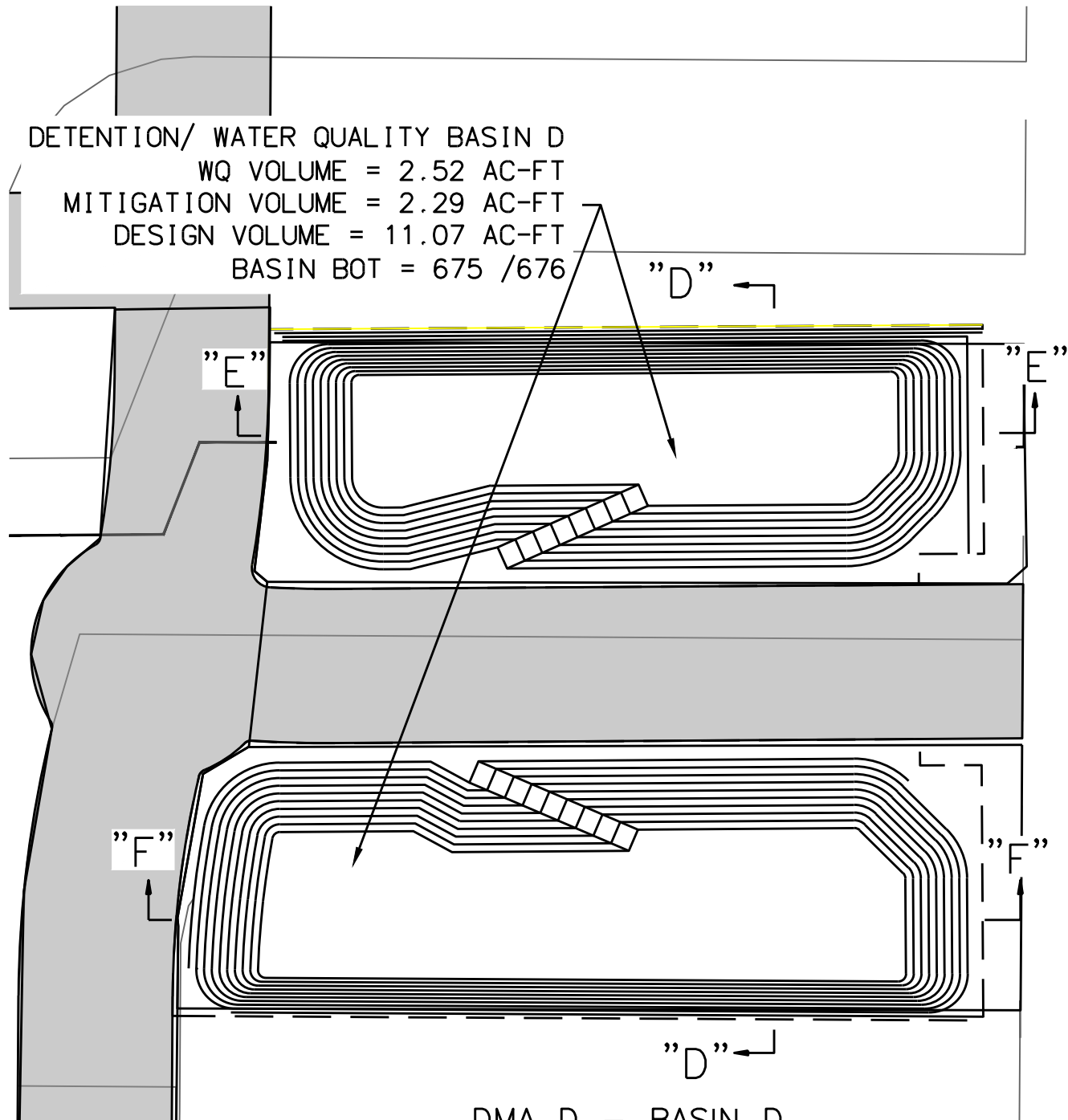
DMA C
BASIN C

JLC Engineering & Consulting, Inc.
41660 IVY STREET, SUITE A
MURRIETA, CA 92562
PH. 951.304.9552 FAX 951.304.3568

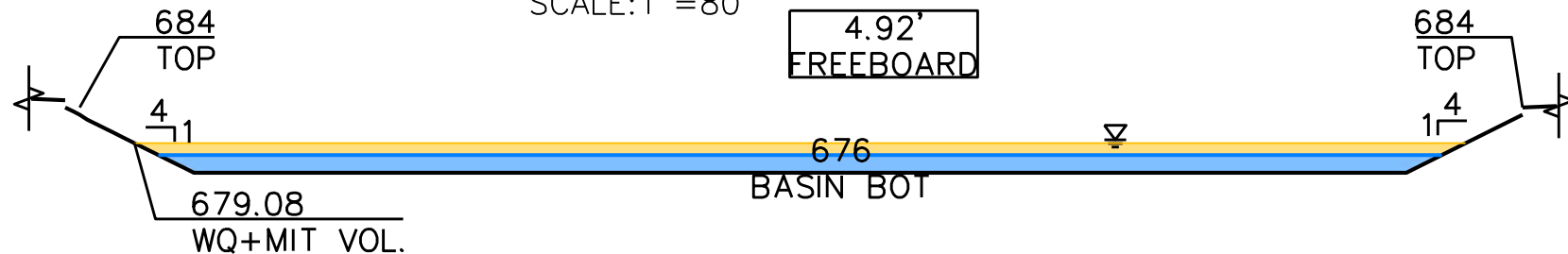


Figure H2 – DMA D – Basin D

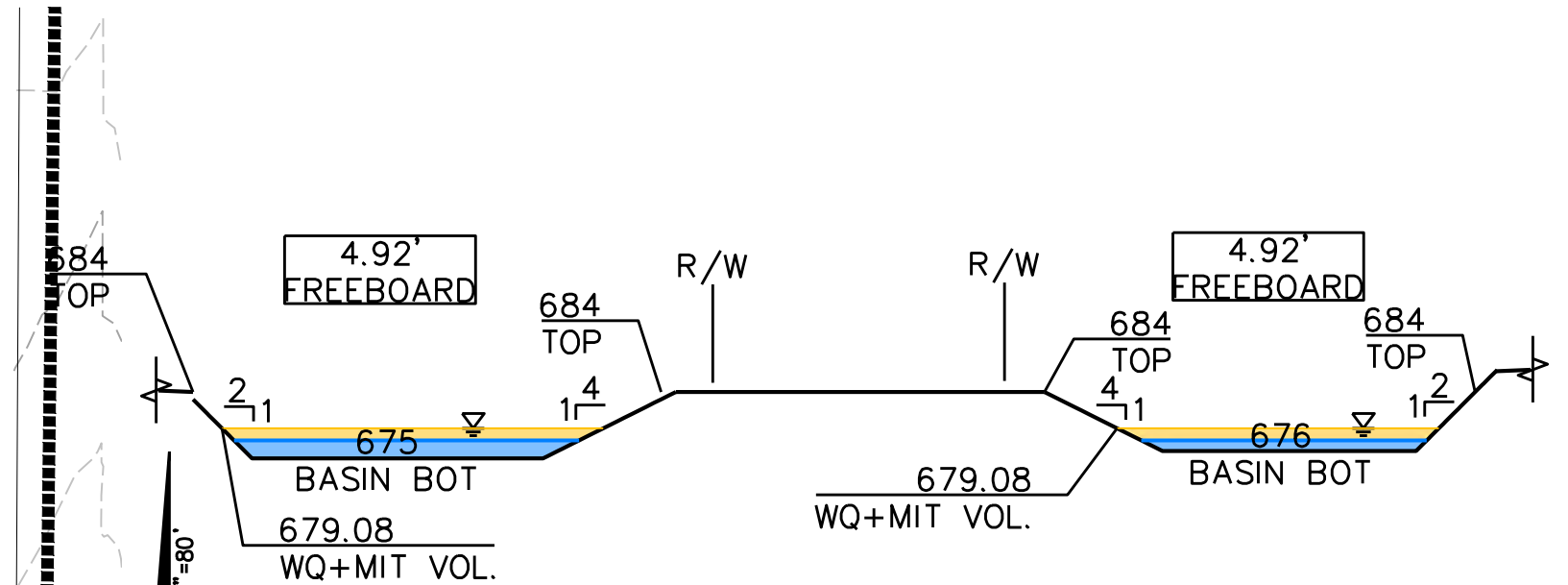
DETENTION/ WATER QUALITY BASIN D
WQ VOLUME = 2.52 AC-FT
MITIGATION VOLUME = 2.29 AC-FT
DESIGN VOLUME = 11.07 AC-FT
BASIN BOT = 675 /676



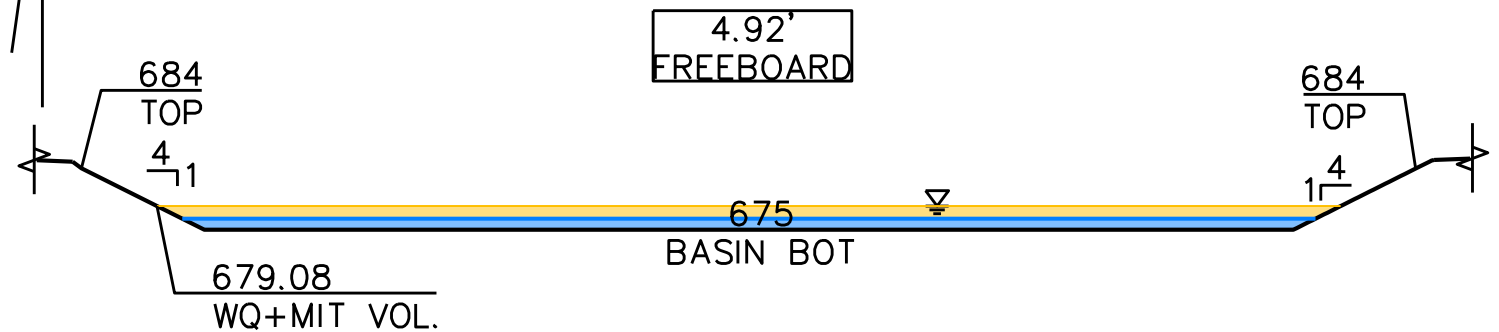
DMA D - BASIN D
SCALE: 1"=80'



WATER QUALITY BASIN D - SECTION "F"-F"
SCALE: HORZ: 1"=50'
VERT.: 1"=25'



WATER QUALITY BASIN D - SECTION "D"-D"
SCALE: HORZ: 1"=50'
VERT.: 1"=25'



WATER QUALITY BASIN D - SECTION "E"-E"
SCALE: HORZ: 1"=50'
VERT.: 1"=25'

LEGEND:



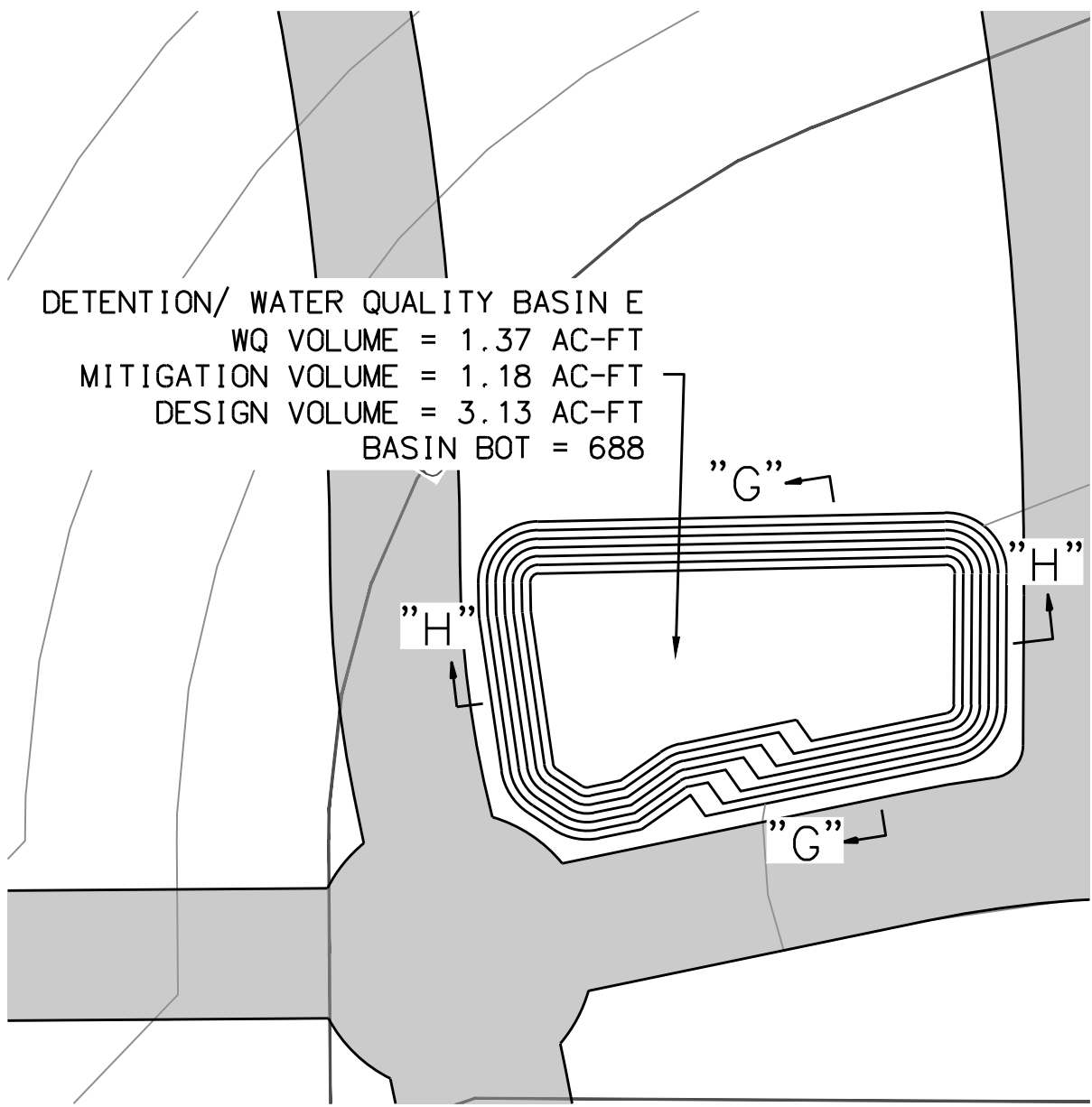
WATER QUALITY VOLUME: 2.52 AC-FT
MITIGATION VOLUME: 2.29 AC-FT



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FIGURE H2
VRSP NO. 22-001
DMA D
BASIN D

Figure H3 – DMA E – Basin E

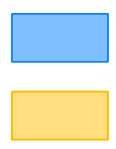


DETENTION/ WATER QUALITY BASIN E
WQ VOLUME = 1.37 AC-FT
MITIGATION VOLUME = 1.18 AC-FT
DESIGN VOLUME = 3.13 AC-FT
BASIN BOT = 688

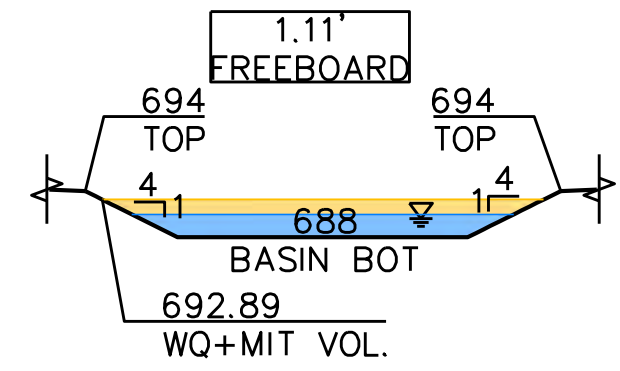
DMA E – BASIN E
SCALE: 1"=80'



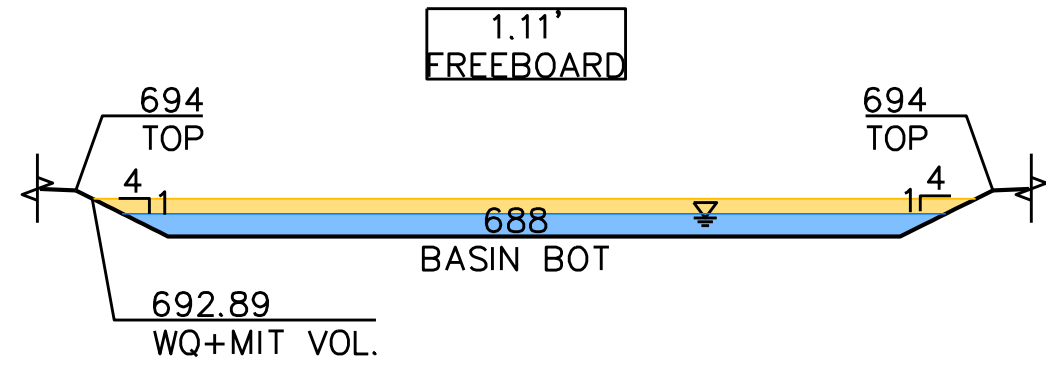
LEGEND:



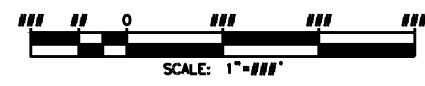
WATER QUALITY VOLUME: 1.37 AC-FT
MITIGATION VOLUME: 1.18 AC-FT



WATER QUALITY BASIN E – SECTION "G" – "G"
SCALE: HORZ: 1"=50'
VERT.: 1"=25'



WATER QUALITY BASIN E – SECTION "H" – "H"
SCALE: HORZ: 1"=50'
VERT.: 1"=25'

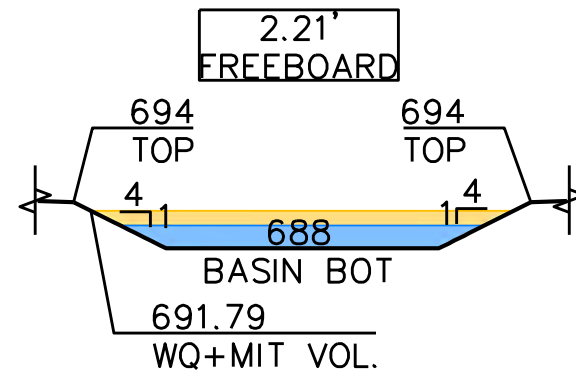
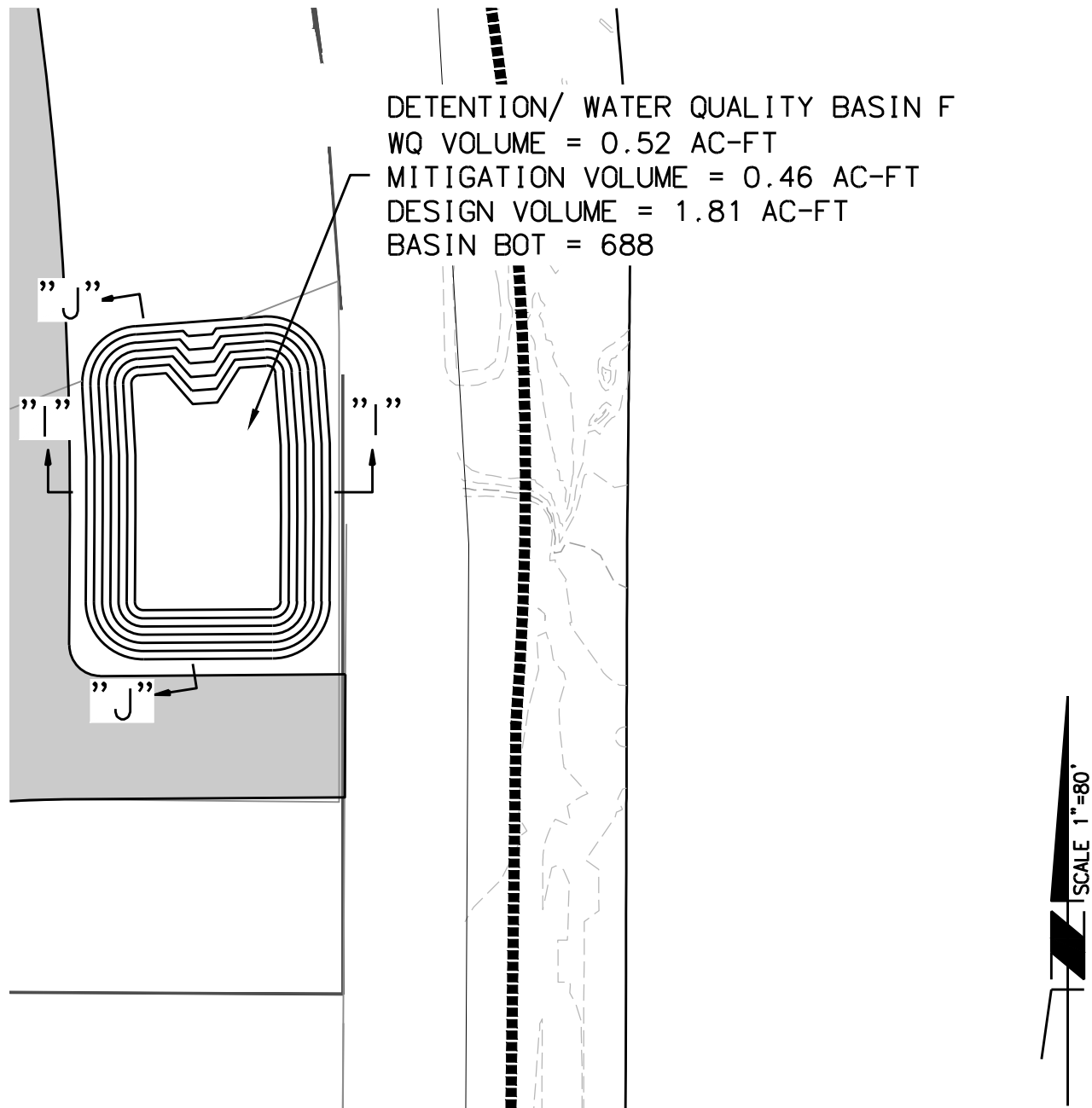


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PH. 951.304.9552 FAX 951.304.3568

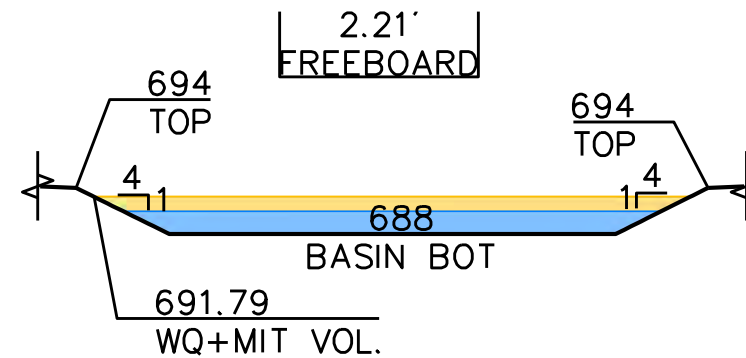
FIGURE H3
VRSP NO. 22-001
DMA E
BASIN E

Drawing Name: O:\17312\21\Engineering\Hydrology-Plan\Exhibits\SPCIFIC PLAN\FIGURE H- Basin Sections.dwg
Last Opened: May 05, 2023 - 4:21pm by BMLTZEN

Figure H4 – DMA F – Basin F



WATER QUALITY BASIN F - SECTION "I"- "I"
SCALE: HORZ: 1"=50'
VERT.: 1"=25'



WATER QUALITY BASIN F - SECTION "J"- "J"
SCALE: HORZ: 1"=50'
VERT.: 1"=25'

LEGEND:



WATER QUALITY VOLUME: 0.52 AC-FT
MITIGATION VOLUME: 0.46 AC-FT

JLC Engineering & Consulting, Inc.
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MURRIETA, CA 92562
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FIGURE H4
VRSP NO. 22-001
DMA F
BASIN F

Appendix 2: Construction Plans

Grading and Drainage Plans

Construction Plans not applicable at this stage of the project.

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data



GeoTek, Inc.

1548 North Maple Street, Corona, California 92878

(951) 710-1160 Office (951) 710-1167 Fax www.geotekusa.com

July 7, 2023

Project No. 2903-CR

Vernola Trust

P.O. Box 217

Upland, California 91785-0217

Attention: Mr. Rick Bondar

Subject: **Addendum Report – Infiltration Evaluation**

Tentative Tract Map 38504

Proposed Residential Development

Vernola Ranch

Bellegrave Avenue and Pats Ranch Road

Jurupa Valley, Riverside County, California

References: See Page 6

Dear Mr. Bondar:

GeoTek, Inc. (GeoTek) has prepared this Addendum Report to provide a summary of information with respect to the previous infiltration testing performed for the subject project, as documented in the referenced reports (GeoTek, 2021 and 2023).

The following sections provide a summary of information for the infiltration testing previously performed by GeoTek for the subject project.

Field Exploration

Eleven percolation test borings, Borings I-I through I-III, were excavated with a track- and/or truck-mounted hollow stem auger drill rig. The tests were performed at depths ranging from five (5) (proposed basins) to 45 feet (proposed dry wells) below existing grade. Additionally, two (2) deep exploratory borings (Borings B-4 and B-11) were excavated within the project area to depths of approximately 51.5 feet for determination of depth of groundwater, if any, and for observation of any hardpan or impermeable layers. The approximate locations of the borings performed for the previous infiltration evaluation, including the two (2) deep exploratory borings, are indicated on the attached Boring Location Map, Figure I.

All borings were approximately 8-inches in diameter. Four-inch diameter slotted PVC pipes encapsulated in filter sock were inserted into the eleven percolation test holes. The annular space between the test hole sidewalls and PVC pipe was filled with gravel.

The logs of the borings are presented in Appendix A.

Groundwater

Groundwater or perched water was not encountered nor observed in any of the borings excavated for the evaluation. Based on a review of groundwater depths noted on the State Department of Water Resources Water Data Library website (<https://wdl.water.ca.gov/waterdatalibrary>), it is estimated a historic high groundwater depth in excess of 100 feet below existing grade exists at the site.

It is possible that seasonal variations (temperature, rainfall, etc.) will cause fluctuations in the groundwater level. Additionally, perched water may be encountered at shallow depths following extensive rain events.

Infiltration Testing

Subsequent to pre-soaking the test holes in general conformance with the referenced document (County of Riverside, 2011), percolation testing was performed in the lower approximate 20 inches in each of the percolation borings. The percolation testing was conducted in general conformance with the referenced document prepared by the County of Riverside. The percolation rates were converted to an infiltration rate via the Porchet Method.

The infiltration rate for each of the tests is presented in the following table after the water level had stabilized.

Boring No.	Infiltration Rate (inches per hour)	Depth of Boring (feet)
Boring I-1	0.80	5
Boring I-2	1.51	25
Boring I-3	0.86	5
Boring I-4	0.86	20
Boring I-5	0.43	20
Boring I-6	0.38	15
Boring I-7	8.24	45
Boring I-8	13.71	45
Boring I-9	14.05	45
Boring I-10	17.41	45
Boring I-11	8.74	45

Copies of the percolation data sheets and infiltration conversion sheets (Porchet Method) are included in Appendix B.

The reported infiltration rates are the measured rate without any factor of safety applied. Over the lifetime of the water quality facility, the infiltration rates may be affected by silt build up and biological activities, as well as local variations in near surface soil conditions. A suitable factor of safety should be applied to the field rates in design of the infiltration systems.

It should be noted that the infiltration rates provided above were performed in relatively undisturbed site materials. Infiltration rates will vary and are mostly dependent on the underlying consistency of the site soil and relative density. Infiltration rates will be impacted by weight of equipment travelling over the soil, placement of engineered fill and other various factors. GeoTek, Inc. assumes no responsibility or liability for the ultimate design or performance of the storm water facilities.

LIMITATIONS

The earth materials observed on the project site appear to be representative of the tested areas; however, soil materials vary in character between excavations and natural outcrops or conditions exposed during site construction. Site conditions may vary due to seasonal changes or other factors. GeoTek, Inc. assumes no responsibility or liability for work, testing or recommendations performed or provided by others.

GeoTek's conclusions and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in



accordance with current standards of practice and no warranty is expressed or implied. Standards of practice are subject to change with time.

The opportunity to be of continued service on this project is sincerely appreciated. If you should have any questions, please do not hesitate to contact GeoTek.

Respectfully submitted,
GeoTek, Inc.



Edward H. LaMont
CEG 1892, Exp. 07/31/24
Principal Geologist



Bruce A. Hick
GE 2284, Exp. 12/31/24
Geotechnical Engineer

Anna M. Scott
Project Geologist

Enclosures: Figure I – Boring Location Map
 Appendix A – Logs of Exploratory Borings
 Appendix B – Percolation Data Sheets and Conversion Sheets (Porchet Method)

Distribution: (1) Addressee via email (PDF file)

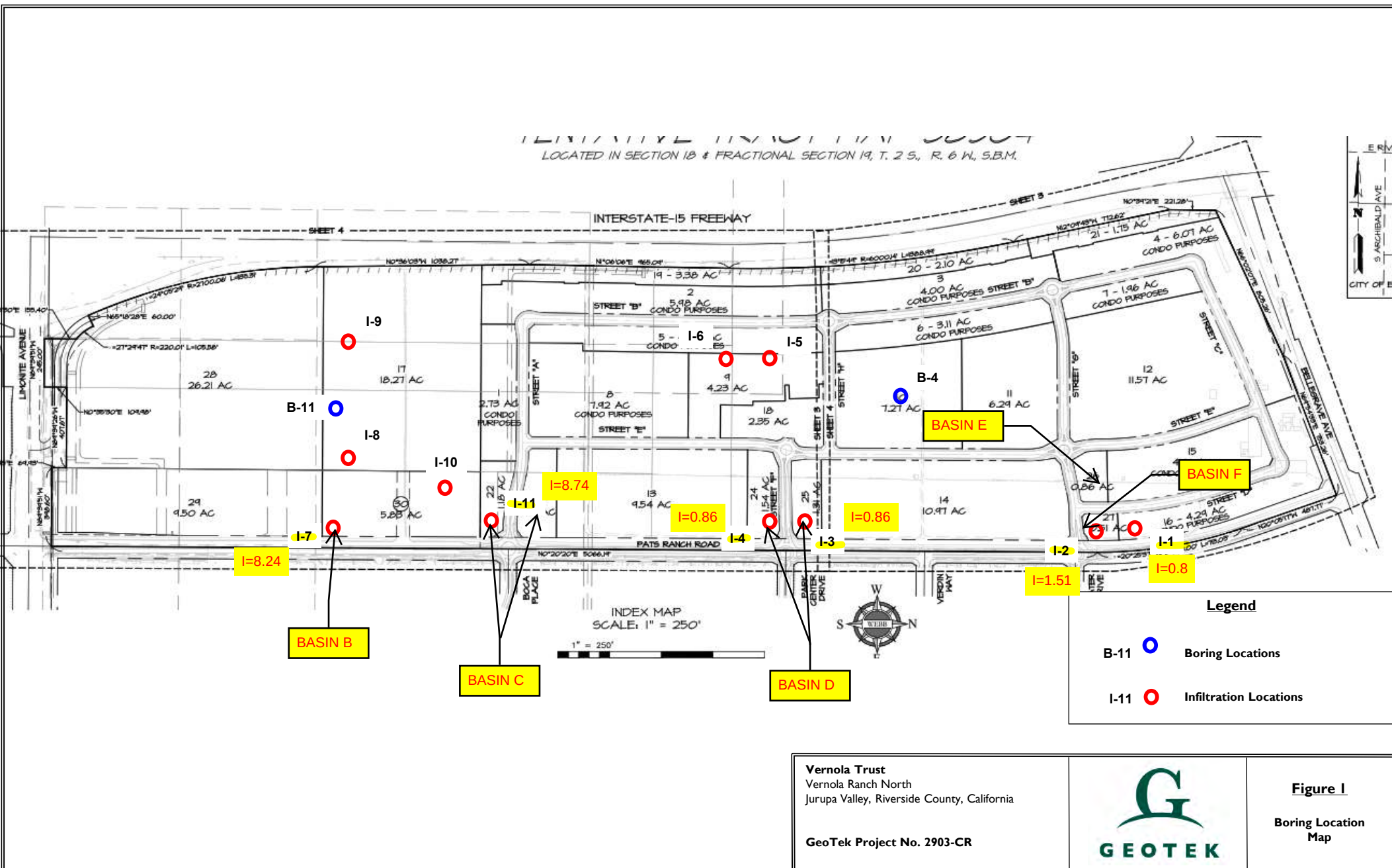
G:\Projects\2901 to 2950\2903CR Vernola Trust Vernola Ranch North Jurupa Valley\Infiltration Evaluation Corrected\2903CR Addendum to Infiltration Evaluation TTM 38504 North.doc

REFERENCES

County of Riverside, 2011, “Technical Guidance Document Appendix A – Infiltration Testing,” dated September.

GeoTek, Inc., 2021, “Geotechnical and Infiltration Evaluation, Proposed Mixed-Use Development, Vernola Ranch North, Bellegrave Avenue and Pats Ranch Road, Jurupa Valley, Riverside County, California,” Project No. 2903-CR, dated November 22.

_____, 2023, Updated Geotechnical and Infiltration Evaluation, Tentative Tract Map 38504, Proposed Residential Development, Vernola Ranch, Bellegrave Avenue and Pats Ranch Road, Jurupa Valley, Riverside County, California,” Project No. 2903-CR, dated April 10.



APPENDIX A

LOGS OF EXPLORATORY BORINGS

TTM 38504

Vernola Ranch

Jurupa Valley, Riverside County, California

Project No. 2903-CR



GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-4 MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					<u>Alluvium:</u>			
3			R1	SM	Silty f SAND, trace gravel, brown, moist, medium dense	11.0	119.7	MD, SR
6								
12								
14			R2		Silty f-c SAND, grey to red-brown, moist, dense	5.0	118.3	
20								
26								
13			R3		Silty f SAND, grey to red-brown, moist, very dense	5.9	113.5	
26								
50-6"								
27			R4		same as above, slightly clayey			
50-6"								
16			R6		Silty f SAND, trace gravel, red-brown, moist, very dense	4.9	117.1	
41								
50-6"								
14			R7		same as above, dense			
20								
25								
8			S1		same as above, medium dense	7.7		
12								
15								
8			S2	SC	Clayey f-c SAND, red-brown, moist, medium dense			
13								
16								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits EI = Expansion Index SA = Sieve Analysis RV = R-Value Test
SR = Sulfate/Resistivity Test SH = Shear Test HC = Consolidation MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-4 (cont.) MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					Alluvium (cont.):			
35		8 9 11	S3	SM/SC	Clayey/Silty f-c SAND, red-brown, moist, medium dense	10.1		
40		13 14 25	S4	SM	Silty f-c SAND, slightly clayey, trace gravel, red-brown, moist, dense			
45		5 7 10	S5	ML	Sandy SILT, slightly clayey, red-brown, moist, very stiff	27.8		
50		8 14 20	S6		same as above, hard			
					BORING TERMINATED AT 51.5 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			
55								
60								

LEGEND	Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
	Lab testing:	AL = Atterberg Limits	SH = Shear Test	SI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/13/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-11	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					MATERIAL DESCRIPTION AND COMMENTS			
					<u>Alluvium:</u>			
		9 10 26	R1	SM	Silty f SAND, red-brown, moist, dense	7.0	113.5	MD, SR
		50-6"	R2		Silty f-c SAND, red-brown, moist, very dense	9.2	116.3	
5		50-6"	R3		same as above	11.0	119.0	
		27 50-6"	R4		same as above			
10		15 19 26	R5		Silty f SAND, red-brown, moist, dense			
15	#	12 21 26	R6		Silty f-c SAND, slightly clayey, grey to red-brown, moist, dense	15.9	117	
20		13 23 33	R7	SM/SC	Clayey/Silty f SAND, red-brown, moist, dense	16.7	123.4	
25		3 9 13	S1		same as above, medium dense			
30		4 6 10	S2		same as above	20.8		

LEGEND	Sample type:	 ---Ring	 ---SPT	 ---Small Bulk	 ---Large Bulk	 ---No Recovery	 ---Water Table	
	Lab testing:	AL = Atterberg Limits	EI = Expansion Index	SA = Sieve Analysis	RV = R-Value Test	SR = Sulfate/Resistivity Test	SH = Shear Test	HC= Consolidation

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits EI = Expansion Index SA = Sieve Analysis RV = R-Value Test
SR = Sulfate/Resistivity Test SH = Shear Test HC = Consolidation MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/13/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: B-11 (cont.)	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					Alluvium (cont.):			
35		10 12 16	S3	SC	Clayey f-c SAND, red-brown, moist, medium dense			
40		14 21 25	S4	SM	Silty f-c SAND, red-brown, moist, dense		9.5	
45		19 19 21	S5	SP	F-c SAND, some gravel, light red-brown, moist, dense			
50		17 25 31	S6	SP	F-c SAND, light brown, moist, very dense		3.9	
					BORING TERMINATED AT 51.5 FEET			
					No groundwater encountered Boring backfilled with soil cuttings			
55								
60								

LEGEND	Sample type:		---Ring		---SPT		---Small Bulk		---Large Bulk		---No Recovery		---Water Table
	Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	HC = Consolidation	RV = R-Value Test	MD = Maximum Density				

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/11/2021

Depth (ft)	SAMPLES				USCS Symbol	BORING NO.: I-I	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number	MATERIAL DESCRIPTION AND COMMENTS			Water Content (%)	Dry Density (pcf)	Others
5				SM	Alluvium: Silty f SAND, brown, moist				
5	BORING TERMINATED AT 5 FEET								
10					No groundwater encountered Boring set with pipe, sock, and gravel				
15									
20									
25									
30									

LEGEND	Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table
	Lab testing: AL = Atterberg Limits SR = Sulfate/Resistivity Test EI = Expansion Index SH = Shear Test SA = Sieve Analysis HC= Consolidation RV = R-Value Test MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/11/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-2	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5				SM	Alluvium: Silty f SAND, brown, moist Trace gravel			
10				SC	Silty clayey f SAND, brown, moist			
15								
20				SM	Silty f-c SAND, some gravel, brown, moist			
25					BORING TERMINATED AT 25 FEET No groundwater encountered Boring set with pipe, sock, and gravel			
30								

LEGEND
Sample type:
 ---Ring
 ---SPT
 ---Small Bulk
 ---Large Bulk
 ---No Recovery
 ---Water Table
Lab testing:
 AL = Atterberg Limits
 EI = Expansion Index
 SA = Sieve Analysis
 RV = R-Value Test
 SR = Sulfate/Resistivity Test
 SH = Shear Test
 HC= Consolidation
 MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/11/2021

Depth (ft)	SAMPLES				USCS Symbol	BORING NO.: I-3	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number	MATERIAL DESCRIPTION AND COMMENTS			Water Content (%)	Dry Density (pcf)	Others
5				SM/SC	<u>Alluvium:</u> Clayey/Silty f SAND, brown, moist				
10					BORING TERMINATED AT 5 FEET No groundwater encountered Boring set with pipe, sock, and gravel				
15									
20									
25									
30									

LEGEND
Sample type:
 ---Ring
 ---SPT
 ---Small Bulk
 ---Large Bulk
 ---No Recovery
 ---Water Table

Lab testing:
AL = Atterberg Limits
EI = Expansion Index
SA = Sieve Analysis
RV = R-Value Test
SR = Sulfate/Resistivity Test
SH = Shear Test
HC= Consolidation
MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/11/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-4	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5				SC	<u>Alluvium:</u> Clayey SAND, brown, moist			
10				SM	Silty f SAND, brown, moist			
15					slightly clayey, some gravel			
20	BORING TERMINATED AT 20 FEET							
25					No groundwater encountered Boring set with pipe, sock, and gravel			
30								

LEGEND	Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table						
	Lab testing: AL = Atterberg Limits EI = Expansion Index SA = Sieve Analysis RV = R-Value Test SR = Sulfate/Resistivity Test SH = Shear Test HC= Consolidation MD = Maximum Density						

GEOTEK

LOGGED BY:	JD
OPERATOR:	George
RIG TYPE:	CME 75
DATE:	10/11/2021

[illegible]

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/11/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-6	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5 10 15 20 25 30				SM	Alluvium: Silty f SAND, brown, moist slightly clayey Clayey silty f SAND, brown, moist			
BORING TERMINATED AT 15 FEET No groundwater encountered Boring set with pipe, sock, and gravel								

LEGEND

Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	HC = Consolidation
					RV = R-Value Test	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-7	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5 10 15 20 25 30				SM	<u>Alluvium:</u> Silty f-c SAND, red-brown, moist			
					Silty f SAND, red-brown, moist			
				SM/SC	Clayey/Silty f SAND, red-brown, moist			

LEGEND

Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	HC = Consolidation
					RV = R-Value Test	MD = Maximum Density

GEOTEK

LOGGED BY:	JD
OPERATOR:	George
RIG TYPE:	CME 75
DATE:	10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-7 (cont.)	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					Alluvium (cont.):			
35				SM	Silty f-c SAND, slightly clayey, brown to red-brown, moist			
40								
45					BORING TERMINATED AT 45 FEET			
					No groundwater encountered Boring set with pipe, sock, and gravel			
50								
55								
60								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits EI = Expansion Index SA = Sieve Analysis RV = R-Value Test
SR = Sulfate/Resistivity Test SH = Shear Test HC= Consolidation MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-8	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5 10 15 20 25 30				SM	<u>Alluvium:</u> Silty f SAND, slightly clayey, red-brown, moist			
				SM/SC	Clayey/Silty f SAND, red-brown to brown, moist			
				CL	Silty CLAY, brown, moist			

LEGEND

Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	HC = Consolidation
					RV = R-Value Test	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES				USCS Symbol	BORING NO.: I-8 (cont.) MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number	Water Content (%)			Dry Density (pcf)	Others	
						<u>Alluvium (cont.):</u>			
35				SM		Silty f-c SAND, some gravel, brown, moist			
45						BORING TERMINATED AT 45 FEET No groundwater encountered Boring set with pipe, sock, and gravel			
50									
55									
60									

LEGEND
Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery

W

 ---Water Table
Lab testing: AL = Atterberg Limits EI = Expansion Index SA = Sieve Analysis RV = R-Value Test
 SR = Sulfate/Resistivity Test SH = Shear Test HC= Consolidation MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-9	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5 10 15 20 25 30				SM	<u>Alluvium:</u> Silty f SAND, slightly clay, red-brown, moist			
				SM/SC	Clayey/Silty f SAND, red-brown to brown, moist			
				CL	Silty CLAY, brown, moist			

LEGEND

Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	RV = R-Value Test
					HC = Consolidation	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES				USCS Symbol	BORING NO.: I-9 (cont.) MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number	Water Content (%)			Dry Density (pcf)	Others	
						<u>Alluvium (cont.):</u>			
35				SM		Silty f-c SAND, some gravel, brown, moist			
45						BORING TERMINATED AT 45 FEET No groundwater encountered Boring set with pipe, sock, and gravel			
50									
55									
60									

LEGEND
Sample type:
 ---Ring
 ---SPT
 ---Small Bulk
 ---Large Bulk
 ---No Recovery
 ---Water Table
Lab testing:
 AL = Atterberg Limits
 EI = Expansion Index
 SA = Sieve Analysis
 RV = R-Value Test
 SR = Sulfate/Resistivity Test
 SH = Shear Test
 HC= Consolidation
 MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-10	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5 10 15 20 25 30				SM	<u>Alluvium:</u> Silty f-c SAND, red-brown, moist			
					Silty f SAND, red-brown, moist			
				SM/SC	Clayey/Silty f SAND, red-brown, moist			

LEGEND

Sample type:	---Ring	---SPT	---Small Bulk	---Large Bulk	---No Recovery	---Water Table
Lab testing:	AL = Atterberg Limits	SR = Sulfate/Resistivity Test	EI = Expansion Index	SH = Shear Test	SA = Sieve Analysis	HC = Consolidation
					RV = R-Value Test	MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-10 (cont.)	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					Alluvium (cont.):			
35				SM	Silty f-c SAND, some gravel, brown, moist			
40								
45					BORING TERMINATED AT 45 FEET			
					No groundwater encountered Boring set with pipe, sock, and gravel			
50								
55								
60								

LEGEND	Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table							
	Lab testing: AL = Atterberg Limits EI = Expansion Index SA = Sieve Analysis RV = R-Value Test SR = Sulfate/Resistivity Test SH = Shear Test HC= Consolidation MD = Maximum Density							

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-11	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
5 10 15 20 25 30				SM	<u>Alluvium:</u> Silty f-c SAND, red-brown, moist			
					Silty f SAND, red-brown, moist			
				SM/SC	Clayey/Silty f SAND, red-brown, moist			

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits EI = Expansion Index SA = Sieve Analysis RV = R-Value Test
 SR = Sulfate/Resistivity Test SH = Shear Test HC= Consolidation MD = Maximum Density

GeoTek, Inc.
LOG OF EXPLORATORY BORING



CLIENT: Vernola Trust
PROJECT NAME: Vernola Ranch
PROJECT NO.: 2903-CR
LOCATION: Jurupa Valley, CA

DRILLER: 2R Drilling
DRILL METHOD: HSA
HAMMER: 140 lbs - 30 in

LOGGED BY: JD
OPERATOR: George
RIG TYPE: CME 75
DATE: 10/12/2021

Depth (ft)	SAMPLES			USCS Symbol	BORING NO.: I-11 (cont.)	Laboratory Testing		
	Sample Type	Blows/6 in.	Sample Number			Water Content (%)	Dry Density (pcf)	Others
					Alluvium (cont.):			
35				SM	Silty f-c SAND, some gravel, brown, moist			
40								
45					BORING TERMINATED AT 45 FEET			
					No groundwater encountered Boring set with pipe, sock, and gravel			
50								
55								
60								

LEGEND	Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table							
	Lab testing: AL = Atterberg Limits EI = Expansion Index SA = Sieve Analysis RV = R-Value Test SR = Sulfate/Resistivity Test SH = Shear Test HC = Consolidation MD = Maximum Density							

APPENDIX B

PERCOLATION DATA AND CONVERSION SHEETS

TTM 38504

Vernola Ranch

Jurupa Valley, Riverside County, California

Project No. 2903-CR



PERCOLATION DATA SHEET

JURUPA

Project: 12080 BELLEGRAVE AVENUE VALLEY

Job No.: 2903-CR

Test Hole No.: I-1 Tested By: DVG

Date: 10/12,13/2021

Depth of Hole As Drilled: 60" Before Test: 60" After Test: 60"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
								<u>PRESOAK 5 GAL</u>
								<u>10/12/2021</u>
	<u>1101</u>		<u>60</u>	<u>20</u>				<u>BEGIN 10/13/2021</u>
	<u>1126</u>	<u>25</u>			<u>14 1/2</u>	<u>5 1/2</u>		<u>1ST 25 MIN.</u>
	<u>1128</u>		<u>60</u>	<u>20</u>				
	<u>1153</u>	<u>25</u>			<u>14 1/2</u>	<u>5 1/2</u>		<u>2ND 25 MIN.</u>
	<u>1155</u>		<u>60</u>	<u>20</u>				
	<u>1225</u>	<u>30</u>			<u>14</u>	<u>6</u>		<u>1ST 30 MIN.</u>
	<u>1227</u>		<u>60</u>	<u>20</u>				
	<u>1257</u>	<u>30</u>			<u>14 1/4</u>	<u>5 3/4</u>		<u>2ND 30 MIN.</u>
	<u>1259</u>		<u>60</u>	<u>20</u>				
	<u>129</u>	<u>30</u>			<u>14 1/2</u>	<u>5 1/2</u>		<u>3RD 30 MIN.</u>
	<u>131</u>		<u>60</u>	<u>20</u>				
	<u>201</u>	<u>30</u>			<u>14 3/4</u>	<u>5 1/4</u>		<u>4TH 30 MIN.</u>
	<u>203</u>		<u>60</u>	<u>20</u>				
	<u>233</u>	<u>30</u>			<u>15</u>	<u>5</u>		<u>5TH 30 MIN.</u>
	<u>235</u>		<u>60</u>	<u>20</u>				
	<u>305</u>	<u>30</u>			<u>15</u>	<u>5</u>		<u>6TH 30 MIN.</u>
	<u>307</u>		<u>60</u>	<u>20</u>				
	<u>337</u>	<u>30</u>			<u>15</u>	<u>5</u>		<u>7TH 30 MIN.</u>

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPA VALLEY

Job No.: 2903-CR

Test Hole No.: I-1 Tested By: DVG

Date: 10/12, 13/2021

Depth of Hole As Drilled: 60" Before Test: 60" After Test: 60"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	<u>339</u>		<u>60</u>	<u>20</u>				
	<u>409</u>	<u>30</u>			<u>15 1/4</u>	<u>4 3/4</u>		<u>8TH 30 MIN.</u>
	<u>411</u>		<u>60</u>	<u>20</u>				
	<u>441</u>	<u>30</u>			<u>15 1/4</u>	<u>4 3/4</u>		<u>9TH 30 MIN.</u>
	<u>443</u>		<u>60</u>	<u>20</u>				
	<u>513</u>	<u>30</u>			<u>15 1/2</u>	<u>4 1/2</u>		<u>10TH 30 MIN.</u>
	<u>515</u>		<u>60</u>	<u>20</u>				
	<u>545</u>	<u>30</u>			<u>15 3/4</u>	<u>4 1/4</u>		<u>11TH 30 MIN.</u>
	<u>547</u>		<u>60</u>	<u>20</u>				
	<u>617</u>	<u>30</u>			<u>16</u>	<u>4</u>		<u>12TH 30 MIN.</u>
	<u> </u>							
	<u> </u>							
	<u> </u>							
	<u> </u>							
	<u> </u>							

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPA

Job No.: 2903-CR

Test Hole No.: I-2 Tested By: DVG

Date: 10/12,13/2021

Depth of Hole As Drilled: 300'' Before Test: 300'' After Test: 300''

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
								<u>PRESOAK 5 GAL.</u>
								<u>10/12/2021</u>
	<u>1054</u>		<u>300</u>	<u>20</u>				<u>BEGIN 10/13/2021</u>
	<u>1119</u>	<u>25</u>			<u>8</u>	<u>12</u>		<u>1ST 25 MIN.</u>
	<u>1121</u>		<u>300</u>	<u>20</u>				
	<u>1146</u>	<u>25</u>			<u>8 3/4</u>	<u>11 1/4</u>		<u>2ND 25 MIN.</u>
	<u>1148</u>		<u>300</u>	<u>20</u>				
	<u>1218</u>	<u>30</u>			<u>7</u>	<u>13</u>		<u>1ST 30 MIN.</u>
	<u>1220</u>		<u>300</u>	<u>20</u>				
	<u>1250</u>	<u>30</u>			<u>7 1/2</u>	<u>12 1/2</u>		<u>2ND 30 MIN.</u>
	<u>1252</u>		<u>300</u>	<u>20</u>				
	<u>122</u>	<u>30</u>			<u>8</u>	<u>12</u>		<u>3RD 30 MIN.</u>
	<u>124</u>		<u>300</u>	<u>20</u>				
	<u>154</u>	<u>30</u>			<u>8 1/2</u>	<u>11 1/2</u>		<u>4TH 30 MIN.</u>
	<u>156</u>		<u>300</u>	<u>20</u>				
	<u>226</u>	<u>30</u>			<u>9</u>	<u>11</u>		<u>5TH 30 MIN.</u>
	<u>228</u>		<u>300</u>	<u>20</u>				
	<u>258</u>	<u>30</u>			<u>10</u>	<u>10</u>		<u>6TH 30 MIN.</u>
	<u>300</u>		<u>300</u>	<u>20</u>				
	<u>330</u>	<u>30</u>			<u>10 3/4</u>	<u>9 1/4</u>		<u>7TH 30 MIN.</u>

JURAPA

Job No.: 2903-CR.

Date: 10/12, 13/2021.

300.

Comments

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPAJob No.: 2903-CRTest Hole No.: I-3 Tested By: DVGDate: 10/12,13/2021Depth of Hole As Drilled: 60" Before Test: 60" After Test: 60"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
								PRESOAK 5 GAL 10/12/2021
	<u>1047</u> <u>1112</u>	<u>25</u>	<u>60</u>	<u>20</u>	<u>14</u>	<u>6</u>		BEGIN 10/13/2021 1ST 25 MIN.
	<u>1114</u> <u>1139</u>	<u>25</u>	<u>60</u>	<u>20</u>	<u>14 1/2</u>	<u>5 1/2</u>		2ND 25 MIN.
	<u>1141</u> <u>1211</u>	<u>30</u>	<u>60</u>	<u>20</u>	<u>13 1/2</u>	<u>6 1/2</u>		1ST 30 MIN.
	<u>1213</u> <u>1243</u>	<u>30</u>	<u>60</u>	<u>20</u>	<u>13 1/2</u>	<u>6 1/2</u>		2ND 30 MIN.
	<u>1245</u> <u>115</u>	<u>30</u>	<u>60</u>	<u>20</u>	<u>13 3/4</u>	<u>6 1/4</u>		3RD 30 MIN.
	<u>117</u> <u>147</u>	<u>30</u>	<u>60</u>	<u>20</u>	<u>14</u>	<u>6</u>		4TH 30 MIN.
	<u>149</u> <u>219</u>	<u>30</u>	<u>60</u>	<u>20</u>	<u>14 1/4</u>	<u>5 3/4</u>		5TH 30 MIN.
	<u>221</u> <u>251</u>	<u>30</u>	<u>60</u>	<u>20</u>	<u>14 1/2</u>	<u>5 1/2</u>		6TH 30 MIN.
	<u>253</u> <u>323</u>	<u>30</u>	<u>60</u>	<u>20</u>	<u>14 3/4</u>	<u>5 1/4</u>		7TH 30 MIN.

JURUPA
VALLEY

After Test: 60"

[illegible]

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPA

Job No.: 2903-CR

Test Hole No.: I-4 Tested By: DVG

Date: 10/12/13/2021

Depth of Hole As Drilled: 240" Before Test: 240"

After Test: 240"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
								<u>PRESOAK 5 GAL</u>
								<u>10/12/2021</u>
	<u>1040</u>		<u>240</u>	<u>20</u>				<u>BEGIN 10/13/2021</u>
	<u>1105</u>	<u>25</u>			<u>13 3/4</u>	<u>6 1/4</u>		<u>1ST 25 MIN.</u>
	<u>1107</u>		<u>240</u>	<u>20</u>				
	<u>1132</u>	<u>25</u>			<u>14 1/4</u>	<u>5 3/4</u>		<u>2ND 25 MIN.</u>
	<u>1134</u>		<u>240</u>	<u>20</u>				
	<u>1204</u>	<u>30</u>			<u>13 1/4</u>	<u>6 3/4</u>		<u>1ST 30 MIN.</u>
	<u>1206</u>		<u>240</u>	<u>20</u>				
	<u>1236</u>	<u>30</u>			<u>13 1/2</u>	<u>6 1/2</u>		<u>2ND 30 MIN.</u>
	<u>1238</u>		<u>240</u>	<u>20</u>				
	<u>108</u>	<u>30</u>			<u>13 3/4</u>	<u>6 1/4</u>		<u>3RD 30 MIN.</u>
	<u>110</u>		<u>240</u>	<u>20</u>				
	<u>140</u>	<u>30</u>			<u>13 3/4</u>	<u>6 1/4</u>		<u>4TH 30 MIN.</u>
	<u>142</u>		<u>240</u>	<u>20</u>				
	<u>212</u>	<u>30</u>			<u>14</u>	<u>6</u>		<u>5TH 30 MIN.</u>
	<u>214</u>		<u>240</u>	<u>20</u>				
	<u>244</u>	<u>30</u>			<u>14</u>	<u>6</u>		<u>6TH 30 MIN.</u>
	<u>246</u>		<u>240</u>	<u>20</u>				
	<u>316</u>	<u>30</u>			<u>14 1/2</u>	<u>5 1/2</u>		<u>7TH 30 MIN.</u>

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPA

Test Hole No.: I-4 Tested By: DVG

Depth of Hole As Drilled: 240 Before Test: 240

Job No.: 2903-CR.

Date: 10/12, 13/2021

After Test: 240"

[illegible]

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPA

Job No.: 2903 - CR

Test Hole No.: I-5 Tested By: DVG

Date: 10/13, 14/2021

Depth of Hole As Drilled: 240" Before Test: 240" After Test: 240"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
								<u>PRESOAK 5 GAL.</u>
								<u>10/13/2021</u>
	<u>1024</u>		<u>240</u>	<u>20</u>				<u>BEGIN 10/14/2021</u>
	<u>1049</u>	<u>25</u>			<u>16 3/4</u>	<u>3 1/4</u>		<u>1ST 25 MIN.</u>
	<u>1051</u>		<u>240</u>	<u>20</u>				
	<u>1116</u>	<u>25</u>			<u>17</u>	<u>3</u>		<u>2ND 25 MIN.</u>
	<u>1118</u>		<u>240</u>	<u>20</u>				
	<u>1148</u>	<u>30</u>			<u>16 1/4</u>	<u>3 3/4</u>		<u>1ST 30 MIN.</u>
	<u>1150</u>		<u>240</u>	<u>20</u>				
	<u>1220</u>	<u>30</u>			<u>16 1/2</u>	<u>3 1/2</u>		<u>2ND 30 MIN.</u>
	<u>1222</u>		<u>240</u>	<u>20</u>				
	<u>1252</u>	<u>30</u>			<u>16 3/4</u>	<u>3 1/4</u>		<u>3RD 30 MIN.</u>
	<u>1254</u>		<u>240</u>	<u>20</u>				
	<u>124</u>	<u>30</u>			<u>17</u>	<u>3</u>		<u>4TH 30 MIN.</u>
	<u>126</u>		<u>240</u>	<u>20</u>				
	<u>156</u>	<u>30</u>			<u>17</u>	<u>3</u>		<u>5TH 30 MIN.</u>
	<u>158</u>		<u>240</u>	<u>20</u>				
	<u>228</u>	<u>30</u>			<u>17 1/4</u>	<u>2 3/4</u>		<u>6TH 30 MIN.</u>
	<u>230</u>		<u>240</u>	<u>20</u>				
	<u>300</u>	<u>30</u>			<u>17 1/2</u>	<u>2 1/2</u>		<u>7TH 30 MIN.</u>

JURAPA
VALLEY

Job No.: 2903-CR

Date: 10/13, 14/2021

Depth of Hole As Drilled: 240" Before Test: 240" After Test: 240"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	<u>302</u>		<u>240</u>	<u>20</u>				
	<u>332</u>	30			<u>17 1/2</u>	<u>2 1/2</u>		8TH 30 MIN.
	<u>334</u>		<u>240</u>	<u>20</u>				
	<u>404</u>	30			<u>17 1/2</u>	<u>2 1/2</u>		9TH 30 MIN.
	<u>406</u>		<u>240</u>	<u>20</u>				
	<u>436</u>	30			<u>17 3/4</u>	<u>2 1/4</u>		10TH 30 MIN.
	<u>438</u>		<u>240</u>	<u>20</u>				
	<u>508</u>	30			<u>17 3/4</u>	<u>2 1/4</u>		11TH 30 MIN.
	<u>510</u>		<u>240</u>	<u>20</u>				
	<u>540</u>	30			<u>17 3/4</u>	<u>2 1/4</u>		12TH 30 MIN.
	<u> </u>							
	<u> </u>							
	<u> </u>							
	<u> </u>							
	<u> </u>							

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPA VALLEY Job No.: 2903-CR.
 Test Hole No.: I-6 Tested By: DVG Date: 10/13,14/2021.
 Depth of Hole As Drilled: 180" Before Test: 180" After Test: 180"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
								<u>PRESOAK 5 GAL</u> <u>10/13/2021</u>
	<u>1017</u> <u>1042</u>	<u>25</u>	<u>180</u>	<u>20</u>	<u>17 1/4</u>	<u>2 3/4</u>		<u>BEGIN 10/14/2021</u> <u>1ST 25 MIN.</u>
	<u>1044</u> <u>1109</u>	<u>25</u>	<u>180</u>	<u>20</u>	<u>17 1/2</u>	<u>2 1/2</u>		<u>2ND 25 MIN.</u>
	<u>1111</u> <u>1141</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17</u>	<u>3</u>		<u>1ST 30 MIN.</u>
	<u>1143</u> <u>1213</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17 1/4</u>	<u>2 3/4</u>		<u>2ND 30 MIN.</u>
	<u>1215</u> <u>1245</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17 1/4</u>	<u>2 3/4</u>		<u>3RD 30 MIN.</u>
	<u>1247</u> <u>117</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17 1/2</u>	<u>2 1/2</u>		<u>4TH 30 MIN.</u>
	<u>119</u> <u>149</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17 1/2</u>	<u>2 1/2</u>		<u>5TH 30 MIN.</u>
	<u>151</u> <u>221</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17 1/2</u>	<u>2 1/2</u>		<u>6TH 30 MIN.</u>
	<u>223</u> <u>253</u>	<u>30</u>	<u>180</u>	<u>20</u>	<u>17 3/4</u>	<u>2 1/4</u>		<u>7TH 30 MIN.</u>

Project: 12080 BELLEGRAVE AVENUE JURUPA VALLEY, Job No.: 2903-CR
Test Hole No.: I-6 Tested By: DVG, Date: 10/13, 14/2021
Depth of Hole As Drilled: 180" Before Test: 180" After Test: 180"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	<u>255</u>		<u>180</u>	<u>20</u>				
	<u>325</u>	30			<u>17 $\frac{3}{4}$</u>	<u>2 $\frac{1}{4}$</u>		8TH 30 MIN.
	<u>327</u>		<u>180</u>	<u>20</u>				
	<u>357</u>	30			<u>17 $\frac{3}{4}$</u>	<u>2 $\frac{1}{4}$</u>		9TH 30 MIN.
	<u>359</u>		<u>180</u>	<u>20</u>				
	<u>429</u>	30			<u>18</u>	<u>2</u>		10TH 30 MIN.
	<u>431</u>		<u>180</u>	<u>20</u>				
	<u>501</u>	30			<u>18</u>	<u>2</u>		11TH 30 MIN.
	<u>503</u>		<u>180</u>	<u>20</u>				
	<u>533</u>	30			<u>18</u>	<u>2</u>		12TH 30 MIN.
	<u> </u>							
	<u> </u>							
	<u> </u>							
	<u> </u>							
	<u> </u>							

PERCOLATION DATA SHEET

JURUPA

Project: 12080 BELLEGRAVE AVENUE VALLEY

Job No.: 2903-CR.

Test Hole No.: I-7 Tested By: DVG

Date: 10/14, 15/2021.

Depth of Hole As Drilled: 540" Before Test: 540" After Test: 540"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
								<u>PRESOAK 5 GAL.</u> <u>10/14/2021</u>
	<u>140</u>		<u>540</u>	<u>20</u>				<u>BEGIN 10/15/2021</u>
	<u>150</u>	<u>10</u>			<u>1/2</u>	<u>19 1/2</u>		<u>1ST 25 MIN.</u>
	<u>152</u>		<u>540</u>	<u>20</u>				
	<u>202</u>	<u>10</u>			<u>1 3/4</u>	<u>18 1/4</u>		<u>2ND 25 MIN.</u>
	<u>204</u>		<u>540</u>	<u>20</u>				
	<u>214</u>	<u>10</u>			<u>3 1/4</u>	<u>16 3/4</u>		<u>1ST 10 MIN.</u>
	<u>216</u>		<u>540</u>	<u>20</u>				
	<u>226</u>	<u>10</u>			<u>4 3/4</u>	<u>15 1/4</u>		<u>2ND 10 MIN.</u>
	<u>228</u>		<u>540</u>	<u>20</u>				
	<u>238</u>	<u>10</u>			<u>6</u>	<u>14</u>		<u>3RD 10 MIN.</u>
	<u>240</u>		<u>540</u>	<u>20</u>				
	<u>250</u>	<u>10</u>			<u>7 1/4</u>	<u>12 3/4</u>		<u>4TH 10 MIN.</u>
	<u>252</u>		<u>540</u>	<u>20</u>				
	<u>302</u>	<u>10</u>			<u>8 1/2</u>	<u>11 1/2</u>		<u>5TH 10 MIN.</u>
	<u>304</u>		<u>540</u>	<u>20</u>				
	<u>314</u>	<u>10</u>			<u>8 3/4</u>	<u>11 1/4</u>		<u>6TH 10 MIN.</u>

PERCOLATION DATA SHEET

Project: Jurupa Valley, Job No.: 2903-CR.
 Test Hole No.: I-8 Tested By: JD, Date: 10/15/21.
 Depth of Hole As Drilled: 540 Before Test: 540 After Test: 540.

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	<u> </u> <u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	Prewater 5 gallons 10/14/2021
1	7:14AM <u> </u> 7:39AM	<u> </u> 25	540 <u> </u>	20 <u> </u>	<u> </u> 0	<u> </u> 20	<u> </u> 1.25	<u> </u> <u> </u>
2	7:41AM <u> </u> 8:06AM	<u> </u> 25	540 <u> </u>	20 <u> </u>	<u> </u> 0	<u> </u> 20	<u> </u> 1.25	<u> </u> <u> </u>
3	8:08AM <u> </u> 8:18AM	<u> </u> 10	540 <u> </u>	20 <u> </u>	<u> </u> 0.5	<u> </u> 19.5	<u> </u> 0.51	<u> </u> <u> </u>
4	8:20AM <u> </u> 8:30AM	<u> </u> 10	540 <u> </u>	20 <u> </u>	<u> </u> 1.75	<u> </u> 18.25	<u> </u> 0.55	<u> </u> <u> </u>
5	8:32AM <u> </u> 8:42AM	<u> </u> 10	540 <u> </u>	20 <u> </u>	<u> </u> 2.5	<u> </u> 17.5	<u> </u> 0.57	<u> </u> <u> </u>
6	8:44AM <u> </u> 8:54AM	<u> </u> 10	540 <u> </u>	20 <u> </u>	<u> </u> 3.75	<u> </u> 16.25	<u> </u> 0.62	<u> </u> <u> </u>
7	8:56AM <u> </u> 9:06AM	<u> </u> 10	540 <u> </u>	20 <u> </u>	<u> </u> 4	<u> </u> 16	<u> </u> 0.63	<u> </u> <u> </u>
8	9:08AM <u> </u> 9:18AM	<u> </u> 10	540 <u> </u>	20 <u> </u>	<u> </u> 4	<u> </u> 16	<u> </u> 0.63	<u> </u> <u> </u>

PERCOLATION DATA SHEET

Project: Jurupa Valley, Job No.: 2903-CR.
 Test Hole No.: I-9 Tested By: JD, Date: 10/15/21.
 Depth of Hole As Drilled: 540 Before Test: 540 After Test: 540.

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	_____	_____	_____	_____	_____	_____	_____	Prewater 5 gallons 10/14/2021
1	7:21AM _____	_____	540	20	_____	_____	_____	_____
	7:46AM	25	_____	_____	0	20	1.25	_____
2	7:48AM _____	_____	540	20	_____	_____	_____	_____
	8:13AM	25	_____	_____	0	20	1.25	_____
3	8:15AM _____	_____	540	20	_____	_____	_____	_____
	8:25AM	10	_____	_____	0.25	19.75	0.51	_____
4	8:27AM _____	_____	540	20	_____	_____	_____	_____
	8:37AM	10	_____	_____	1.5	18.5	0.54	_____
5	8:39AM _____	_____	540	20	_____	_____	_____	_____
	8:49AM	10	_____	_____	2.25	17.75	0.56	_____
6	8:51AM _____	_____	540	20	_____	_____	_____	_____
	9:01AM	10	_____	_____	3	17	0.59	_____
7	9:03AM _____	_____	540	20	_____	_____	_____	_____
	9:13AM	10	_____	_____	3.5	16.5	0.61	_____
8	9:15AM _____	_____	540	20	_____	_____	_____	_____
	9:25AM	10	_____	_____	3.75	16.25	0.62	_____

PERCOLATION DATA SHEET

Project: Jurupa Valley, Job No.: 2903-CR.
 Test Hole No.: I-10 Tested By: JD, Date: 10/15/21.
 Depth of Hole As Drilled: 540 Before Test: 540 After Test: 540.

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
	<u> </u> <u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	Prewater 5 gallons 10/14/2021
1	9:38AM <u> </u> 10:03AM	<u> </u> <u> </u> 25	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 0	<u> </u> <u> </u> 20	<u> </u> <u> </u> 1.25	<u> </u> <u> </u> <u> </u>
2	10:05AM <u> </u> 10:30AM	<u> </u> <u> </u> 25	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 0	<u> </u> <u> </u> 20	<u> </u> <u> </u> 1.25	<u> </u> <u> </u> <u> </u>
3	10:32AM <u> </u> 10:42AM	<u> </u> <u> </u> 10	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 0.5	<u> </u> <u> </u> 19.5	<u> </u> <u> </u> 0.51	<u> </u> <u> </u> <u> </u>
4	10:44AM <u> </u> 10:54AM	<u> </u> <u> </u> 10	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 0.75	<u> </u> <u> </u> 19.25	<u> </u> <u> </u> 0.52	<u> </u> <u> </u> <u> </u>
5	10:56AM <u> </u> 11:06AM	<u> </u> <u> </u> 10	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 1.5	<u> </u> <u> </u> 18.5	<u> </u> <u> </u> 0.54	<u> </u> <u> </u> <u> </u>
6	11:08AM <u> </u> 11:18AM	<u> </u> <u> </u> 10	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 1.5	<u> </u> <u> </u> 18.5	<u> </u> <u> </u> 0.54	<u> </u> <u> </u> <u> </u>
7	11:20AM <u> </u> 11:30AM	<u> </u> <u> </u> 10	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 1.25	<u> </u> <u> </u> 18.75	<u> </u> <u> </u> 0.53	<u> </u> <u> </u> <u> </u>
8	11:32AM <u> </u> 11:42AM	<u> </u> <u> </u> 10	540 <u> </u> <u> </u>	20 <u> </u> <u> </u>	<u> </u> <u> </u> 1.5	<u> </u> <u> </u> 18.5	<u> </u> <u> </u> 0.54	<u> </u> <u> </u> <u> </u>

PERCOLATION DATA SHEET

Project: 12080 BELLEGRAVE AVENUE JURUPA VALLEY Job No.: 2903-CR.
 Test Hole No.: I-11 Tested By: DVG Date: 10/14, 15/2021
 Depth of Hole As Drilled: 540" Before Test: 540" After Test: 540"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ In Water Level (Inches)	Rate (minutes per inch)	Comments
								<u>PRESOAK 5 GAL</u> <u>10/14/2021</u>
	<u>1120</u>		<u>540</u>	<u>20</u>				<u>BEGIN 10/15/2021</u>
	<u>1130</u>	<u>10</u>			<u>0</u>	<u>20</u>		<u>1ST 25 MIN.</u>
	<u>1132</u>		<u>540</u>	<u>20</u>				
	<u>1142</u>	<u>10</u>			<u>1 1/4</u>	<u>18 3/4</u>		<u>2ND 25 MIN.</u>
	<u>1144</u>		<u>540</u>	<u>20</u>				
	<u>1154</u>	<u>10</u>			<u>3</u>	<u>17</u>		<u>1ST 10 MIN.</u>
	<u>1156</u>		<u>540</u>	<u>20</u>				
	<u>1206</u>	<u>10</u>			<u>4 1/2</u>	<u>15 1/2</u>		<u>2ND 10 MIN.</u>
	<u>1208</u>		<u>540</u>	<u>20</u>				
	<u>1218</u>	<u>10</u>			<u>5 3/4</u>	<u>14 1/4</u>		<u>3RD 10 MIN.</u>
	<u>1220</u>		<u>540</u>	<u>20</u>				
	<u>1230</u>	<u>10</u>			<u>7</u>	<u>13</u>		<u>4TH 10 MIN.</u>
	<u>1232</u>		<u>540</u>	<u>20</u>				
	<u>1242</u>	<u>10</u>			<u>7 3/4</u>	<u>12 1/4</u>		<u>5TH 10 MIN.</u>
	<u>1244</u>		<u>540</u>	<u>20</u>				
	<u>1254</u>	<u>10</u>			<u>8 1/4</u>	<u>11 3/4</u>		<u>6TH 10 MIN.</u>

Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

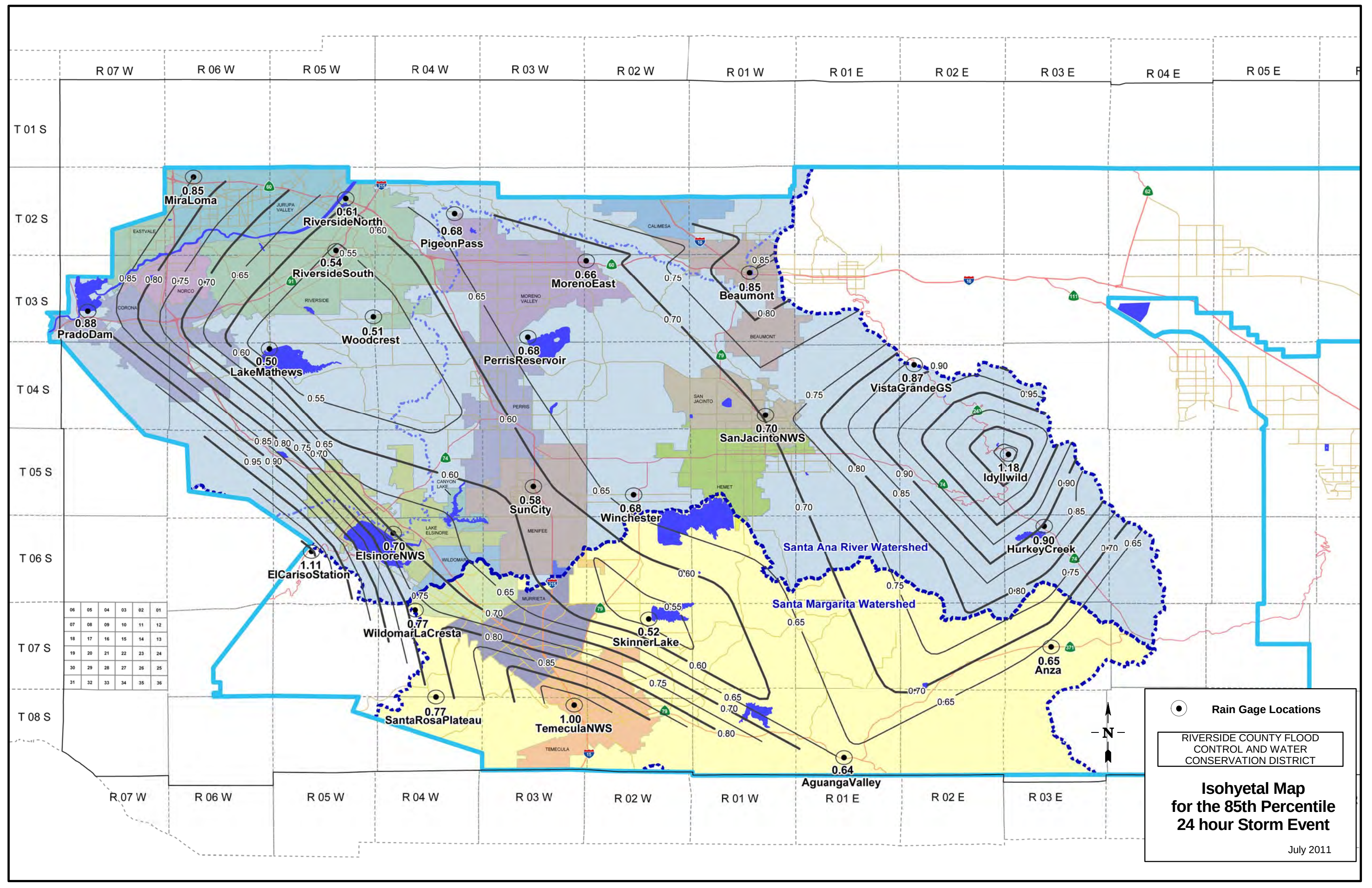
Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

85th Percentile 24-Hour Rainfall Map



06	05	04	03	02	01
07	08	09	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

**Rain Gage Locations**

RIVERSIDE COUNTY FLOOD
CONTROL AND WATER
CONSERVATION DISTRICT

**Isohyetal Map
for the 85th Percentile
24 hour Storm Event**

July 2011

Santa Ana Watershed BMP Design Volume Spreadsheet

Santa Ana Watershed - BMP Design Volume, V_{BMP} (Rev. 10-2011)						Legend:		Required Entries Calculated Cells	
(Note this worksheet shall only be used in conjunction with BMP designs from the LID BMP Design Handbook)									
Company Name JLC Engineering and Consulting, Inc.						Date 11/3/2022			
Designed by Matthew Hunt						Case No			
Company Project Number/Name Vernola Ranch Specific Plan No. 22-001									
BMP Identification									
BMP NAME / ID Subsurface Basin B						Must match Name/ID used on BMP Design Calculation Sheet			
Design Rainfall Depth									
85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E						D ₈₅ = 0.85 inches			
Drainage Management Area Tabulation									
Insert additional rows if needed to accommodate all DMAs draining to the BMP									
DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I _f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Storm Depth (in)	Design Capture Volume, V _{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)	
B	210177	Ornamental Landscaping	0.1	0.11	23215.7				
B	878823	Concrete or Asphalt	1	0.89	783910.1				
1089000		Total			807125.8				0.85
Notes:									

Santa Ana Watershed - BMP Design Volume, V _{BMP}						Legend:		Required Entries	
(Rev. 10-2011)								Calculated Cells	
(Note this worksheet shall only be used in conjunction with BMP designs from the LID BMP Design Handbook)									
Company Name JLC Engineering and Consulting, Inc.						Date 11/3/2022			
Designed by Matthew Hunt						Case No			
Company Project Number/Name Vernola Ranch Specific Plan No. 22-001									
BMP Identification									
BMP NAME / ID WQ Detention Basin C									
Must match Name/ID used on BMP Design Calculation Sheet									
Design Rainfall Depth									
85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E						D ₈₅ = 0.85 inches			
Drainage Management Area Tabulation									
Insert additional rows if needed to accommodate all DMAs draining to the BMP									
DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I _f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Storm Depth (in)	Design Capture Volume, V _{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)	
C	494633	Ornamental Landscaping	0.1	0.11	54636.2				
C	1143223	Concrete or Asphalt	1	0.89	1019754.9				
	1637856	Total			1074391.1	0.85	76102.7	246,985	
Notes:									

(Rev. 10-2011)

Calculated Cells

Vernola Ranch Specific Plan No. 22-001

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP} (Rev. 10-2011)						Legend:		Required Entries Calculated Cells	
(Note this worksheet shall only be used in conjunction with BMP designs from the LID BMP Design Handbook)									
Company Name JLC Engineering and Consulting, Inc.						Date 11/3/2022			
Designed by Matthew Hunt						Case No			
Company Project Number/Name						Vernola Ranch Specific Plan No. 22-001			
BMP Identification									
BMP NAME / ID WQ Detention Basin E						<i>Must match Name/ID used on BMP Design Calculation Sheet</i>			
Design Rainfall Depth									
85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E						$D_{85} = $ 0.85 inches			
Drainage Management Area Tabulation									
<i>Insert additional rows if needed to accommodate all DMAs draining to the BMP</i>									
DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)	
E	385506	Ornamental Landscaping	0.1	0.11	42582.2				
E	899514	Concrete or Asphalt	1	0.89	802366.5				
	1285020		Total		844948.7				0.85
Notes:									

Santa Ana Watershed - BMP Design Volume, V_{BMP} (Rev. 10-2011)						Legend:		Required Entries Calculated Cells	
(Note this worksheet shall only be used in conjunction with BMP designs from the LID BMP Design Handbook)									
Company Name JLC Engineering and Consulting, Inc.						Date 11/4/2022			
Designed by Matthew Hunt						Case No			
Company Project Number/Name Vernola Ranch Specific Plan No. 22-001									
BMP Identification									
BMP NAME / ID WQ Detention Basin F						Must match Name/ID used on BMP Design Calculation Sheet			
Design Rainfall Depth									
85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E						$D_{85} = 0.85$ inches			
Drainage Management Area Tabulation									
Insert additional rows if needed to accommodate all DMAs draining to the BMP									
DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)	
F	128903	Ornamental Landscaping	0.1	0.11	14238.4				
F	341545	Concrete or Asphalt	1	0.89	304658.1				
	470448	Total			318896.5				0.85
Notes:									

Subsurface Infiltration Basin Design Volume Spreadsheet

10 Barrell 96-Inch Subsurface Infiltration Basin Volume Calculations

NUMBER OF CELLS

[illegible]

Santa Ana Watershed BMP Infiltration

Trench Sizing Spreadsheet

The current calculation broke up the total volume into 3 infiltration trench calculations.
Volumes was prorated based on two- 10 acres drainage areas and one- 5 acres drainage area
defined as BMP B1, BMP B2, and BMP B3

Infiltration Trench - Design Procedure		BMP ID	Legend:	Required Entries
		B1		Calculated Cells
Company Name:	JLC Engineering	Date:		7/11/2023
Designed by:	Joe Castaneda	County/City Case No.:		
Design Volume				
Enter the area tributary to this feature, Max = 10 acres		$A_t =$		10 acres
Enter V_{BMP} determined from Section 2.1 of this Handbook		$V_{BMP} =$		40,332 ft ³
Calculate Maximum Depth of the Reservoir Layer				
Enter Infiltration rate		$I =$		8.2 in/hr
Enter Factor of Safety, FS (unitless)		$FS =$		3
<i>Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook</i>				
		$n =$		40 %
Calculate D_1 .	$D_1 = \frac{I \text{ (in/hr)} \times 72 \text{ hrs}}{12 \text{ (in/ft)} \times (n/100) \times FS}$	$D_1 =$		41.20 ft
Enter depth to historic high groundwater mark (measured from finished grade)				50 ft
Enter depth to top of bedrock or impermeable layer (measured from finished grade)				50 ft
D_2 is the smaller of:				
Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft		$D_2 =$		39.0 ft
D_{MAX} is the smaller value of D_1 and D_2 , must be less than or equal to 8 feet.		$D_{MAX} =$		8.0 ft
Trench Sizing				
Enter proposed reservoir layer depth D_R , must be $\leq D_{MAX}$		$D_R =$		8.00 ft
Calculate the design depth of water, d_w				
$\text{Design } d_w = (D_R) \times (n/100)$		Design $d_w =$		3.20 ft
Minimum Surface Area, A_S	$A_S = \frac{V_{BMP}}{d_w}$	$A_S =$		12,604 ft ²
Proposed Design Surface Area		$A_D =$		12,700 ft ²
Minimum Width = $D_R + 1$ foot pea gravel				9.00 ft
Sediment Control Provided? (Use pulldown)	Yes			
Geotechnical report attached? (Use pulldown)	Yes			

If the trench has been designed correctly, there should be no error messages on the spreadsheet.

Infiltration Trench - Design Procedure		BMP ID	Legend:	Required Entries
		B2		Calculated Cells
Company Name:	JLC Engineering	Date:		7/11/2023
Designed by:	Joe Castaneda	County/City Case No.:		
Design Volume				
Enter the area tributary to this feature, Max = 10 acres		$A_t =$		10 acres
Enter V_{BMP} determined from Section 2.1 of this Handbook		$V_{BMP} =$		40,332 ft ³
Calculate Maximum Depth of the Reservoir Layer				
Enter Infiltration rate		$I =$		8.2 in/hr
Enter Factor of Safety, FS (unitless)		$FS =$		3
<i>Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook</i>				
		$n =$		40 %
Calculate D_1 .	$D_1 = \frac{I \text{ (in/hr)} \times 72 \text{ hrs}}{12 \text{ (in/ft)} \times (n/100) \times FS}$	$D_1 =$		41.20 ft
Enter depth to historic high groundwater mark (measured from finished grade)				50 ft
Enter depth to top of bedrock or impermeable layer (measured from finished grade)				50 ft
D_2 is the smaller of:				
Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft		$D_2 =$		39.0 ft
D_{MAX} is the smaller value of D_1 and D_2 , must be less than or equal to 8 feet.		$D_{MAX} =$		8.0 ft
Trench Sizing				
Enter proposed reservoir layer depth D_R , must be $\leq D_{MAX}$		$D_R =$		8.00 ft
Calculate the design depth of water, d_w				
$\text{Design } d_w = (D_R) \times (n/100)$		$\text{Design } d_w =$		3.20 ft
Minimum Surface Area, A_S	$A_S = \frac{V_{BMP}}{d_w}$	$A_S =$		12,604 ft ²
Proposed Design Surface Area		$A_D =$		12,700 ft ²
Minimum Width = $D_R + 1$ foot pea gravel				9.00 ft
Sediment Control Provided? (Use pulldown)	Yes			
Geotechnical report attached? (Use pulldown)	Yes			

If the trench has been designed correctly, there should be no error messages on the spreadsheet.

Infiltration Trench - Design Procedure		BMP ID B3	Legend:	Required Entries
				Calculated Cells
Company Name:	JLC Engineering	Date:		7/11/2023
Designed by:	Joe Castaneda	County/City Case No.:		
Design Volume				
Enter the area tributary to this feature, Max = 10 acres		A _t =		5 acres
Enter V _{BMP} determined from Section 2.1 of this Handbook		V _{BMP} =		20,166 ft ³
Calculate Maximum Depth of the Reservoir Layer				
Enter Infiltration rate		I =		8.2 in/hr
Enter Factor of Safety, FS (unitless)		FS =		3
Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook				
		n =		40 %
Calculate D ₁ .	$D_1 = \frac{I \text{ (in/hr)} \times 72 \text{ hrs}}{12 \text{ (in/ft)} \times (n/100) \times FS}$	D ₁ =		41.20 ft
Enter depth to historic high groundwater mark (measured from finished grade)				50 ft
Enter depth to top of bedrock or impermeable layer (measured from finished grade)				50 ft
D ₂ is the smaller of:				
Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft		D ₂ =		39.0 ft
D _{MAX} is the smaller value of D ₁ and D ₂ , must be less than or equal to 8 feet.		D _{MAX} =		8.0 ft
Trench Sizing				
Enter proposed reservoir layer depth D _R , must be ≤ D _{MAX}		D _R =		8.00 ft
Calculate the design depth of water, d _w				
Design d _w = (D _R) x (n/100)		Design d _w =		3.20 ft
Minimum Surface Area, A _S	$A_S = \frac{V_{BMP}}{d_w}$	A _S =		6,302 ft ²
Proposed Design Surface Area		A _D =		6,500 ft ²
Minimum Width = D _R + 1 foot pea gravel				9.00 ft
Sediment Control Provided? (Use pulldown)	Yes			
Geotechnical report attached? (Use pulldown)	Yes			

If the trench has been designed correctly, there should be no error messages on the spreadsheet.

Santa Ana Watershed BMP Infiltration
Basin Sizing Spreadsheet

This is for DMA C and Basin C

Infiltration Basin - Design Procedure (Rev. 03-2012)		BMP ID C	Legend:	Required Entries Calculated Cells
Company Name:	JLC Engineering and Consulting, Inc.			Date: 7/11/2023
Designed by:	Joe Castaneda	County/City Case No.:		
Design Volume				
a) Tributary area (BMP subarea)			$A_T =$	37.6 acres
b) Enter V_{BMP} determined from Section 2.1 of this Handbook			$V_{BMP} =$	76,103 ft ³
Maximum Depth				
a) Infiltration rate			$I =$	8.74 in/hr
b) Factor of Safety (See Table 1, Appendix A: "Infiltration Testing" from this BMP Handbook)			$FS =$	3
c) Calculate D_1	$D_1 = \frac{I \text{ (in/hr)} \times 72 \text{ hrs}}{12 \text{ (in/ft)} \times FS}$		$D_1 =$	17.5 ft
d) Enter the depth of freeboard (at least 1 ft)				3 ft
e) Enter depth to historic high ground water (measured from top of basin)				50 ft
f) Enter depth to top of bedrock or impermeable layer (measured from top of basin)				50 ft
g) D_2 is the smaller of:				
Depth to groundwater - (10 ft + freeboard) and			$D_2 =$	37.0 ft
Depth to impermeable layer - (5 ft + freeboard)				
h) D_{MAX} is the smaller value of D_1 and D_2 but shall not exceed 5 feet			$D_{MAX} =$	17.5 ft
Basin Geometry				
a) Basin side slopes (no steeper than 4:1)			$z =$	4 :1
b) Proposed basin depth (excluding freeboard)			$d_B =$	5 ft
c) Minimum bottom surface area of basin ($A_S = V_{BMP}/d_B$)			$A_S =$	15221 ft ²
d) Proposed Design Surface Area			$A_D =$	33821 ft ²
Forebay				
a) Forebay volume (minimum 0.5% V_{BMP})			Volume =	381 ft ³
b) Forebay depth (height of berm/splashwall. 1 foot min.)			Depth =	ft
c) Forebay surface area (minimum)			Area =	ft ²
d) Full height notch-type weir			Width (W) =	in

Notes: Bottom area based on Basin C Volume Table included in App 6. This is the lowest bottom area of the basin.
The water quality volume for the project is 76,102.7 cf, but the basin can store upto 246,985 cf.

Santa Ana Watershed BMP Bioretention

Basin Sizing Spreadsheet with Drywell Treatment

This is for DMA D, E and F and Basin D, E and F

Basin D, Basin E, and Basin F have been designed as treatment trains using bioretention and drywells. The design is based on using the bottom area of the basin and determine the maximum water quality volume treatment that is feasible. The residual volume (Total water quality volume minus treated volume) will be treated with the use of drywells. The client will be performing extensive infiltration testing during final engineering for the drywells. Drywells are currently being used within the existing development east of Pat Ranch Road.

Treatment Train Effectiveness:

		Bioretention Basin Component		Drywell Component
BMP	WQ Volume (cf)	Basin Bottom (sf)	WQ Treatment (cf)	Drywell Treatment Volume (cf)
D	109,650.1	42,259	76,000	33,650
E	59,851	15,310	27,000	32,851
F	22,589	7,893	13,500	9,089

Bioretention Facility - Design Procedure		BMP ID D	Legend:	Required Entries	
				Calculated Cells	
Company Name:	JLC Engineering		Date: 7/11/2023		
Designed by:	Joe Castaneda		County/City Case No.:		
Design Volume					
Enter the area tributary to this feature			$A_T =$	57.1	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook			$V_{BMP} =$	76,000	ft ³
Type of Bioretention Facility Design					
☐ Side slopes required (parallel to parking spaces or adjacent to walkways) ☒ No side slopes required (perpendicular to parking space or Planter Boxes)					
Bioretention Facility Surface Area					
Depth of Soil Filter Media Layer			$d_s =$	3.0	ft
Top Width of Bioretention Facility, excluding curb			$w_T =$	66.4	ft
Total Effective Depth, d_E					
$d_E = [(0.3) \times d_s + (0.4) \times 1] + 0.5$			$d_E =$	1.80	ft
Minimum Surface Area, A_m					
$A_M (ft^2) = \frac{V_{BMP} (ft^3)}{d_E (ft)}$			$A_M =$	42,223	ft ²
Proposed Surface Area			$A =$	60,917	ft ²
Minimum Required Length of Bioretention Facility, L			$L =$	635.9	ft
Bioretention Facility Properties					
Side Slopes in Bioretention Facility			$z =$	4	:1
Diameter of Underdrain				6	inches
Longitudinal Slope of Site (3% maximum)				0	%
6" Check Dam Spacing				0	feet
Describe Vegetation:					
Notes: Water quality volume is 109,650.1 cf. The project currently provides a bottom area of 42,529 sf. which can treat 76,000 cf. During final engineering further infiltration studies will be done to assess the use of drywells to allow the treatment of 33,650 cf, which brings total treatment volume to 109,650.1.					

Bioretention Facility - Design Procedure		BMP ID E	Legend:	Required Entries	
				Calculated Cells	
Company Name:	JLC Engineering		Date: 7/11/2023		
Designed by:	Joe Castaneda		County/City Case No.:		
Design Volume					
Enter the area tributary to this feature			$A_T =$	29.5	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook			$V_{BMP} =$	27,000	ft ³
Type of Bioretention Facility Design					
☐ Side slopes required (parallel to parking spaces or adjacent to walkways) ☒ No side slopes required (perpendicular to parking space or Planter Boxes)					
Bioretention Facility Surface Area					
Depth of Soil Filter Media Layer			$d_s =$	3.0	ft
Top Width of Bioretention Facility, excluding curb			$w_T =$	66.4	ft
Total Effective Depth, d_E					
$d_E = [(0.3) \times d_s + (0.4) \times 1] + 0.5$			$d_E =$	1.80	ft
Minimum Surface Area, A_m					
$A_M (ft^2) = \frac{V_{BMP} (ft^3)}{d_E (ft)}$			$A_M =$	15,000	ft ²
Proposed Surface Area			$A =$	15,310	ft ²
Minimum Required Length of Bioretention Facility, L			$L =$	225.9	ft
Bioretention Facility Properties					
Side Slopes in Bioretention Facility			$z =$	4	:1
Diameter of Underdrain				6	inches
Longitudinal Slope of Site (3% maximum)				0	%
6" Check Dam Spacing				0	feet
Describe Vegetation:					
Notes: Water quality volume is 59,851 cf. The project currently provides a bottom area of 15,310 sf.					
which can treat 27,000 cf. During final engineering further infiltration studies will be done to assess					
the use of drywells to allow the treatment of 32,851 cf, which brings total treatment volume to 59,851					

Bioretention Facility - Design Procedure		BMP ID E	Legend:	Required Entries	
				Calculated Cells	
Company Name:	JLC Engineering		Date: 7/11/2023		
Designed by:	Joe Castaneda		County/City Case No.:		
Design Volume					
Enter the area tributary to this feature			$A_T =$	10.8	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook			$V_{BMP} =$	13,500	ft ³
Type of Bioretention Facility Design					
☐ Side slopes required (parallel to parking spaces or adjacent to walkways) ☒ No side slopes required (perpendicular to parking space or Planter Boxes)					
Bioretention Facility Surface Area					
Depth of Soil Filter Media Layer			$d_s =$	3.0	ft
Top Width of Bioretention Facility, excluding curb			$w_T =$	66.4	ft
Total Effective Depth, d_E					
$d_E = [(0.3) \times d_s + (0.4) \times 1] + 0.5$			$d_E =$	1.80	ft
Minimum Surface Area, A_m					
$A_M (ft^2) = \frac{V_{BMP} (ft^3)}{d_E (ft)}$			$A_M =$	7,500	ft ²
Proposed Surface Area			$A =$	7,893	ft ²
Minimum Required Length of Bioretention Facility, L			$L =$	113.0	ft
Bioretention Facility Properties					
Side Slopes in Bioretention Facility			$z =$	4	:1
Diameter of Underdrain				6	inches
Longitudinal Slope of Site (3% maximum)				0	%
6" Check Dam Spacing				0	feet
Describe Vegetation:					
Notes: Water quality volume is 22,589 cf. The project currently provides a bottom area of 7,893 sf. which can treat 13,500 cf. During final engineering further infiltration studies will be done to assess the use of drywells to allow the treatment of 9,089 cf, which brings total treatment volume to 22,589					

Mitigation Volume Calculations – Small Unit Hydrograph

Figure shows the difference in runoff volume (“Mitigation Volume”) the basins incorporated in order to moderate flow rates to the existing Line J storm drain and prevent them from exceeding the allowable flow rate that Line J was designed to capture.

Drawing Name: O:\173.12.21\Engineering\WQMP\Appendix 6 - BMP Design Details\Figure - Unit Hydrograph.dwg
Last Opened: Nov 10, 2022 - 3:17pm by mhunt

UNIT HYDROGRAPH MITIGATION VOLUME CALCULATIONS

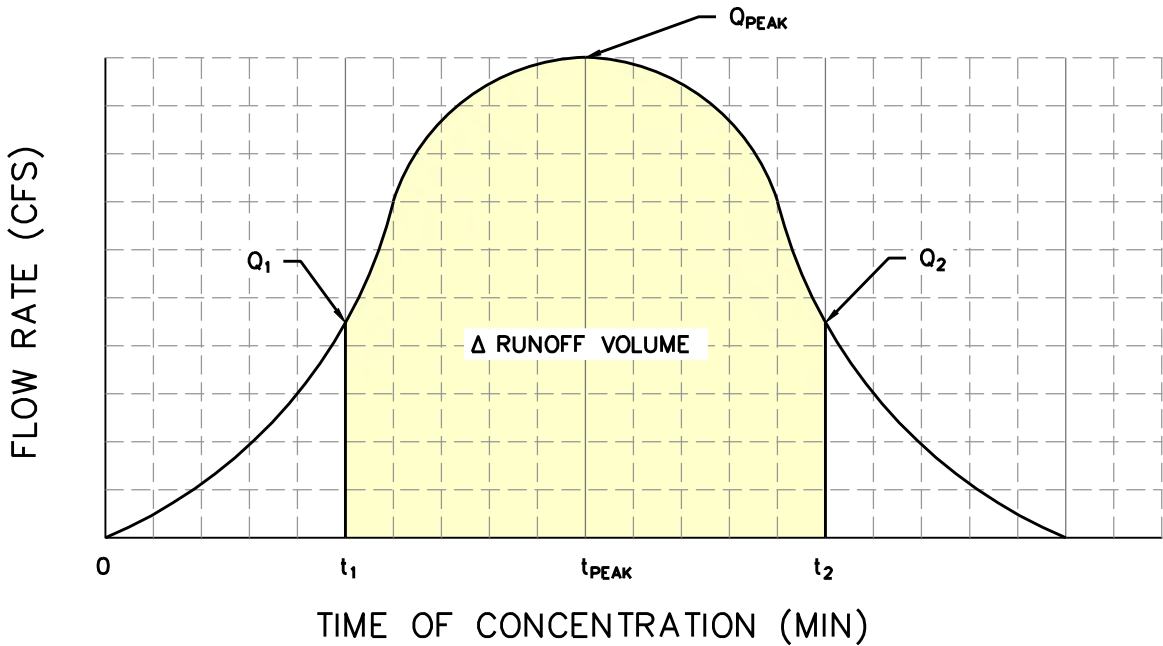
SUBSURFACE BASIN B MITIGATION VOLUME		
TIME (MIN)	VOLUME (AC-FT)	Q (CFS)
t ₁	0.91	28.9
t ₂	1.91	26.1
Δ RUNOFF VOLUME = 1.00 AC-FT		
Q _{PEAK} = 59.3 CFS		
t _{PEAK} = 50 MIN		
Q _{ALLOWABLE} = 84.1 CFS		

BASIN C MITIGATION VOLUME		
TIME (MIN)	VOLUME (AC-FT)	Q (CFS)
t ₁	1.44	48.2
t ₂	3.01	40.2
Δ RUNOFF VOLUME = 1.57 AC-FT		
Q _{PEAK} = 95.6 CFS		
t _{PEAK} = 50 MIN		
Q _{ALLOWABLE} = 132.3 CFS		

BASIN D MITIGATION VOLUME		
TIME (MIN)	VOLUME (AC-FT)	Q (CFS)
t ₁	2.06	73.8
t ₂	4.35	48.6
Δ RUNOFF VOLUME = 2.29 AC-FT		
Q _{PEAK} = 158.7 CFS		
t _{PEAK} = 50 MIN		
Q _{ALLOWABLE} = 123.1 CFS		

BASIN E MITIGATION VOLUME		
TIME (MIN)	VOLUME (AC-FT)	Q (CFS)
t ₁	0.96	32.5
t ₂	2.14	34.6
Δ RUNOFF VOLUME = 1.18 AC-FT		
Q _{PEAK} = 73.7 CFS		
t _{PEAK} = 55 MIN		
BASIN E&F Q _{ALLOWABLE} = 102 CFS		

BASIN F MITIGATION VOLUME		
TIME (MIN)	VOLUME (AC-FT)	Q (CFS)
t ₁	0.42	14.3
t ₂	0.88	10.8
Δ RUNOFF VOLUME = 0.46 AC-FT		
Q _{PEAK} = 29.1 CFS		
t _{PEAK} = 50 MIN		
BASIN E&F Q _{ALLOWABLE} = 102 CFS		



NOTE:
BASINS INCORPORATE A MITIGATION VOLUME IN ORDER TO PREVENT FLOW RATES FROM EXCEEDING THE $Q_{ALLOWABLE}$. THE $Q_{ALLOWABLE}$ BEGINS AT THE UPSTREAM END OF STORM DRAIN LINE J AND ACCUMULATES AT EACH SECTION SHOWN IN FIGURE D3. THE $Q_{ALLOWABLE}$ FOR EACH AREA IS THEREFORE THE CUMULATIVE $Q_{ALLOWABLE}$ MINUS THE TOTAL Q THAT HAS BEEN SENT INTO LINE J. THE TOTAL CUMULATIVE $Q_{ALLOWABLE}$ IS 255 CFS.

FIGURE 3

VRSP NO. 22-001

UNIT HYDROGRAPH



JLC Engineering & Consulting, Inc.

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MURRIETA, CA 92562
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Infiltration Basin Design Volume Spreadsheet

Basin C Volume Sizing

Contour Elevation	Contour Area (sf)	Contour Area (ac)	Contour Interval Volume (ac-ft)	Total Basin Volume (ac-ft)
661.0	33821.0	0.776		0
			0.843	
662.0	39710.9	0.912		0.843
			0.982	
663.0	45896.9	1.054		1.825
			1.127	
664.0	52378.9	1.202		2.952
			1.279	
665.0	59156.5	1.358		4.232
			1.438	
666.0	66229.8	1.520		5.670
WATER QUALITY VOLUME = 1.75 AC-FT, PONDS AT 662.92 FT MITIGATION VOLUME = 1.57 AC-FT, PONDS AT 664.14 FT, WILL MITIGATE HYDROGRAPH PEAK FLOW RATE FROM 95.6 CFS TO 48.2 CFS				

Basin D Volume Sizing

Contour Elevation	Contour Area (sf)	Contour Area (ac)	Contour Interval Volume (ac-ft)	Total Basin Volume (ac-ft)
676.0	36475.7	0.837		0
			0.910	
677.0	42925.9	0.985		0.910
			1.061	
678.0	49577.2	1.138		1.971
			1.216	
679.0	56429.5	1.295		3.187
			1.376	
680.0	63483	1.457		4.563
			1.540	
681.0	70737.4	1.624		6.103
			1.700	
682.0	77388	1.777		7.802
			1.821	
683.0	81253.7	1.865		9.623
			1.378	
684.0	41061.1	0.943		11.001
WATER QUALITY VOLUME = 2.52 AC-FT, PONDS AT 678.56 FT MITIGATION VOLUME = 2.29 AC-FT, PONDS AT 680.12 FT, WILL MITIGATE HYDROGRAPH PEAK FLOW RATE FROM 158.7 CFS TO 73.8 CFS				

Basin E Volume Sizing

Contour Elevation	Contour Area (sf)	Contour Area (ac)	Contour Interval Volume (ac-ft)	Total Basin Volume (ac-ft)
688.0	15309.9	0.351		0
			0.378	
689.0	17627.9	0.405		0.378
			0.432	
690.0	20046.4	0.460		0.810
			0.489	
691.0	22565.6	0.518		1.299
			0.548	
692.0	25185.5	0.578		1.847
			0.609	
693.0	27905.9	0.641		2.456
			0.673	
694.0	30727	0.705		3.128
WATER QUALITY VOLUME = 1.37 AC-FT, PONDS AT 691.17 FT MITIGATION VOLUME = 1.18 AC-FT, PONDS AT 693.07 FT, WILL MITIGATE HYDROGRAPH PEAK FLOW RATE FROM 73.7 CFS TO 34.6 CFS				

Basin F Volume Sizing

Contour Elevation	Contour Area (sf)	Contour Area (ac)	Contour Interval Volume (ac-ft)	Total Basin Volume (ac-ft)
688.0	7893.4	0.181		0
			0.199	
689.0	9508.2	0.218		0.199
			0.238	
690.0	11212.9	0.257		0.437
			0.278	
691.0	13007.4	0.299		0.715
			0.320	
692.0	14891.7	0.342		1.035
			0.364	
693.0	16865.9	0.387		1.399
			0.411	
694.0	18930	0.435		1.810
WATER QUALITY VOLUME = 0.52 AC-FT, PONDS AT 690.36 FT MITIGATION VOLUME = 0.46 AC-FT, PONDS AT 691.74, WILL MITIGATE HYDROGRAPH PEAK FLOW RATE FROM 29.1 CFS TO 14.3 CFS				

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

Project discharges into Line J, an MS4 facility which conveys the runoff into an existing concrete channel located south of 68th street. The concrete channel then conveys the runoff directly into the Santa Ana River.

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

Source Control to be included during future engineering.

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

Operation and Management documentation will be provided with the final design report.

Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

Education Materials documentation will be provided with the final design report.