Ventura Engineering Inland INC
VEI

PRELIMINARY WATER QUALITY MANAGEMENT PLAN
SANTA ANA WATERSHED OF RIVERSIDE COUNTY

GARBANI SOUTH (TTM 37450)
DEV2021-009

27441 GARBANI ROAD
MENIFEE, CALIFORNIA 92584
APN: 360-350-004 & 005 *LEGAL TTM 37450*

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REVISION 3: *August 16, 2022* ***REVISION 2:*** *March 17, 2022*
REVISION 1: *May 29, 2018* ***ORIGINAL DATE:*** *October 30, 2017*

I hereby declare that I am the engineer of work for this project, that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions code, and that the design is consistent with current standards.



WILFREDO VENTURA
R.C.E. NO. 66532
EXPIRES 6/30/24

8/16/22
DATE

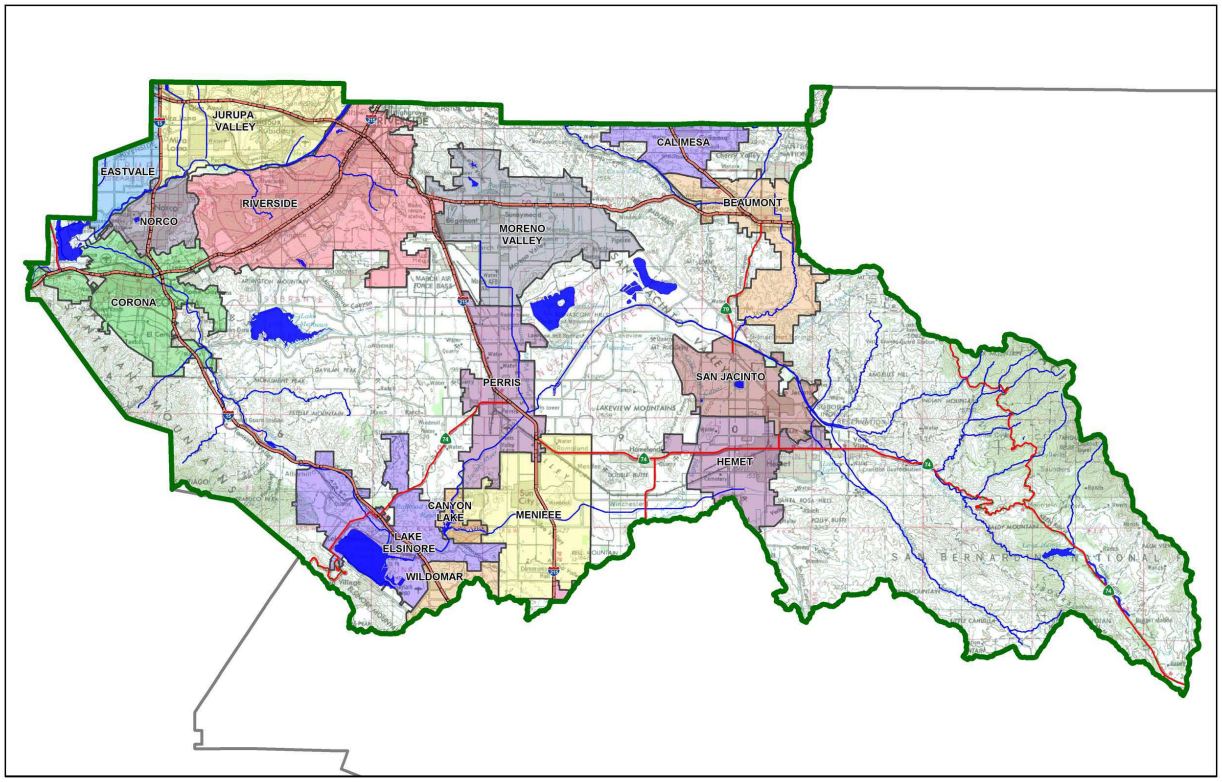
Project Specific Water Quality Management Plan

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

Project Title: Garbani South (TTM 37450)

Development No: DEV2021-009

Design Review/Case No: Preliminary



☒ **Preliminary**
☐ **Final**

Original Date Prepared: 10/30/17

Revision Date(s): 8/16/22, 3/17/22, 5/29/18

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

Template revised June 30, 2016

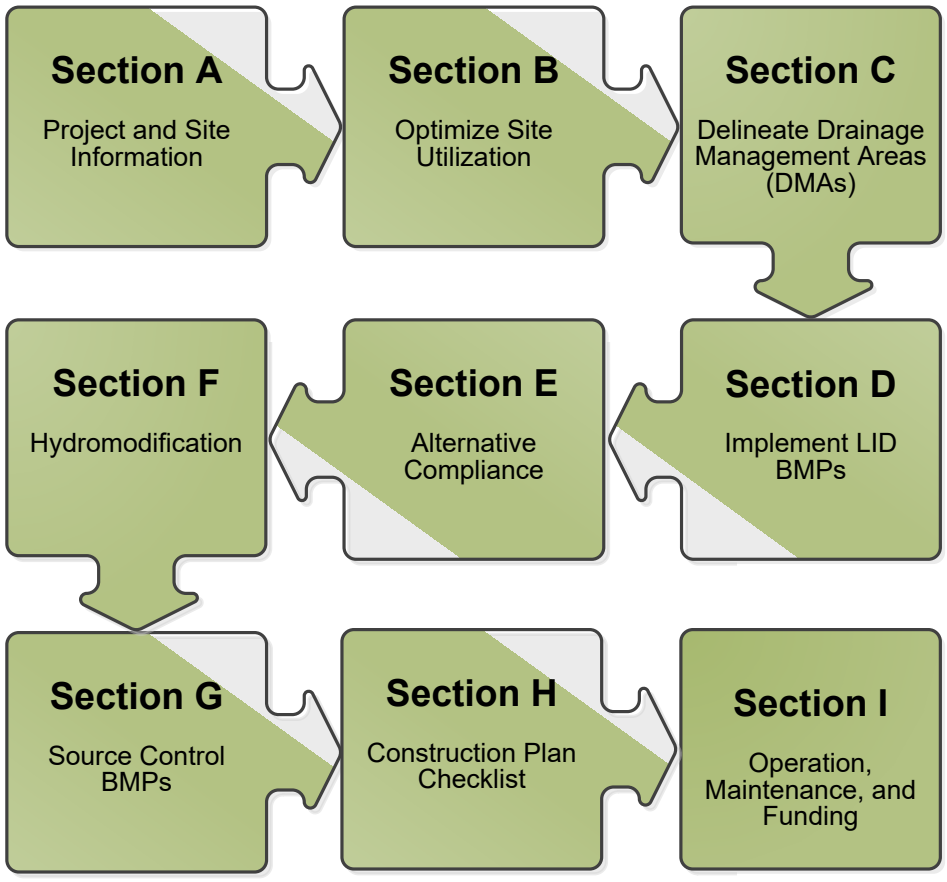
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A Brief Introduction

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 Menifee 18 Holdings, LLC by Ventura Engineering Inland, Inc. for the Garbani South (TTM 37450) residential subdivision project.

This WQMP is intended to comply with the requirements of the County of Riverside Water Quality Ordinance 754.2, 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 the County of Riverside Water Quality Ordinance 754.2.

"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
Wilfredo S. Ventura Preparer's Printed Name	Principal Engineer Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information

PROJECT INFORMATION	
Type of Project:	Single-Family Residential Subdivision
Planning Area:	Residential Transition Community Structure Area
Community Name:	N/A
Development Name:	Garbani Road Residential Tract
PROJECT LOCATION	
Latitude & Longitude (DMS): 33° 39' 20.58" N , -117° 10' 49.42" W	
Project Watershed and Sub-Watershed: Santa Ana Watershed, Canyon Lake (Railroad Canyon Reservoir)	
APN(s): 360-350-004 & 005	
Map Book and Page No.: Thomas Brothers Page 868, Grid D5	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Hillside RR5 / R 2.1-5 DU/AC
Proposed or Potential SIC Code(s)	1521
Total Area of Project Footprint (SF)	462,226 S.F.
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement	230,051 S.F.
Does the project consist of offsite road improvements?	☒ 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 existing Impervious Surfaces within the Project Footprint (SF)	8,436 S.F.
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)	C and D
What is the Water Quality Design Storm Depth for the project?	0.6

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
Canyon Lake	Nutrients, Pathogens	MUN, AGR, GWR, REC1, REC2, WARM, WILD	N/A
Lake Elsinore	Nutrients, Organic Enrichment/Low Dissolved Oxygen, PCBs, Sediment Toxicity, Unknown toxicity	MUN, REC1, REC2, WARM, WILD	N/A

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 (WDID# Required At Grading Permit Issue)	☒ 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)*		
- City of Menifee Grading Permit	☒ Y	☐ N
- City of Menifee Improvement Permit	☒ Y	☐ N
- City of Menifee Right-Of-Way Permit(s)	☒ 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 site is collecting off-site flows and routing them around the project site to maintain the same ultimate discharge point downstream of the project site in the public right-of-way drainage ditch at the southeast corner of the intersection of Garbani Road and Sherman Road.

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

The project site is mostly scrub that is not listed as protected. The project site proposes landscaping adjacent to the streets and each proposed lot will be required to incorporate landscaping per the applicable City landscape ordinances.

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

Infiltration testing has not been performed at this stage, but the project site will utilize bioretention for water quality mitigation and incidental infiltration will be allowed.

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

The project site landscaping on all lots, disconnected impervious areas, and landscaping along proposed roads and streets.

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

Impervious areas are all treated in some capacity by a permeable design element as in the lot landscaping, sidewalk parkway areas, and the BMPs.

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

DMA1 - Table C.1 DMA Classifications			
DMA Name or ID	***Surface Type(s)[12]***	***Area (Sq. Ft.)***	***DMA Type***
DMA1/LOT1	ROOF/IMP/LANDSCAPE	2100/310/4828	TYPE D – DRAINS TO BMP
DMA1/LOT2	ROOF/IMP/LANDSCAPE	2100/310/4814	TYPE D – DRAINS TO BMP
DMA1/LOT3	ROOF/IMP/LANDSCAPE	2100/310/4800	TYPE D – DRAINS TO BMP
DMA1/LOT4	ROOF/IMP/LANDSCAPE	2100/310/4787	TYPE D – DRAINS TO BMP
DMA1/LOT5	ROOF/IMP/LANDSCAPE	2100/310/4774	TYPE D – DRAINS TO BMP
DMA1/LOT6	ROOF/IMP/LANDSCAPE	2100/310/4599	TYPE D – DRAINS TO BMP
DMA1/LOT7	ROOF/IMP/LANDSCAPE	2100/310/5056	TYPE D – DRAINS TO BMP
DMA1/LOT8	ROOF/IMP/LANDSCAPE	2100/310/6024	TYPE D – DRAINS TO BMP
DMA1/LOT9	ROOF/IMP/LANDSCAPE	2100/310/4596	TYPE D – DRAINS TO BMP
DMA1/LOT10	ROOF/IMP/LANDSCAPE	2100/310/4523	TYPE D – DRAINS TO BMP
DMA1/LOT11	ROOF/IMP/LANDSCAPE	2100/310/4541	TYPE D – DRAINS TO BMP
DMA1/LOT12	ROOF/IMP/LANDSCAPE	2100/310/5765	TYPE D – DRAINS TO BMP
DMA1/LOT13	ROOF/IMP/LANDSCAPE	2100/310/7211	TYPE D – DRAINS TO BMP
DMA1/LOT14	ROOF/IMP/LANDSCAPE	2100/310/5126	TYPE D – DRAINS TO BMP
DMA1/LOT15	ROOF/IMP/LANDSCAPE	2100/310/5113	TYPE D – DRAINS TO BMP
DMA1/LOT16	ROOF/IMP/LANDSCAPE	2100/310/5113	TYPE D – DRAINS TO BMP
DMA1/LOT17	ROOF/IMP/LANDSCAPE	2100/310/5113	TYPE D – DRAINS TO BMP
DMA1/LOT18	ROOF/IMP/LANDSCAPE	2100/310/5113	TYPE D – DRAINS TO BMP
DMA1/LOT19	ROOF/IMP/LANDSCAPE	2100/310/5690	TYPE D – DRAINS TO BMP
DMA1/LOT20	ROOF/IMP/LANDSCAPE	2100/310/5005	TYPE D – DRAINS TO BMP
DMA1/LOT21	ROOF/IMP/LANDSCAPE	2100/310/4489	TYPE D – DRAINS TO BMP
DMA1/LOT22	ROOF/IMP/LANDSCAPE	2100/310/4495	TYPE D – DRAINS TO BMP
DMA1/LOT23	ROOF/IMP/LANDSCAPE	2100/310/4504	TYPE D – DRAINS TO BMP
DMA1/LOT24	ROOF/IMP/LANDSCAPE	2100/310/4512	TYPE D – DRAINS TO BMP
DMA1/LOT25	ROOF/IMP/LANDSCAPE	2100/310/4520	TYPE D – DRAINS TO BMP
DMA1/LOT26	ROOF/IMP/LANDSCAPE	2100/310/4817	TYPE D – DRAINS TO BMP
DMA1/LOT27	ROOF/IMP/LANDSCAPE	2100/310/4816	TYPE D – DRAINS TO BMP
DMA1/LOT28	ROOF/IMP/LANDSCAPE	2100/310/4521	TYPE D – DRAINS TO BMP
DMA1/LOT29	ROOF/IMP/LANDSCAPE	2100/310/4515	TYPE D – DRAINS TO BMP
DMA1/LOT30	ROOF/IMP/LANDSCAPE	2100/310/4510	TYPE D – DRAINS TO BMP
DMA1/LOT31	ROOF/IMP/LANDSCAPE	2100/310/4502	TYPE D – DRAINS TO BMP

DMA1 - Table C.1 DMA Classifications			
DMA Name or ID	***Surface Type(s)[12]***	***Area (Sq. Ft.)***	***DMA Type***
DMA1/LOT32	ROOF/IMP/LANDSCAPE	2100/310/4501	TYPE D – DRAINS TO BMP
DMA1/LOT33	ROOF/IMP/LANDSCAPE	2100/310/4730	TYPE D – DRAINS TO BMP
DMA1/LOTB	LANDSCAPE	11433	TYPE D – DRAINS TO BMP
DMA1/LOTC	LANDSCAPE	289	TYPE D – DRAINS TO BMP
DMA1/LOTD	LANDSCAPE	17046	TYPE D – DRAINS TO BMP
DMA1/LOTE	LANDSCAPE	2079	TYPE D – DRAINS TO BMP
DMA1/LOTF	LANDSCAPE	939	TYPE D – DRAINS TO BMP
DMA1/LOTG	IMPERVIOUS	3745	TYPE D – DRAINS TO BMP
RD-IMP	IMPERVIOUS	123702	TYPE D – DRAINS TO BMP
RD-LS	LANDSCAPE	7691	TYPE D – DRAINS TO BMP
ST-1	REVEGETATED NATURAL	21982	TYPE A – SELF-TREATING
ST-2	REVEGETATED NATURAL	8701	TYPE A – SELF-TREATING
NAP-A	IMPERVIOUS	13174	OFF-SITE, NOT-A-PART
		462226	

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

Table C.2 Type A, Self-Treating Areas			
DMA Name or ID	***Area (Sq. Ft.)***	***Stabilization Type***	***Irrigation Type (if any)***
ST-1	21982	AUTOMATED	CONSERVATIVE
ST-2	8701	AUTOMATED	CONSERVATIVE

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

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=***	***Required Retention Depth (inches)***
		[A]	***[B]***		***[C]***	***[D] =*** $[B]+\frac{[B]\cdot[C]}{[A]}$
	None					

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

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) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C-4= [C]	Required Retention Depth (inches) [D] = $[B] + \frac{[B]\cdot[C]}{[A]}$
	None					

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

Table C-4 Type 'C', Areas That Drain to Self-Retaining Areas							
DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet) [A]	Post-project surface type	Runoff factor [B]	Product [C] = [A] x [B]	DMA name /ID	Area (square feet) [D]	Ratio [C]/[D]
	None						

Note: (See Section 3.3 of SMR WQMP) Ensure that partially pervious areas draining to a Self-Retaining area do not exceed the following ratio:

$$\left(\frac{2}{Impervious\ Fraction}\right) : 1$$

(Tributary Area**:** Self-Retaining Area)

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

Table C.5: Type 'D', Areas Draining to BMPs	
DMA Name or ID	BMP Name or ID
DMA1: ALL SUBAREAS	BMP1: BIORETENTION AREA
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.	

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 Copermittee 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 (Residential, Less Than 10 Acres, Less Than 30 Units)

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: All		
…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.

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: ***n/a***

Type of Landscaping (Conservation Design or Active Turf): ***n/a***

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: ***n/a***

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: ***n/a***

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: ***n/a***

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)
n/a	n/a

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: ***n/a***

Project Type: ***n/a***

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: ***n/a***

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 or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: ***n/a***

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: ***n/a***

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)
n/a	n/a

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.

None to Describe

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: NA

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: NA

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: NA

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: NA

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)
n/a	n/a

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).

☐ 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

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*	
DMA1	☐	☐	☒	☐	☐

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.

Highest and best use per Chapter 2.4.4 allows for elimination of onsite retention; impervious areas will drain through landscape areas into the public right of way.

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

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***	*DMA1 – BMP1 BIORETENTION*		
	[A]		***[B]***	***[C]***	***[A] x [C]***			
DMA1 ALL ROOF	69,300	ROOF	1.0	0.892	61,816	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA1 ALL PCC	147,577	PCC	1.0	0.892	131,638			
DMA1 ALL LANDSCAPE	201,493	LANDSCAPE	0.1	0.110	22,256			
	418,369				215,710	0.6	10,786	36,000

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:

X 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.

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 ft²)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft²)	P	N	P	P	N	P	P	P
☐ Parking Lots (>5,000 ft²)	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]
Total Credit Percentage[1]	

[1]*Cannot Exceed 50%*
[2]*Obtain 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 (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor			
	[A]		[B]	[C]	[A] x [C]			
						Design Storm Depth (in)	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*

[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 concentration[1] 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			
Volume (Cubic Feet)			

[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:

Canyon Lake and Eventually Lake Elsinore

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.

Please refer to the next page for Table G.1

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
A. On-site storm drain inlets	Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	Maintain and periodically repaint or replace inlet markings
		Provide stormwater pollution prevention information to new site owners, lessees, or operators
		See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
		Include the following in lease agreements: 'Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.
D1. Need for future indoor & structural pest control		Provide Integrated Pest Management information to owners, lessees, and operators.
D2. Landscape/Outdoor Pesticide Use	Show Locations of native trees or areas of shrubs and ground cover to be undisturbed and retained.	Maintain landscaping using minimum or no pesticides
	Show self-retaining landscape areas, if any.	See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/Error! Hyperlink reference not valid.
	Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)	Provide Integrated Pest Management information to new owners, lessees and operators
O. Miscellaneous Drain or Wash Water – Condensate Drain Lines	Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.	
O. Miscellaneous Drain or Wash Water – Roofs, gutters, and trim	Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	
P. Plazas, sidewalks, and parking lots		Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.

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

Table H.1 Construction Plan Cross-Reference		
BMP No. or ID	***Corresponding Plan Sheet(s)***	***BMP Location (Lat/Long)***
DMA1 – BMP1	Conceptual Grading Plan	33^{O} 39’ 20.58” N, -117^{O} 10’ 49.42” W

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.

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: HOA Executed City Maintenance Agreement

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

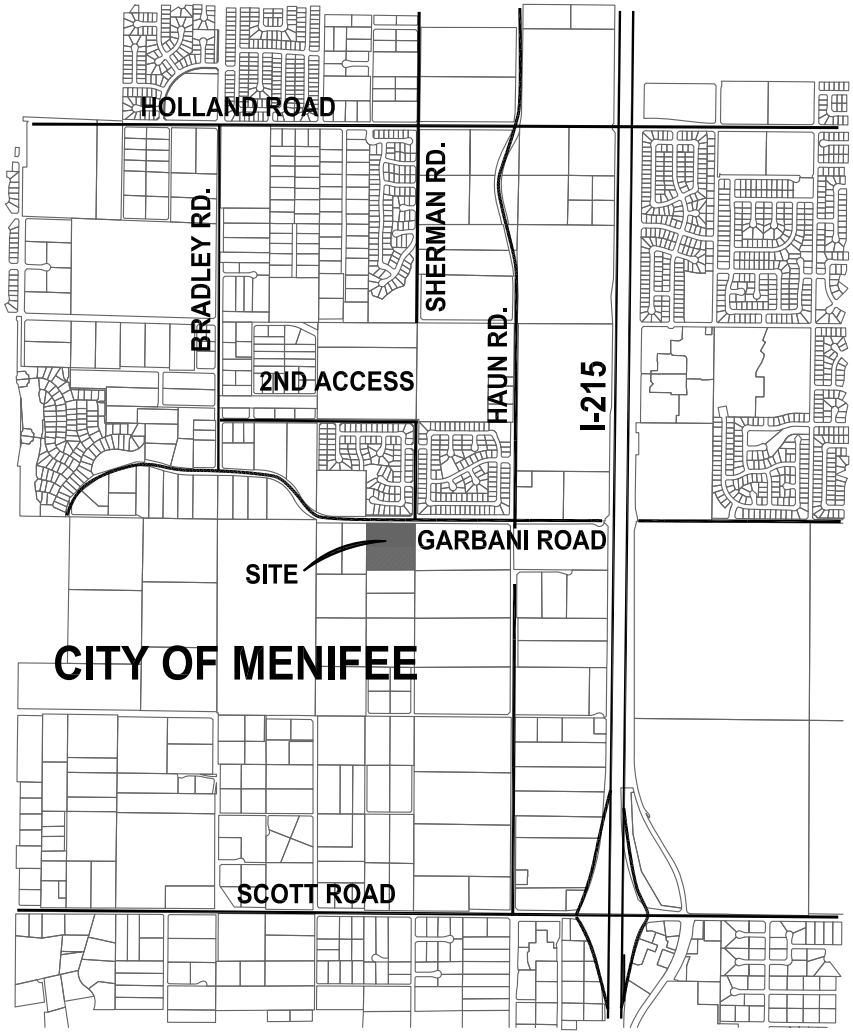
☒ Y ☐ N

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.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

EXHIBIT A
VICINITY MAP



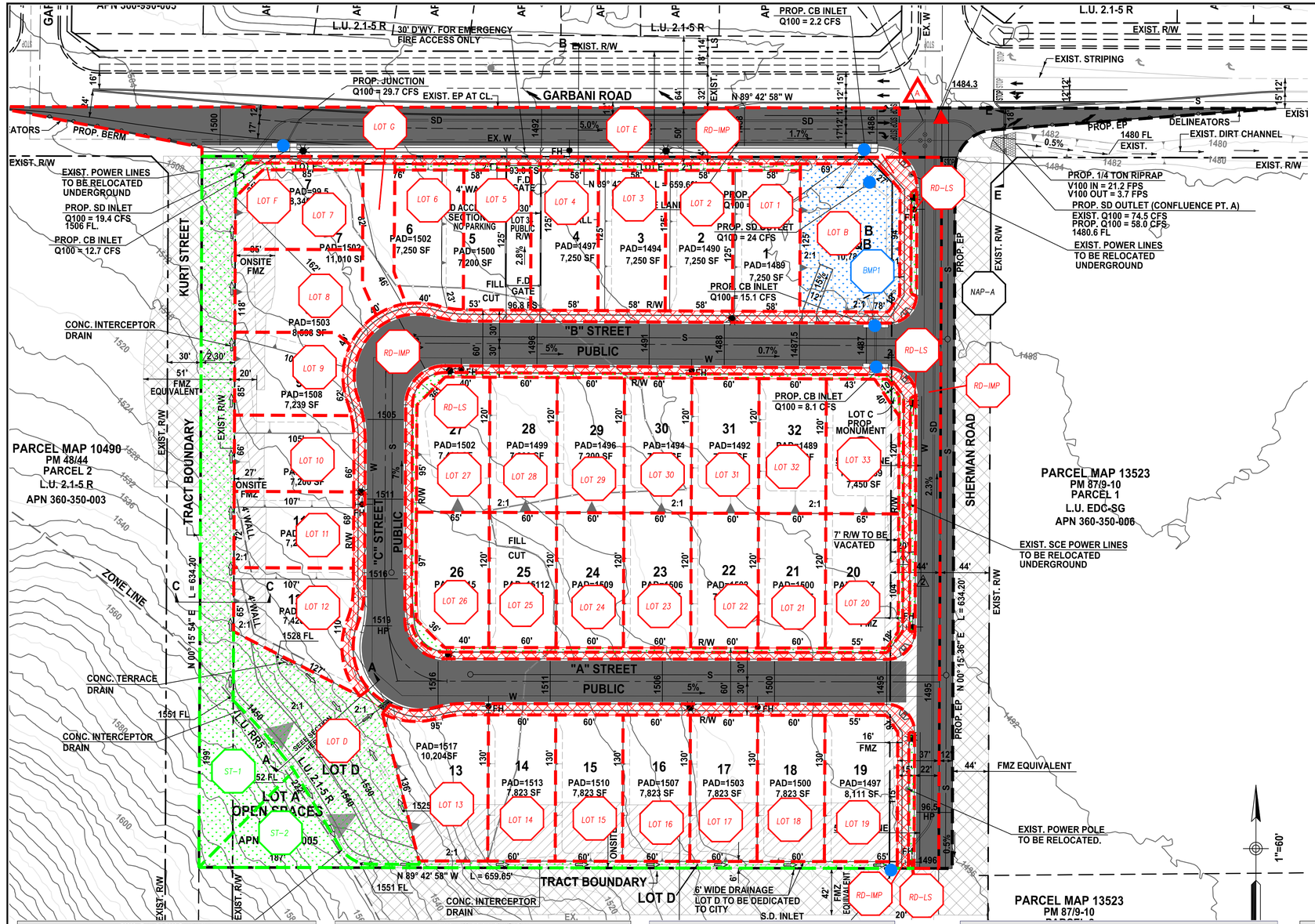
VICINITY MAP

N.T.S.
SECT 15 SBM, T6S, R3W

APN
360–350–004
360–350–005

ADDRESS
27441 GARBANI ROAD
MENIFEE, CALIFORNIA 92584

THOMAS BROTHERS MAP
PAGE 868, GRID D5



DMA LEGEND

- DMA SUB-AREA BOUNDARY
- SELF-RETAINING AREA BOUNDARY
- DRAINS OFF-SITE, NOT-A-PART OF TREATMENT
- DMA SUB-AREA ID
- BMP ID
- SELF-TREATING AREA ID
- AREAS NOT DRAINING TO OUR SITE, NOT-A-PART
- STORM DRAIN STENCILING
- POINT OF COMPLIANCE

SOURCE CONTROL LEGEND

	A	ON-SITE STORM DRAIN STENCILING
NO SYMBOL	D1	NEED FOR FUTURE INDOOR & OUTDOOR STRUCTURAL PEST CONTROLS
NO SYMBOL	D2	LANDSCAPE/OUTDOOR PESTICIDE USE
NO SYMBOL	O	MISC. – CONDENSATE DRAIN LINES
NO SYMBOL	O	MISC. – ROOFING, GUTTERS, AND BUILDING TRIM
	P.	PLAZAS, SIDEWALKS, AND PARKING AREAS

BMP CONTROL LEGEND

- BIORETENTION BASIN

DMA1 - Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[12]	Area (Sq. Ft.)	DMA Type
DMA1/LOT1	ROOF/IMP/LANDSCAPE	2100/310/4828	TYPE D – DRAINS TO BMP
DMA1/LOT2	ROOF/IMP/LANDSCAPE	2100/310/4814	TYPE D – DRAINS TO BMP
DMA1/LOT3	ROOF/IMP/LANDSCAPE	2100/310/4800	TYPE D – DRAINS TO BMP
DMA1/LOT4	ROOF/IMP/LANDSCAPE	2100/310/4787	TYPE D – DRAINS TO BMP
DMA1/LOT5	ROOF/IMP/LANDSCAPE	2100/310/4774	TYPE D – DRAINS TO BMP
DMA1/LOT6	ROOF/IMP/LANDSCAPE	2100/310/4599	TYPE D – DRAINS TO BMP
DMA1/LOT7	ROOF/IMP/LANDSCAPE	2100/310/5056	TYPE D – DRAINS TO BMP
DMA1/LOT8	ROOF/IMP/LANDSCAPE	2100/310/6024	TYPE D – DRAINS TO BMP
DMA1/LOT9	ROOF/IMP/LANDSCAPE	2100/310/4596	TYPE D – DRAINS TO BMP
DMA1/LOT10	ROOF/IMP/LANDSCAPE	2100/310/4523	TYPE D – DRAINS TO BMP
DMA1/LOT11	ROOF/IMP/LANDSCAPE	2100/310/4541	TYPE D – DRAINS TO BMP
DMA1/LOT12	ROOF/IMP/LANDSCAPE	2100/310/5765	TYPE D – DRAINS TO BMP
DMA1/LOT13	ROOF/IMP/LANDSCAPE	2100/310/7211	TYPE D – DRAINS TO BMP
DMA1/LOT14	ROOF/IMP/LANDSCAPE	2100/310/5126	TYPE D – DRAINS TO BMP
DMA1/LOT15	ROOF/IMP/LANDSCAPE	2100/310/5113	TYPE D – DRAINS TO BMP
DMA1/LOT16	ROOF/IMP/LANDSCAPE	2100/310/5113	TYPE D – DRAINS TO BMP
DMA1/LOT17	ROOF/IMP/LANDSCAPE	2100/310/5113	TYPE D – DRAINS TO BMP
DMA1/LOT18	ROOF/IMP/LANDSCAPE	2100/310/5113	TYPE D – DRAINS TO BMP
DMA1/LOT19	ROOF/IMP/LANDSCAPE	2100/310/5690	TYPE D – DRAINS TO BMP
DMA1/LOT20	ROOF/IMP/LANDSCAPE	2100/310/5005	TYPE D – DRAINS TO BMP
DMA1/LOT21	ROOF/IMP/LANDSCAPE	2100/310/4489	TYPE D – DRAINS TO BMP
DMA1/LOT22	ROOF/IMP/LANDSCAPE	2100/310/4495	TYPE D – DRAINS TO BMP
DMA1/LOT23	ROOF/IMP/LANDSCAPE	2100/310/4504	TYPE D – DRAINS TO BMP
DMA1/LOT24	ROOF/IMP/LANDSCAPE	2100/310/4512	TYPE D – DRAINS TO BMP
DMA1/LOT25	ROOF/IMP/LANDSCAPE	2100/310/4520	TYPE D – DRAINS TO BMP
DMA1/LOT26	ROOF/IMP/LANDSCAPE	2100/310/4817	TYPE D – DRAINS TO BMP
DMA1/LOT27	ROOF/IMP/LANDSCAPE	2100/310/4816	TYPE D – DRAINS TO BMP
DMA1/LOT28	ROOF/IMP/LANDSCAPE	2100/310/4521	TYPE D – DRAINS TO BMP
DMA1/LOT29	ROOF/IMP/LANDSCAPE	2100/310/4515	TYPE D – DRAINS TO BMP
DMA1/LOT30	ROOF/IMP/LANDSCAPE	2100/310/4510	TYPE D – DRAINS TO BMP
DMA1/LOT31	ROOF/IMP/LANDSCAPE	2100/310/4502	TYPE D – DRAINS TO BMP

DMA1 - Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[12]	Area (Sq. Ft.)	DMA Type
DMA1/LOT32	ROOF/IMP/LANDSCAPE	2100/310/4501	TYPE D – DRAINS TO BMP
DMA1/LOT33	ROOF/IMP/LANDSCAPE	2100/310/4730	TYPE D – DRAINS TO BMP
DMA1/LOTB	LANDSCAPE	11433	TYPE D – DRAINS TO BMP
DMA1/LOTC	LANDSCAPE	289	TYPE D – DRAINS TO BMP
DMA1/LOTD	LANDSCAPE	17046	TYPE D – DRAINS TO BMP
DMA1/LOTE	LANDSCAPE	2079	TYPE D – DRAINS TO BMP
DMA1/LOTF	LANDSCAPE	939	TYPE D – DRAINS TO BMP
DMA1/LOTG	IMPERVIOUS	3745	TYPE D – DRAINS TO BMP
RD-IMP	IMPERVIOUS	123702	TYPE D – DRAINS TO BMP
RD-LS	LANDSCAPE	7691	TYPE D – DRAINS TO BMP
ST-1	REVEGETATED NATURAL	21982	TYPE A – SELF-TREATING
ST-2	REVEGETATED NATURAL	8701	TYPE A – SELF-TREATING
NAP-A	IMPERVIOUS	13174	OFF-SITE, NOT-A-PART
		462226	

Table C.2 Type A, Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
ST-1	21982	AUTOMATED	CONSERVATIVE
ST-2	8701	AUTOMATED	CONSERVATIVE

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet) [A]	Post-Project Surface Type	Effective Impervious Fraction, I_f [B]	DMA Runoff Factor [C]	DMA Areas x Runoff Factor [A] x [C]	DMA1 – BMP1 BIORETENTION		
						Design Storm Depth (in)	Design Capture Volume, V_{BMP} (cubic feet)	Proposed Volume on Plans (cubic feet)
DMA1 ALL ROOF	69,300	ROOF	1.0	0.892	61,816			
DMA1 ALL PCC	147,577	PCC	1.0	0.892	131,638			
DMA1 ALL LANDSCAPE	201,493	LANDSCAPE	0.1	0.110	22,256			
	418,369				215,710	0.6	10,786	36,000

Table H.1 Construction Plan Cross-Reference

BMP No. or ID	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)
DMA1 – BMP1	Conceptual Grading Plan	33° 39' 20.58" N, -117° 10' 49.42" W

LANDSCAPING NOTE:

ALL LANDSCAPED AREAS WILL BE REQUIRED TO PROVIDE FOR FUTURE STRUCTURAL PEST CONTROL METHODS PER ACCEPTABLE BMPS AND LANDSCAPE STANDARDS.

DMA NOTE:

THE ENTIRE PROJECT IS ONE DMA. ALL ARES NOTES ARE SUB-BASIN AREAS OF DMA1

60 0 60 120

(IN FEET)
1 inch = 60 ft.
(ORIGINAL EXHIBIT SIZE IS 24X36)

VENTURA ENGINEERING, LLC
27393 YNEZ ROAD, SUITE 159
TEMECULA, CALIFORNIA 92591
PHONE (951) 252-7632
FAX (951) 346-5726

DEV2021-009, TTM 37450

CITY OF MENIFEE

TTM 37450
GARBANI SOUTH
27441 GARBANI ROAD, MENIFEE, CALIFORNIA 92584
APN: 360-350-004 & 005

APPENDIX 1: DMA EXHIBIT

PRELIMINARY WQMP

NPDES MUNICIPAL PERMIT
SANTA ANA RIVER WATERSHED
EXHIBIT SA-2
(LAKE ELSINORE, CANYON LAKE, PERRIS, MENIFEE, WILDOMAR AREAS)

- CITY MS4 FACILITIES
- COUNTY MS4 FACILITIES
- RCFC&WCD MS4 FACILITIES
- OTHER FACILITIES
- MAJOR OUTFALL SITES
- SAR CORE MONITORING STATIONS
- SANTA ANA RIVER WATERSHED BOUNDARY
- SANTA MARGARITA RIVER MS4 PERMIT AREA BOUNDARY
- LANDFILL SITES
- SEWAGE TREATMENT PLANTS
- BLUE LINE STREAMS
- RIVERSIDE COUNTY BOUNDARY
- INCORPORATED AREAS
- FREEWAYS/HIGHWAYS
- PRIMARY STREETS

N

0 0.5 1 1.5 2 MILES

UPDATED NOVEMBER 2015

CORONA

PERRIS

LAKE ELSINORE

CANYON LAKE

MENIFEE

WILDOMAR

RIVERSIDE COUNTY
ORANGE COUNTY

SEE FOOTNOTE 1

SITE

SEE FOOTNOTE 1

FOOTNOTE:
1) MS4 PERMIT AREA REMOVED FROM REGION 8 BASED ON JURISDICTIONAL AREA SWAP AGREEMENT BETWEEN REGION 8 AND REGION 9

The graphical and tabular information shown on this document may be derived from a variety of public agency and/or private commercial sources such as Riverside County Transportation and Land Management Agency, Thomas Brothers Mapping, the Stephen P. Teale Data Center, GIS Technology Center, State of California, the United States Geologic Survey and the United States National Atlas. These sources may possess varying levels of accuracy and precision and this product is meant only as a guide to the relative position and scale of the depicted features. This GIS document is in no case to be interpreted as fundamental or decisive for purposes of land surveying, field engineering, plan drafting, code enforcement, land boundary determination and/or land acquisition.

SAR 2016 ArcMap - MS4 Maps_Map2.mxd

Appendix 2: Construction Plans

Grading and Drainage Plans

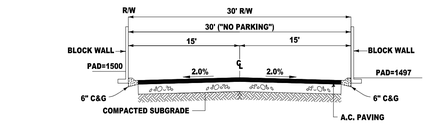
PRELIMINARY -
REFERENCE COPY

EASEMENTS:

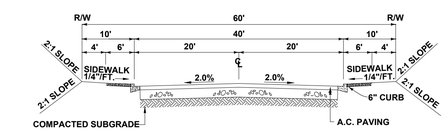
1. PUBLIC UTILITY EASEMENT IN FAVOR OF GENERAL TELEPHONE COMPANY OF CALIFORNIA, RECORDED JANUARY 28,1981, RECORDING NO. 81-1593, OFFICIAL RECORDS. (THE WESTERLY 20' OF THE WESTERLY 44' ALONG SHERMAN ROAD, ALONG THE WESTERLY R/W LINE)

2. ROAD, PUBLIC UTILITIES AND PUBLIC SERVICES EASEMENT RECORDED MARCH 12, 1980, RECORDED NO, 80-48092, OFFICIAL RECORDS. (THE WESTERLY 44' ALONG SHERMAN ROAD AND THE EASTERLY 30' ALONG KURT STREET AND CORNER CUTBACKS AT INTERSECTION WITH GARBANI ROAD.

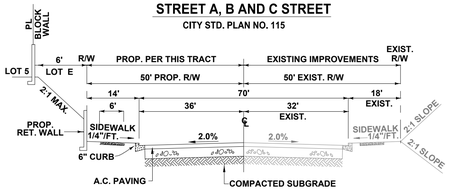
CITY OF MENIFEE
TENTATIVE TRACT MAP NO. 37450
SITE & CONCEPTUAL GRADING PLAN



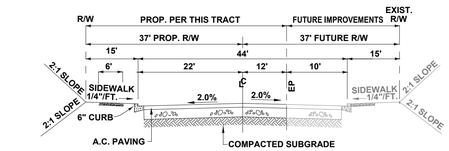
SECTION F-F (FIRE ACCESS ROAD)
NOT TO SCALE



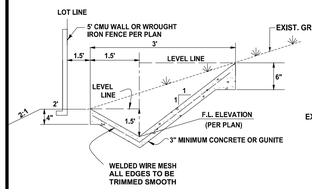
STREET A, B AND C STREET
CITY STD. PLAN NO. 115



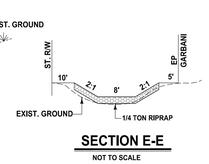
GARBANI ROAD (SECTION B-B)
CITY STD. PLAN NO. 111



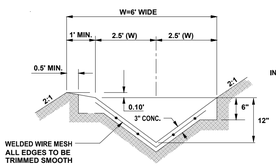
SHERMAN ROAD
CITY STD. PLAN NO. 113



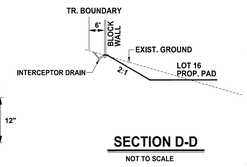
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NOT TO SCALE



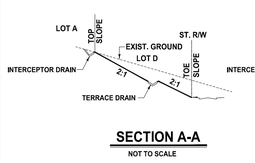
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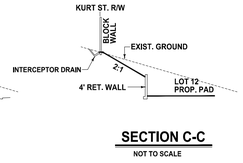
DETAIL: TERRACE DRAIN
NOT TO SCALE



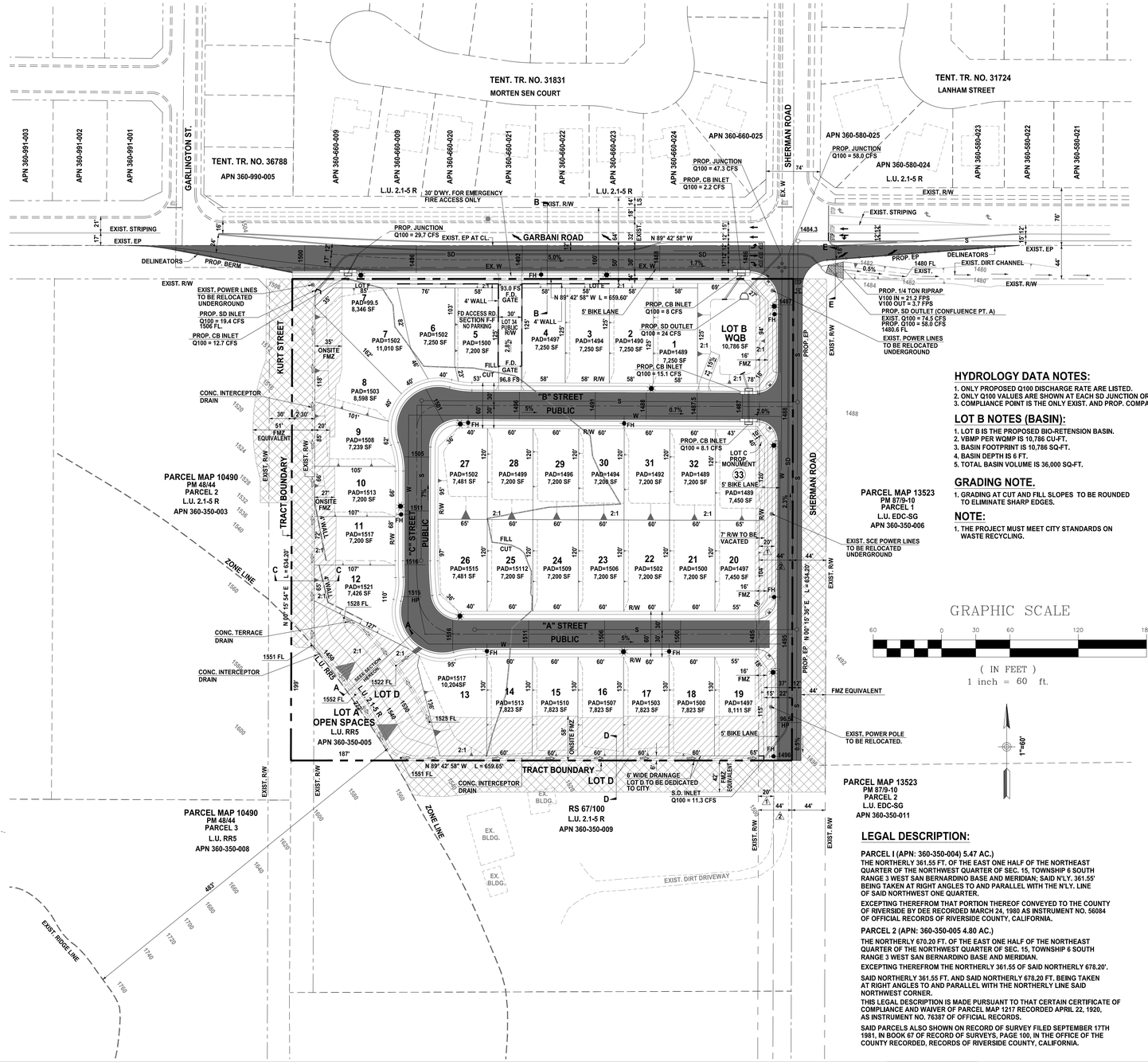
SECTION D-D
NOT TO SCALE

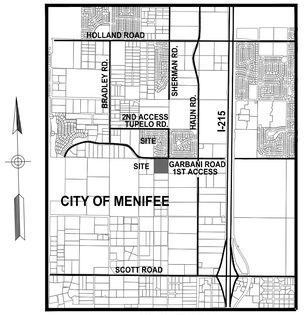


SECTION A-A
NOT TO SCALE



SECTION C-C
NOT TO SCALE





VICINITY MAP
NOT TO SCALE
2020 THOMAS BROS. PG 868, D5
SECT 15 SBM, T6S, R3W

BASIS OF BEARING:

THE BASIS OF BEARING FOR THIS PROJECT IS THE CENTERLINE OF GARBANI ROAD. THE BEARING IS N 89° 42' 58" W

GENERAL NOTES

1. TOTAL ORIGINAL ACREAGE: 10.27 ACRES (GROSS), 8.52 ACRES (NET)
2. NUMBER OF LOTS: 33 SINGLE FAMILY LOTS, 1 DRAINAGE BASIN LOT (CFD), 6 OPEN SPACE LOT (CFD)
3. MINIMUM LOT SIZE: 7,200 SF
4. EXISTING ZONING: LDR-2, RR-5
5. PROPOSED ZONING: LDR-2, RR-5
6. EXISTING LAND USE: 2.1-5 R, RR5
7. PROPOSED LAND USE: 2.1-5 R, RR5
8. NOTE: NO EASEMENT ON THIS PROPERTY.
9. METHOD OF SEWAGE DISPOSAL SEWER SYSTEM PER EMWD
10. SCHOOL DISTRICT: MENIFEE UNION SCHOOL DISTRICT, PERRIS UNION HIGH SCHOOL DISTRICT
11. ASSESSORS PARCEL NO.: 360-350-004, 360-350-005
12. 2006 THOMAS BROS. GUIDE: PAGE 868, GRID D5
13. TENTATIVE MAP PREPARED: OCTOBER 28, 2021
14. ALL PROPOSED DRAINAGE FACILITIES SHALL BE DESIGNATED TO ACCOMODATE 100 YEAR STORM FLOWS. ALL STORM FLOWS ARE APPROX.
15. ALL FENCES ON SITE TO BE REMOVED AS PART OF DEVELOPMENT.
16. THIS IS A SCHEDULE "A" SUBDIVISION.
17. TENTATIVE MAP SHOWS ENTIRE CONTIGUOUS OWNERSHIP.
18. THIS PROJECT IS NOT WITHIN A SPECIFIC PLAN.
19. ALL SLOPES ARE 2:1 UNLESS NOTED.
20. THIS PROPERTY IS NOT WITHIN A SPECIAL STUDIES ZONE AND IS NOT SUBJECT TO LIQUEFACTION OR OTHER GEOLOGICAL HAZARD.
21. OPEN SPACE TO BE MAINTAINED BY CFD.
22. FEMA FLOOD PLAIN: FLOOD ZONE X
23. EARTHWORK QUANTITIES: CUT = 29,790 CY, FILL = 29,790 CY
24. UTILITY PURVEYORS:
    WATER SERVICE: EMWD
    SEWER SERVICE: EMWD
    GAS: SOUTHER CA. GAS CO.
    ELECTRICITY: SOUTHERN CA. EDISON
    TEL. / CABLE: AT&T / FRONTIER
25. THIS MAP INCLUDES THE ENTIRE CONTIGUOUS OWNERSHIP OF THE LAND DEVIDER.
26. STREET ADDRESS: 27441 GARBANI ROAD, MENIFEE CA. 92584
27. OWNERS: STEPHEN PARK, TRUSTEES OF THE STEPHEN H. PARK AND KAY PARK REVOCABLE TRUST, 13202 AVENIDA SANTA TECLA, #718A, MIRADA, CA. 90638
26. EXIST. POWER LINE TO BE RELOCATED UNDERGROUND (SHERMAN ROAD AND GARBANI ROAD)
27. THIS PROJECT IS IN HIGH FIRE HAZARD SEVERITY ZONE.
28. NO WETLANDS ON THIS PROPERTY.

HYDROLOGY DATA NOTES:

1. ONLY PROPOSED Q100 DISCHARGE RATE ARE LISTED.
2. ONLY Q100 VALUES ARE SHOWN AT EACH SD JUNCTION OR FEATURE.
3. COMPLIANCE POINT IS THE ONLY EXIST. AND PROP. COMPARISON.

LOT B NOTES (BASIN):

1. LOT B IS THE PROPOSED BIO-RETENSION BASIN.
2. VBMP PER WQMP IS 10,786 CU-FT.
3. BASIN FOOTPRINT IS 10,786 SQ-FT.
4. BASIN DEPTH IS 6 FT.
5. TOTAL BASIN VOLUME IS 36,000 SQ-FT.

GRADING NOTE.

1. GRADING AT CUT AND FILL SLOPES TO BE ROUNDED TO ELIMINATE SHARP EDGES.

NOTE:

1. THE PROJECT MUST MEET CITY STANDARDS ON WASTE RECYCLING.

LEGAL DESCRIPTION:

PARCEL I (APN: 360-350-004) 5.47 AC.)
THE NORTHERLY 361.55 FT. OF THE EAST ONE HALF OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SEC. 15, TOWNSHIP 6 SOUTH RANGE 3 WEST SAN BERNARDINO BASE AND MERIDIAN; SAID N'LY. 361.55' BEING TAKEN AT RIGHT ANGLES TO AND PARALLEL WITH THE N'LY. LINE OF SAID NORTHWEST ONE QUARTER.

EXCEPTING THEREFROM THAT PORTION THEREOF CONVEYED TO THE COUNTY OF RIVERSIDE BY DEE RECORDED MARCH 24, 1980 AS INSTRUMENT NO. 56084 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

PARCEL 2 (APN: 360-350-005 4.80 AC.)
THE NORTHERLY 670.20 FT. OF THE EAST ONE HALF OF THE NORTHEAST QUARTER OF THE NORTHWEST QUARTER OF SEC. 15, TOWNSHIP 6 SOUTH RANGE 3 WEST SAN BERNARDINO BASE AND MERIDIAN.

EXCEPTING THEREFROM THE NORTHERLY 361.55 OF SAID NORTHERLY 678.20'.

SAID NORTHERLY 361.55 FT. AND SAID NORTHERLY 678.20 FT. BEING TAKEN AT RIGHT ANGLES TO AND PARALLEL WITH THE NORTHERLY LINE SAID NORTHWEST CORNER.

THIS LEGAL DESCRIPTION IS MADE PURSUANT TO THAT CERTAIN CERTIFICATE OF COMPLIANCE AND WAIVER OF PARCEL MAP 1217 RECORDED APRIL 22, 1920, AS INSTRUMENT NO. 76387 OF OFFICIAL RECORDS.

SAID PARCELS ALSO SHOWN ON RECORD OF SURVEY FILED SEPTEMBER 17TH 1981, IN BOOK 67 OF RECORD OF SURVEYS, PAGE 100, IN THE OFFICE OF THE COUNTY RECORDED, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

OPEN SPACE LOT AREAS (CFD MAINTAINED):

LOT	LOT AREA	LOT	LOT AREA
LOT A	26,009 SF	LOT D	2,616 SF
LOT B	10,786 SF	LOT E	2,166 SF
LOT C	290 SF	LOT E	1,584 SF

LEGEND:

FMZ — FIRE MODIFICATION ZONE
W — PROP. WATER
S — PROP. SEWER
PROP. AC PAVEMENT
PROP. 2:1 SLOPE
PROP. STREET LIGHT
PROP. FIRE HYDRANT
ONSITE FUEL MOD. ZONE
FMZ EQUIVALENT

BENCHMARK:

BRASS DISC IN THE TOP OF CONCRETE POST, 0.2 MILE SOUTH ON WASHINGTON AVE., FROM THE POST OFFICE IN MURRIETA, 2.4 MILES EAST ON LOS ALAMOS ROAD, 4.8 MILES NORTH ON HWY. 395, 0.1 MILE WEST ON SCOTT ROAD, 78' SOUTHEAST OF POWER POLE NO. 312098-S, 60' SOUTH OF SCOTT RD., 4' NORTHWEST OF THE NORTHEAST CORNER OF A PUMP HOUSE, 2' WEST OF MARKER POST.
STAMPED 600-20-68
ELEVATION: 1520.01' NAVD88.

Call before you Dig
Avoid cutting underground utility lines. It's costly.
Call 811 OR 1-800-422-4133

REVISIONS				
NO.	SHT.	DESCRIPTION	DATE	BY	APRD

PREPARED BY:
BM SAMILIN AND ASSOCIATES
LAND DEVELOPMENT CONSULTANT
41635 ENTERPRISE CIR. NORTH, SUITE C, TEMECULA, CA. 92590
CONTACT: EDWIN SAMILIN (951-972-0450)

ARTURO BANANAL — DATE
R.C.E. No. 36117 EXP. DATE 06-30-24

SEAL: REGISTERED PROFESSIONAL ENGINEER — ARTURO BANANAL — No. 36117 — Exp. 6-30-24 — CIVIL — STATE OF CALIFORNIA

APPLICANT / DEVELOPER:
MENIFEE 18 HOLDINGS, LLC
32823 TEMECULA PARKWAY
TEMECULA, CA. 92592
CONTACT: JORDAN BURSCH
509-954-6518

CITY OF MENIFEE
PLANNING DEPARTMENT
TENTATIVE TRACT MAP NO. 37450
APN 360-350-004 AND 360-350-005
SITE PLAN AND CONCEPTUAL GRADING PLAN

SHEET NO. 1 OF 1
PROJECT NO:

PRINTED: 6/12/22

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

United States Department of Agriculture

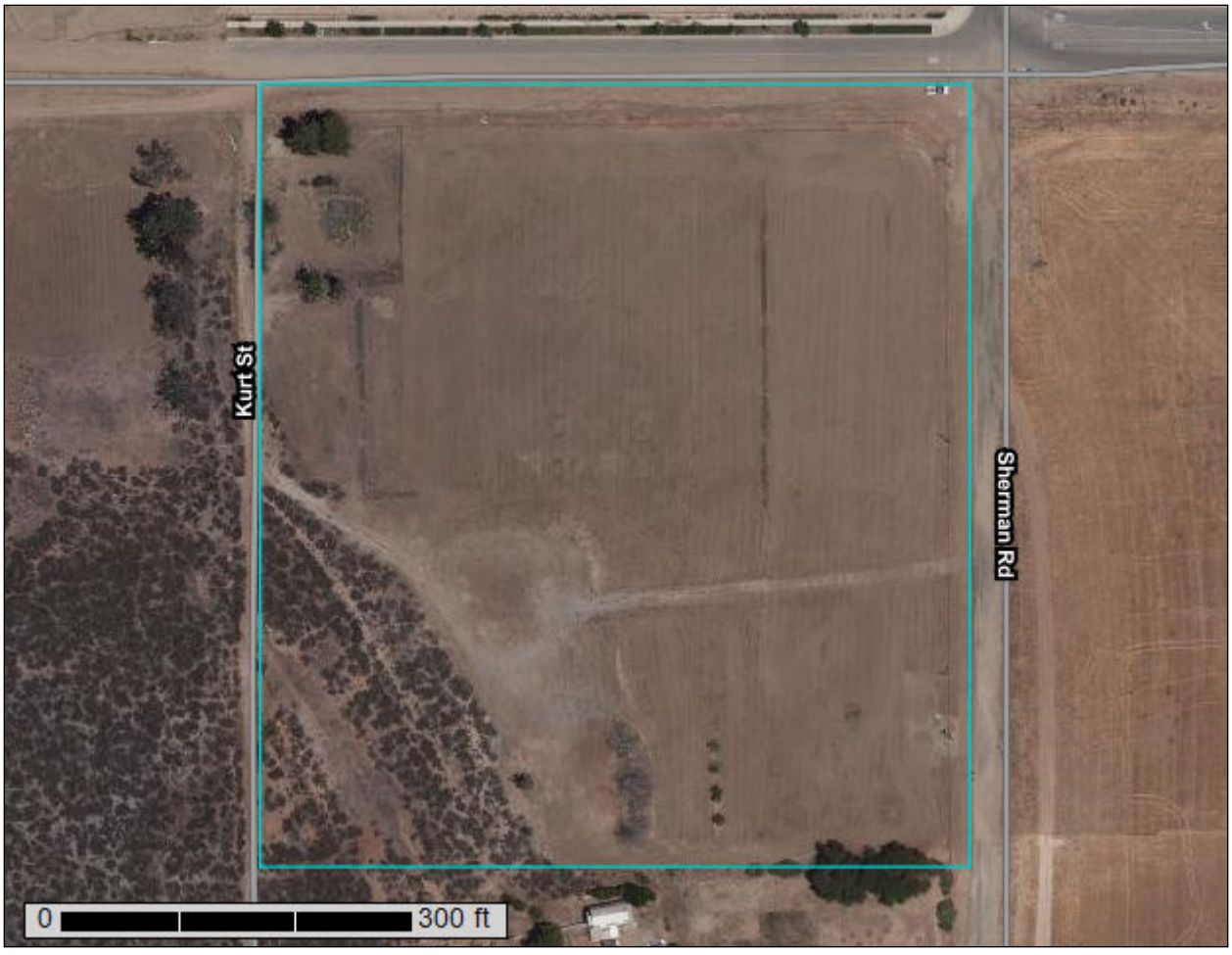
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Western Riverside Area, California

Garbani South



March 2, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Soil Map.....9
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Map Unit Descriptions.....11
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LkF3—Las Posas rocky loam, 15 to 50 percent slopes, severely eroded...14
WxD2—Wyman fine sandy loam, 8 to 15 percent slopes, eroded.....15
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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

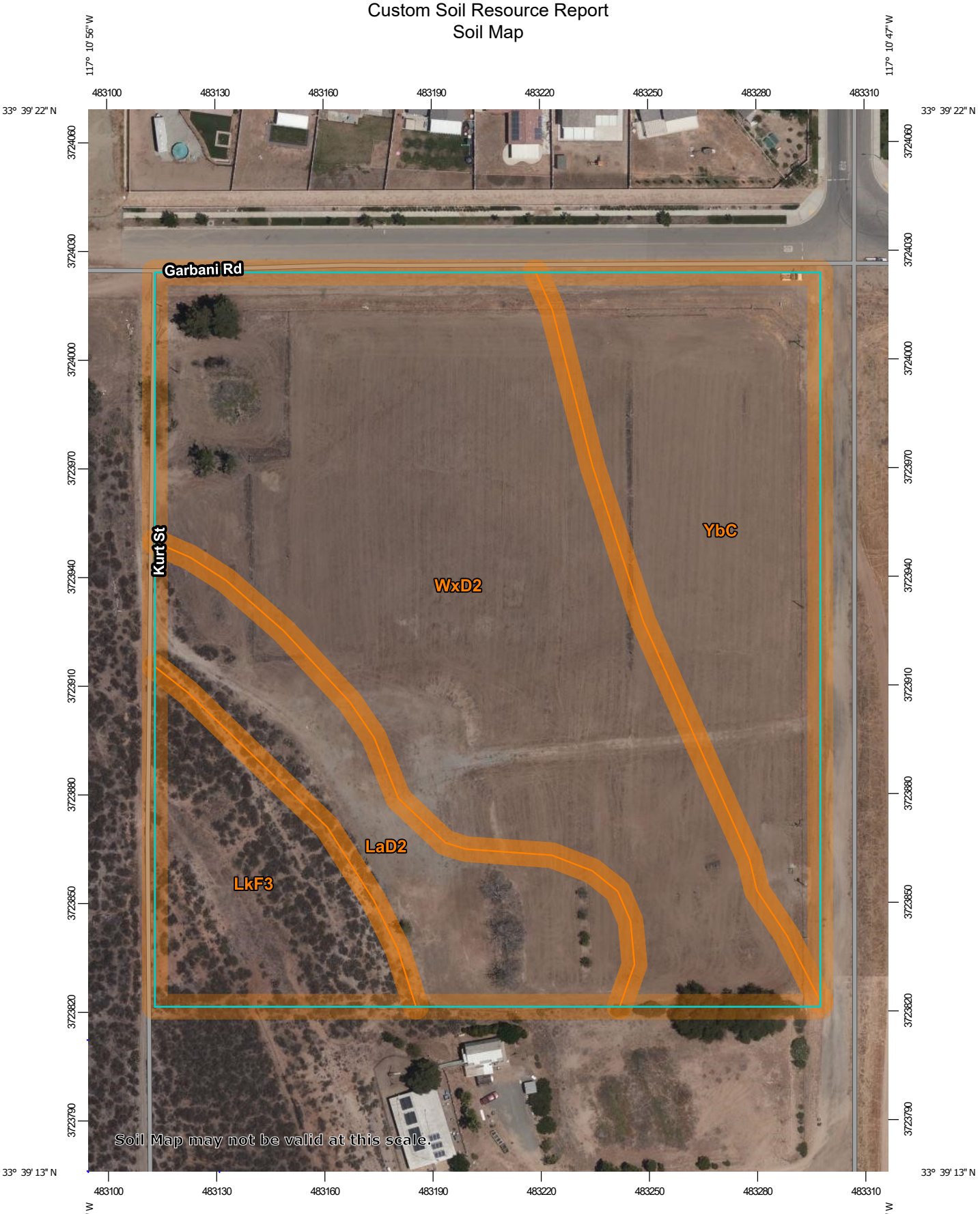
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,430 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 14, Sep 13, 2021

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

Date(s) aerial images were photographed: May 15, 2018—Jun 25, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
LaD2	Las Posas loam, 8 to 15 percent slopes, eroded	1.4	14.6%
LkF3	Las Posas rocky loam, 15 to 50 percent slopes, severely eroded	1.0	11.1%
WxD2	Wyman fine sandy loam, 8 to 15 percent slopes, eroded	4.7	50.6%
YbC	Yokohl loam, 2 to 8 percent slopes	2.2	23.6%
Totals for Area of Interest		**9.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Western Riverside Area, California

LaD2—Las Posas loam, 8 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcwk
Elevation: 200 to 3,000 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 240 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Las posas and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Las Posas

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from gabbro

Typical profile

H1 - 0 to 12 inches: loam
H2 - 12 to 30 inches: clay loam
H3 - 30 to 54 inches: weathered bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Murrieta

Percent of map unit: 5 percent
Hydric soil rating: No

Tumescal

Percent of map unit: 5 percent
Hydric soil rating: No

Cajalco

Percent of map unit: 5 percent
Hydric soil rating: No

LkF3—Las Posas rocky loam, 15 to 50 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: hcwp
Elevation: 200 to 3,000 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 240 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Las posas and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Las Posas

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from gabbro

Typical profile

H1 - 0 to 6 inches: stony loam
H2 - 6 to 20 inches: clay loam
H3 - 20 to 24 inches: weathered bedrock

Properties and qualities

Slope: 15 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R019XD060CA - SHALLOW LOAMY (1975)
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 10 percent
Hydric soil rating: No

Tumescal

Percent of map unit: 5 percent
Hydric soil rating: No

Murrieta

Percent of map unit: 5 percent
Hydric soil rating: No

Cajalco

Percent of map unit: 5 percent
Hydric soil rating: No

WxD2—Wyman fine sandy loam, 8 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: hd0d
Elevation: 300 to 2,500 feet
Mean annual precipitation: 9 to 25 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Wyman and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wyman

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Alluvium derived from igneous rock

Typical profile

H1 - 0 to 12 inches: fine sandy loam

H2 - 12 to 36 inches: clay loam
H3 - 36 to 60 inches: stratified loam to clay loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Honcut

Percent of map unit: 10 percent
Hydric soil rating: No

Buren

Percent of map unit: 5 percent
Hydric soil rating: No

YbC—Yokohl loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hd0g
Elevation: 500 feet
Mean annual precipitation: 10 to 14 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 260 days
Farmland classification: Not prime farmland

Map Unit Composition

Yokohl and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Yokohl

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from igneous rock

Typical profile

H1 - 0 to 10 inches: loam
H2 - 10 to 26 inches: clay loam
H3 - 26 to 30 inches: indurated
H4 - 30 to 60 inches: stratified sandy loam to gravelly loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 20 to 39 inches to duripan
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R019XD061CA - CLAYPAN (1975)
Hydric soil rating: No

Minor Components

Wyman

Percent of map unit: 5 percent
Hydric soil rating: No

Porterville

Percent of map unit: 5 percent
Hydric soil rating: No

Buren

Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

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GEOTECHNICAL INVESTIGATION

PROPOSED RESIDENTIAL DEVELOPMENT

TRACT MAP NO. 31831

APN 360-350-004 & 005

SWC SHERMAN AND GARBANI ROAD

MENIFEE, CALIFORNIA

-Prepared By-

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December 12, 2017

Project No. 644-17079
17-12-115

Garbani 10, LLC
32823 Temecula Parkway
Temecula, California 92592

Subject: Geotechnical Investigation

Project: Proposed Residential Development
Tract Map No. 31831
APN: 360-350-004 & 005
SWC Sherman Road and Garbani Road
Menifee, California

Sladden Engineering is pleased to present the results of our geotechnical investigation performed for the residential development (Tract Map No. 31831) proposed for the subject site located on the southwest corner of Sherman Road and Garbani Road in the City of Menifee, California. Our services were completed in accordance with our proposal for geotechnical engineering services dated September 20, 2017 and your authorization to proceed with the work. The purpose of our investigation was to explore the subsurface conditions at the site in order to provide recommendations for foundation design and site preparation. Evaluation of environmental issues and hazardous wastes was not included within the scope of services provided.

The opinions, recommendations and design criteria presented in this report are based on our field exploration program, laboratory testing and engineering analyses. Based on the results of our investigation, it is our professional opinion that the proposed project should be feasible from a geotechnical perspective provided that the recommendations presented in this report are implemented into design and carried out through construction.

We appreciate the opportunity to provide service to you on this project. If you have any questions regarding this report, please contact the undersigned.

Respectfully submitted,
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GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
TRACT MAP NO. 31831
APN:360-350-004 & 005
SWC SHERMAN ROAD AND GARBANI ROAD
MENIFEE, CALIFORNIA

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INTRODUCTION

This report presents the results of the geotechnical investigation performed by Sladden Engineering (Sladden) for the residential development (Tract Map No. 31831) proposed for the subject site located on the southwest corner of Sherman Road and Garbani Road in the City of Menifee, California. The site is located at approximately 34.6553 degrees North latitude and 117.1812 degrees West longitude. The approximate location of the site is indicated on the Site Location Map (Figure 1).

Our investigation was conducted in order to evaluate the engineering properties of the subsurface materials, to evaluate their *in-situ* characteristics, and to provide engineering recommendations and design criteria for site preparation, foundation design and the design of various site improvements. This study also includes a review of published and unpublished geotechnical and geological literature regarding seismicity at and near the subject site.

PROJECT DESCRIPTION

Based on the provided site plan (Kolibrien 2017), it is our understanding that the proposed project will consist of constructing a total of thirty (30) residential structures on the subject site. The project will also include paved roadways, retention basins, drainage easements, underground utilities, landscaping and various other site improvements. For our analyses, we expect that the proposed residential buildings will consist of relatively lightweight one or two-story wood-frame structures supported on conventional shallow spread footings and concrete slabs-on-grade or post-tensioned slabs.

Based on the relatively minor surface gradients throughout the subject site, it is apparent that grading will consist of generally minor cuts and fills in order to achieve the final pad elevations and to provide adequate gradients for site drainage. This does not include remedial grading consisting of the over-excavation and re-compaction of primary foundation bearing soil and/or bedrock within the building areas. Upon completion of the precise grading plans, Sladden should be retained to review the plans in order to confirm that the recommendations presented within in this report are incorporated into the design of the proposed project.

Structural foundation loads were not available at the time of this report. Based on our experience with relatively lightweight wood-frame structures, we expect that isolated column loads will be less than 20 kips and continuous wall loads will be less than 2.0 kips per linear foot. If these assumed loads vary significantly from the actual loads, we should be consulted to verify the applicability of the recommendations provided.

SCOPE OF SERVICES

The purpose of our investigation was to determine specific engineering characteristics of the surface and near surface soil in order to develop foundation design criteria and recommendations for site preparation. Exploration of the site was achieved, by drilling six (6) exploratory boreholes to depths between approximately 11 and 16 feet below the existing ground surface (bgs). Specifically, our site characterization consisted of the following tasks:

- Site reconnaissance to assess the existing surface conditions on and adjacent to the site.
- The excavation of six (6) exploratory boreholes to depths varying from approximately 11 to 16 feet bgs in order to characterize the subsurface soil conditions. Representative samples of the soil were classified in the field and retained for laboratory testing and engineering analyses.
- The performance of laboratory testing on selected samples to evaluate their engineering characteristics.
- The review of geologic literature with respect to potential geologic hazards.
- The performance of engineering analyses to develop recommendations for foundation design and site preparation.
- The preparation of this report summarizing our work at the site.

SITE CONDITIONS

The site is located on the southwest corner of Sherman Road and Garbani Road in the City of Menifee, California. At the time of our investigation, the site was undeveloped and appeared to have been previously disked. Wire perimeter fencing bounds the property. An existing gravel pad exists on the site along with an access road to the pad. The site is bounded by Garbani Road to the north, Sherman Road to the east, an existing residence to the south and a natural ascending hill to the east.

According to the Romoland 7.5-Minute Quadrangle map (USGS, 2015), the site varies in elevation between approximately 1,515 and 1,485 feet above mean sea level (MSL).

No ponding water or surface seeps were observed at or near the site during our investigation conducted on October 31, 2017. Site drainage is controlled by sheet flow, surface infiltration and within City and/or County maintained storm drain systems located along nearby streets.

GEOLOGIC SETTING

The project site is located in the northern portion of the Peninsular Ranges Physiographic Province of California. The Peninsular Ranges are mountainous areas that extend from the western edge of the continental borderland to the Salton Trough and from the Transverse Ranges Physiographic Province in the north to the tip of Baja California in the south. The province is characterized by elongated, northwest-southeast trending mountain ranges and valleys and is truncated at its northern margin by the east-west grain of the Transverse Ranges.

The site has been mapped by Morton (2003) to be immediately underlain by old alluvial fan deposits deposits (Qof) and monzogranite to granodiorite (Kpvg) bedrock. The geologic setting for the site and site vicinity is presented on the Regional Geologic Map (Figure 2).

SUBSURFACE CONDITIONS

The subsurface conditions at the site were investigated by drilling six (6) exploratory boreholes on the site. The approximate locations of the boreholes are illustrated on the Borehole Location Plan (Figure 3). The boreholes were advanced using a truck-mounted Mobile B-61 drill-rig equipped with 8-inch outside diameter hollow stem augers. A representative of Sladden was on-site to log the materials encountered and retrieve samples for laboratory testing and engineering analyses.

During our field investigation, artificial fill/disturbed soil was encountered to a depth of generally less than four (4) feet bgs within the majority of our bores. However, deeper fill was encountered to a depth of seven (7) feet bgs in the vicinity of BH-4. A previously demolished residence in the vicinity of BH-4 resulted in deeper fill depths. Underlying the artificial fill/disturbed soil and extending to the maximum explored depth, native alluvium and shallow seated bedrock was encountered. The native soil consisted primarily of clayey sand (SC) and sand (SP) that appeared dark yellowish brown in *in-situ* color, slightly moist, medium dense to very dense and fine-to-coarse grained. Hard intrusive bedrock was encountered underlying alluvial fan deposits at a depth of approximately 2.5 to 10.5 feet bgs within our bores. The presence of bedrock resulted in practical auger refusal within each of our bores.

The final logs represent our interpretation of the contents of the field logs, and the results of the laboratory observations and tests of the field samples. The final logs are included in Appendix A of this report. The stratification lines represent the approximate boundaries between soil types although the transitions may be gradual and/or variable across the site.

Groundwater was not encountered to our maximum explored depth of 16 feet bgs. Due to the presence of shallow seated bedrock, it is our opinion that groundwater will not be a factor in the construction of the proposed project.

SEISMICITY AND FAULTING

The southwestern United States is a tectonically active and structurally complex region, dominated by northwest trending dextral faults. The faults of the region are often part of complex fault systems, composed of numerous subparallel faults that splay or step from the main fault traces. Strong seismic shaking could be produced by any of these faults during the design life of the proposed project.

We consider the most significant geologic hazard to the project to be the potential for moderate to strong seismic shaking that is likely to occur during the design life of the project. The proposed project is located in the highly seismic Southern California region within the influence of several fault systems that are considered to be active or potentially active. An active fault is defined by the State of California as a "sufficiently active and well defined fault" that has exhibited surface displacement within the Holocene epoch (about the last 11,000 years). A potentially active fault is defined by the State as a fault with a history of movement within Pleistocene time (between 11,000 and 1.6 million years ago).

Table 1 lists the closest known active faults that were generated in part using the EQFAULT computer programs (Blake, 2000), as modified using the fault parameters from The Revised 2002 California Probabilistic Seismic Hazard Maps (Cao et al, 2003). This table does not identify the probability of reactivation or the on-site effects from earthquakes occurring on any of the other faults in the region.

TABLE 1
CLOSEST KNOWN ACTIVE FAULTS

Fault Name	Distance (Km)	Maximum Event
Elsinore – Temecula	11.8	6.8
Elsinore – Glen Ivy	16.1	6.8
San Jacinto – San Jacinto Valley	24.0	6.9
San Jacinto – Anza	25.8	7.2
Elsinore – Julian	33.9	7.1
San Jacinto – San Bernardino	41.1	7.5
Chino – Central Ave (Elsinore)	41.4	6.7
Whittier	48.4	6.8
San Andreas – San Bernardino	48.5	6.7
San Andreas – Southern	48.5	7.2

2016 CBC SEISMIC DESIGN PARAMETERS

Sladden has reviewed the 2016 California Building Code (CBC) and summarized the current seismic design parameters for the proposed structures. The seismic design category for a structure may be determined in accordance with Section 1613 of the 2016 CBC or ASCE7. According to the 2016 CBC, Site Class C may be used to estimate design seismic loading for the proposed structures. The 2016 CBC Seismic Design Parameters are summarized below (USGS, 2017a). The project Design Map Reports are included within Appendix C.

Risk Category (Table 1.5-1): I/II/III
Site Class (Table 1613.3.2): C
Ss (Figure 1613.3.1): 1.501g
S1 (Figure 1613.3.1): 0.611g
Fa (Table 1613.3.3(1)): 1.0
Fv (Table 1613.5.3(2)): 1.3
Sms (Equation 16-37 {Fa X Ss}): 1.501g
Sm1 (Equation 16-38 {Fv X S1}): 0.795g
SDS (Equation 16-39 {2/3 X Sms}): 1.000g
SD1 (Equation 16-40 {2/3 X Sm1}): 0.530g
Seismic Design Category: D

GEOLOGIC HAZARDS

The subject site is located in an active seismic zone and will likely experience strong seismic shaking during the design life of the proposed project. In general, the intensity of ground shaking will depend on several factors including: the distance to the earthquake focus, the earthquake magnitude, the response characteristics of the underlying materials, and the quality and type of construction. Geologic hazards and their relationship to the site are discussed below.

I. Surface Rupture. Surface rupture is expected to occur along preexisting, known active fault traces. However, surface rupture could potentially splay or step from known active faults or rupture along unidentified traces. Based on review of Jennings (1994), Morton (2003), RCPR (2017) and CDOC (2017), faults are not mapped on the site. In addition, no signs of active surface faulting were observed during our review of non-stereo digitized photographs of the site and site vicinity (Google, 2017). Finally, no signs of active surface rupture or secondary seismic effects (lateral spreading, lurching etc.) were identified on-site during our field investigation. Therefore, it is our opinion that risks associated with primary surface ground rupture should be considered "low".

II. Ground Shaking. The site has been subjected to past ground shaking by faults that traverse through the region. Strong seismic shaking from nearby active faults is expected to produce strong seismic shaking during the design life of the proposed project. A probabilistic approach was employed to the estimate the peak ground acceleration (a_{max}) that could be experienced at the site. Based on the USGS Unified Hazard Tool (USGS, 2017b) and shear wave velocity (Vs30) of 537 m/s, the site could be subjected to ground motions on the order of 0.40g. The peak ground acceleration at the site is judged to have a 475 year return period and a 10 percent chance of exceedance in 50 years.

III. Liquefaction/Seismic Settlement. Liquefaction is the process in which loose, saturated granular soil loses strength as a result of cyclic loading. The strength loss is a result of a decrease in granular sand volume and a positive increase in pore pressures. Generally, liquefaction can occur if all of the following conditions apply: liquefaction-susceptible soil, groundwater within a depth of 50 feet or less, and strong seismic shaking.

The State of California has not evaluated the Romoland Quadrangle for liquefaction hazards. However, the project site is underlain by shallow seated bedrock and risks associated with liquefaction are considered negligible.

IV. Tsunamis and Seiches. Because the site is situated at an elevated inland location, and is not immediately adjacent to any impounded bodies of water, risk associated with tsunamis and seiches is considered negligible.

V. Slope Failure, Landsliding, Rock Falls. The site is situated on relatively flat ground, however is located adjacent to an ascending sloped hillside to the west of the site. Signs of slope instability in the form of landslides, rock falls, earthflows and slumps were not observed at or near the subject site during our investigation. As such, risks associated with slope instability should be considered "low".

VI. Expansive Soil. Expansion Index testing of select samples was performed in order to evaluate the expansive potential of the materials underlying the site. Based the results of our laboratory testing (EI=46), the materials present near the ground surface are considered to have a "low" expansion potential. Accordingly, risk of structural damage caused by volumetric changes in the surface soil should be considered "in design and construction".

VII. Settlement. Settlement resulting from the anticipated foundation loads should be tolerable provided that the recommendations included in this report are considered in foundation design and construction. The estimated ultimate settlement is calculated to be approximately one inch when using the recommended bearing values. As a practical matter, differential settlement between footings can be assumed as one-half of the total settlement.

VIII. Flooding and Erosion. No signs of flooding or erosion were observed during our field investigation. Risks associated with flooding and erosion should be considered evaluated and mitigated by the project design Civil Engineer.

IX. Subsidence. Land subsidence can occur in areas where aquifer systems have been subjected to extensive groundwater pumping, such that groundwater pumping exceeds groundwater recharge. Generally, pore water reduction can result in a rearrangement of skeletal grains and could result in elastic (recoverable) or inelastic (unrecoverable) deformation of an aquifer system.

Locally, no fissures or other surficial evidence of subsidence were observed at or near the subject site. Based upon the presence of shallow seated bedrock throughout the site, the potential for subsidence related settlement is considered "negligible".

X. Ground Fissures. No surface features indicative of ground fissuring were identified on the site during our field investigation. Accordingly, risks associated with ground fissuring are considered low.

XI. Debris Flows. Debris flows are viscous flows consisting of poorly sorted mixtures of sediment and water and are generally initiated on slopes steeper than approximately six horizontal to one vertical (6H:1V). Based on the relatively flat nature of the site, the relatively shallow sloped hillside to the south of the site and the composition of the surface soil, we judge that risks associated with debris flows should be considered "low".

CONCLUSIONS

Based on the results of our investigation, it is our professional opinion that the project should be feasible from a geotechnical perspective provided that the recommendations provided in this report are incorporated into design and carried out through construction. The main geotechnical concerns in the design and construction of the proposed project are the presence of loose and potentially expansive near surface soil and the potential hard bedrock conditions that will likely be encountered throughout the site. Specialized grading equipment will likely be necessary to accomplish significant excavations.

Because of the presence of relatively loose and potentially expansive near surface soil and shallow bedrock, we recommend that remedial grading within the proposed building areas include over-excavation and/or re-compaction of the artificial fill soil and the primary foundation bearing soil and/or bedrock. Specific recommendations for site preparation are presented in the Earthwork and Grading section of this report.

Caving did occur to varying degrees within each of our exploratory bores and the surface soil may be susceptible to caving within deeper excavations. All excavations should be constructed in accordance with the normal CalOSHA excavation criteria. On the basis of our observations of the materials encountered, we anticipate that the subsoil will conform to that described by CalOSHA as Type B or C. Soil conditions should be verified in the field by a "Competent person" employed by the Contractor.

The following recommendations present more detailed design criteria that have been developed on the basis of our field and laboratory investigation.

EARTHWORK AND GRADING

All earthwork including excavation, backfill and preparation of the surface soil, should be performed in accordance with the geotechnical recommendations presented in this report and portions of the local regulatory requirements, as applicable. All earth work should be performed under the observation and testing of a qualified soil engineer. The following geotechnical engineering recommendations for the proposed project are based on observations from the field investigation program, laboratory testing and geotechnical engineering analyses.

a. Stripping. Areas to be graded should be cleared of the scattered weeds and surface vegetation. All areas scheduled to receive fill should be cleared of surface improvements, artificial fill and any unsuitable matter. The unsuitable materials should be removed from the site. Existing artificial fill soil should be removed in its entirety and replaced as engineered fill. Voids left by obstructions should be properly backfilled in accordance with the compaction recommendations of this report.

b. Preparation of Building Areas. In order to provide uniform foundation bearing conditions and to mitigate potential differential settlements related to likely soil/bedrock transition conditions, we recommend over-excavation and re-compaction throughout the new building areas. The artificial fill soil, native low density near surface soil and bedrock should be removed to at least 3 feet below existing grade or 3 feet below the bottom of the footings, whichever is deeper. If deeper removals are deemed necessary during site grading, the removals should be equivalent to approximately one-half of the maximum removal depth to minimize the potential for differential settlements related to variable fill depths. Remedial grading should extend laterally beyond the building perimeters a minimum distance equivalent to the fill depth where possible. The exposed surface soil should then be scarified, moisture conditioned to within two percent of optimum moisture content, and compacted to at least 90 percent relative compaction.

c. Compaction. Soil to be used as engineered fill should be free of organic material, debris, and other deleterious substances, and should not contain irreducible matter greater than three inches in maximum dimension. All fill materials should be placed in thin lifts, not exceeding six inches in their loose state. If import fill is required, the material should be of a low to non-expansive nature and should meet the following criteria:

Plastic Index	Less than 12
Liquid Limit	Less than 35
Percent Soil Passing #200 Sieve	Between 15% and 35%
Maximum Aggregate Size	3 inches

The subgrade and all fills material should be compacted with acceptable compaction equipment, to at least 90 percent relative compaction. The bottom of the exposed subgrade should be observed by a representative of Sladden Engineering prior to fill placement. Compaction testing should be performed on all lifts in order to ensure proper placement of the fill materials. Table 2 provides a summary of the excavation and compaction recommendation.

TABLE 2
SUMMARY OF RECOMMENDATIONS

*Remedial Grading	Excavation and recompaction within the building envelope and extending laterally for 5 feet beyond the building limits and to a minimum of 3 feet below existing grade or 2 feet below the bottom of the footings, whichever is deeper
Native / Import Engineered Fill	Place in thin lifts not exceeding 6 inches in a loose condition, compact to a minimum of 90 percent relative compaction.
Asphalt Concrete Sections	Compact the top 12 inches to at least 95 percent compaction within 2 percent of optimum moisture content.

*Actual depth may vary and should be determined by a representative of Sladden Engineering in the field during construction.

d. Shrinkage and Subsidence. Volumetric shrinkage of the material that is excavated and replaced as controlled compacted fill should be anticipated. We estimate that this shrinkage could vary from 10 to 15 percent. Subsidence of the surfaces that are scarified and compacted should be between 1 and 2 tenths of a foot. This will vary depending upon the type of equipment used, the moisture content of the soil at the time of grading and the actual degree of compaction attained. Bulking of excavated bedrock is likely to occur, however the actual bulking rate cannot be determined until grading commences.

POST-TENSIONED SLABS

Post-tensioned slabs may be considered for the proposed residential structures in order to mitigate potential expansive soil conditions. We have evaluated the on-site soil for construction of post-tensioned foundation systems in general accordance with design specifications of the Post Tensioning Institute. Final design should be based upon the results of Expansion Index testing performed after rough grading. Post-tensioned slabs should be designed to be rigid and capable of spanning areas of non-uniform support and meet the following criteria:

Design Criteria		Category I Very Low to Low Expansion Potential (EI 0-50)
Center Lift	e_m center	9.0
	y_m center	0.46
Edge Lift	E_m edge	4.8
	Y_m edge	1.03
Perimeter Footing Depth (inches)		18
Allowable Bearing Capacity (psf)		2,500

Resistance to lateral loads may be provided by a combination of friction acting at the base of the slabs or foundations and passive earth pressure along the sides of the foundations. A coefficient of friction of 0.40 between soil and concrete may be used with consideration to dead load forces only. A passive earth pressure of 250 pounds per square foot, per foot of depth, may be used for the sides of footings that are placed against properly compacted native or approved import soil. Passive earth pressure should be ignored within the upper 1 foot except where confined (such as beneath a floor slab).

FOUNDATIONS: CONVENTIONAL SHALLOW SPREAD FOOTINGS

Conventional spread footings may be expected to provide adequate support for the proposed residential structures provided that the expansive soil conditions are considered in design. All footings should be founded upon properly compacted engineered fill and should have a minimum embedment depth of 18 inches measured from the lowest adjacent finished grade. Continuous and isolated footings should have minimum widths of 12 inches and 24 inches, respectively. Continuous and isolated footings supported upon properly compacted soil may be designed using allowable (net) bearing pressures of 1800 and 2000 pounds per square foot (psf), respectively. Allowable increases of 250 psf for each additional 1 foot in width and 250 psf for each additional 6 inches in depth may be utilized, if desired. The maximum allowable bearing pressure should be 2500 psf. The allowable bearing pressure applies to combined dead and sustained live loads. The allowable bearing pressures may be increased by one-third when considering transient live loads, including seismic and wind forces.

Based on the recommended allowable bearing pressures, the total static settlement of the shallow footings is anticipated to be less than one-inch provided that foundation preparation conforms to the recommendations described in this report. Static differential settlement is anticipated to be approximately one-half of the total settlement for similarly loaded footings spaced up to approximately 50 feet apart.

Lateral load resistance for the spread footings will be developed by passive pressure against the sides of the footings below grade and by friction acting at the base of the footings. An allowable passive pressure of 250 psf per foot of depth may be used for design purposes. An allowable coefficient of friction 0.40 may be used for dead and sustained live loads to compute the frictional resistance of the footing placed directly on compacted fill. Under seismic and wind loading conditions, the passive pressure and frictional resistance may be increased by one-third.

All footing excavations should be observed by a representative of the project geotechnical consultant to verify adequate embedment depths prior to placement of forms, steel reinforcement or concrete. The excavations should be trimmed neat, level and square. All loose, disturbed, sloughed or moisture-softened soils and/or any construction debris should be removed prior to concrete placement. Excavated soil generated from footing and/or utility trenches should not be stockpiled within the building envelopes or in areas of exterior concrete flatwork. All footings should be reinforced in accordance with the project Structural Engineer's recommendations.

SLABS-ON-GRADE

In order to reduce the risk of heave, cracking and settlement, concrete slabs-on-grade must be placed on properly compacted fill as outlined in the previous sections. The slab subgrades should remain near optimum moisture content and should not be permitted to dry prior to concrete placement. All slab subgrades should be firm and unyielding. Disturbed soils should be removed and then replaced and compacted to a minimum of 90 percent relative compaction.

Slab thickness and reinforcement should be determined by the Structural Engineer based upon the post-grading expansion test results. All slab reinforcement should be supported on concrete chairs to ensure that reinforcement is placed at slab mid-height.

Slabs with moisture sensitive surfaces should be underlain with a moisture vapor barrier consisting of a polyvinyl chloride membrane such as 10-mil Visqueen. All laps within the membrane should be sealed and at least 2 inches of clean sand should be placed over the membrane to promote uniform curing of the concrete and to limit damage. To reduce the potential for punctures, the membrane should be placed on a pad surface that has been graded smooth without any sharp protrusions. If a smooth surface can not be achieved by grading, consideration should be given to placing a 1-inch thick leveling course of sand across the pad surface prior to placement of the membrane.

PRELIMINARY PAVEMENT DESIGN

Asphalt concrete pavements should be designed in accordance with Topic 610 of the Caltrans Highway Design Manual based on R-Value and Traffic Index. The R-Value of the near surface soil is expected to exceed 40. On-site soil and any imported soil should be tested for R-Value prior to establishing final pavement design sections. For preliminary pavement design, Traffic Indices (TI) of 5.0 and 6.5 were used for the light duty and heavy duty pavements, respectively. We assumed Asphalt Concrete (AC) over Class II Aggregate Base (AB). The preliminary flexible pavement layer thickness is as follows:

RECOMMENDED ASPHALT PAVEMENT SECTION LAYER THICKNESS		
Pavement Material	Recommended Thickness	
	TI=5.0	TI=6.5
Asphalt Concrete Surface Course	3.0 inches	4.0 inches
Class II Aggregate Base Course	6.0 inches	6.0 inches
Compacted Subgrade Soil	12 inches	12 inches

Asphalt concrete should conform to Sections 203 and 302 of the latest edition of the Standard Specifications for Public Works Construction (Caltrans or Greenbook). Class II aggregate base should conform to Section 26 of the Caltrans Standard Specifications or Greenbook, latest edition. The aggregate base course should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Method D 1557.

CORROSION SERIES

The soluble sulfate concentrations of the surface soil were determined to be 20 parts per million (ppm). The soil is considered to have a "negligible" corrosion potential with respect to concrete. The use of Type V cement and special sulfate resistant concrete mixes should not be necessary. Soluble sulfate content of the surface soil should be reevaluated after grading and appropriate concrete mix designs should be established based upon post-grading test results.

The pH level of the surface soil was determined to be 8.0. Based on soluble chloride concentration testing (30 ppm), the soil is considered to have a "low" corrosive potential with respect to normal grade steel. The minimum resistivity of the surface soil was found to be 3500 ohm-cm, which suggests the site soil is considered to have a "moderate" corrosion potential with respect to ferrous metal installations. A corrosion expert should be consulted regarding appropriate corrosion protection measures.

UTILITY TRENCH BACKFILL

All utility trench backfill should be compacted to a minimum relative compaction of 90 percent. Trench backfill materials should be placed in lifts no greater than six inches in a loose condition, moisture conditioned as necessary to achieve near optimum moisture conditions, and then mechanically compacted in place to a minimum relative compaction of 90 percent. A representative of the project geotechnical consultant should test the backfills to verify adequate compaction.

EXTERIOR CONCRETE FLATWORK

To minimize cracking of concrete flatwork, the subgrade soil below concrete flatwork areas should first be compacted to a minimum relative compaction of 90 percent. A representative of the project geotechnical consultant should observe and verify the density and moisture content of the soil.

DRAINAGE

All final grades should be provided with positive gradients away from foundations to provide rapid removal of surface water runoff to an adequate discharge point. No water should be allowed to be pond on or immediately adjacent to foundation elements. In order to reduce water infiltration into the subgrade soil, surface water should be directed away from building foundations to an adequate discharge point. Subgrade drainage should be evaluated upon completion of the precise grading plans and in the field during grading.

LIMITATIONS

The findings and recommendations presented in this report are based upon an interpolation of the soil conditions between the exploratory boring locations and extrapolation of these conditions throughout the proposed building area. Should conditions encountered during grading appear different than those indicated in this report, this office should be notified.

The use of this report by other parties or for other projects is not authorized. The recommendations of this report are contingent upon monitoring of the grading operation by a representative of Sladden Engineering. All recommendations are considered to be tentative pending our review of the grading operation and additional testing, if indicated. If others are employed to perform any soil testing, this office should be notified prior to such testing in order to coordinate any required site visits by our representative and to assure indemnification of Sladden Engineering.

We recommend that a pre-job conference be held on the site prior to the initiation of site grading. The purpose of this meeting will be to assure a complete understanding of the recommendations presented in this report as they apply to the actual grading performed.

ADDITIONAL SERVICES

Once completed, final project plans and specifications should be reviewed by use prior to construction to confirm that the full intent of the recommendations presented herein have been applied to design and construction. Following review of plans and specifications, observation should be performed by the Soil Engineer during construction to document that foundation elements are founded on/or penetrate into the recommended soil, and that suitable backfill soil is placed upon competent materials and properly compacted at the recommended moisture content.

Tests and observations should be performed during grading by the Soil Engineer or his representative in order to verify that the grading is being performed in accordance with the project specifications. Field density testing shall be performed in accordance with acceptable ASTM test methods. The minimum acceptable degree of compaction should be 90 percent for engineered fill and subgrade soils and 95 percent for Class II aggregate base as obtained by ASTM Test Method D1557. Where testing indicates insufficient density, additional compactive effort shall be applied until retesting indicates satisfactory compaction.

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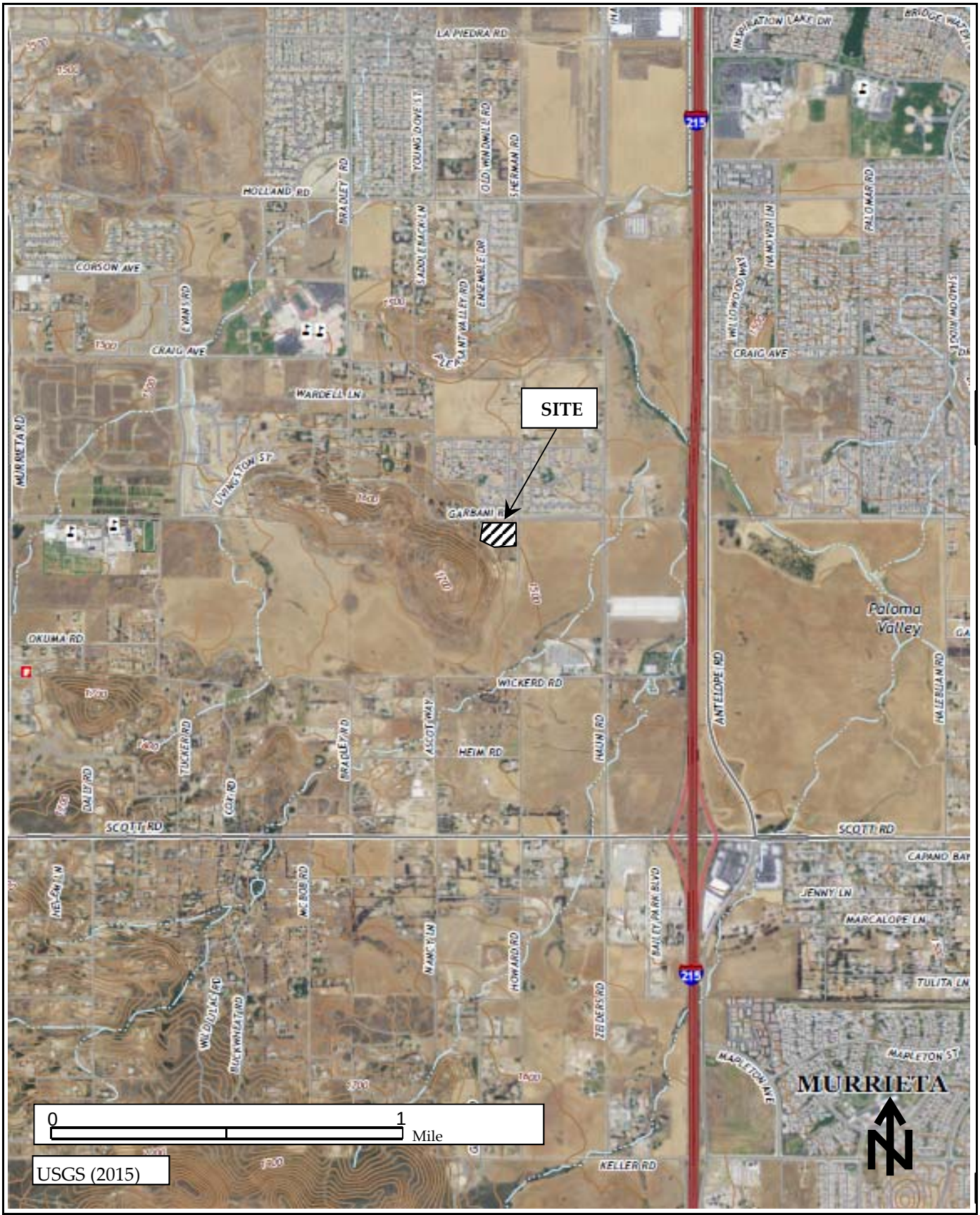
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FIGURES

SITE LOCATION MAP
REGIONAL GEOLOGIC MAP
BOREHOLE LOCATION PLAN



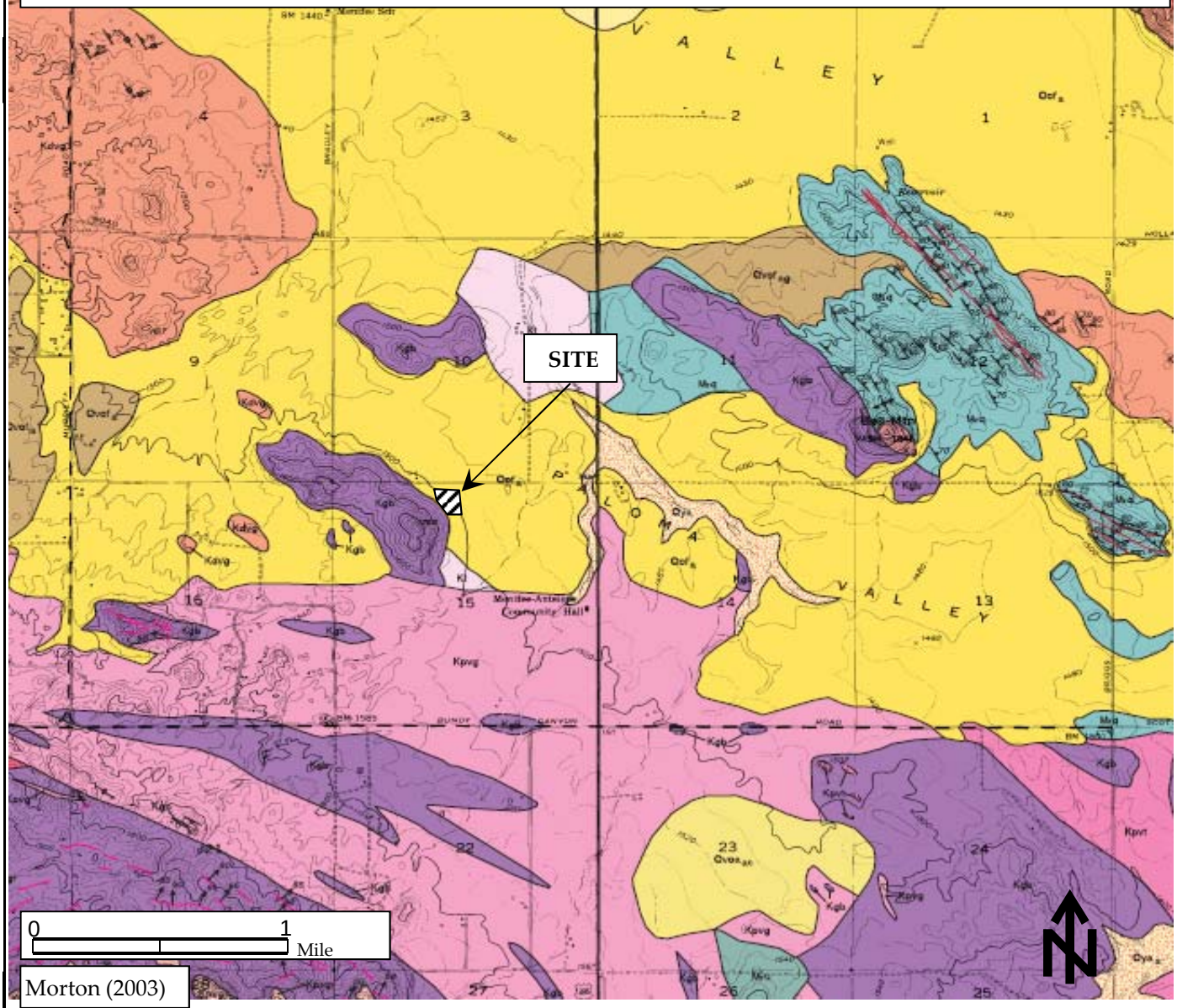
Sladden Engineering	SITE LOCATION MAP	FIGURE 1
	Project Number: 644-17079	
	Report Number: 17-12-115	
	Date: December 12, 2017	

EXPLANATION OF SITE UNITS

Qof — **Old alluvial fan deposits (late to middle Pleistocene)**—Reddish brown, gravel and sand alluvial fan deposits; indurated, commonly slightly dissected. In places includes thin alluvial fan deposits of Holocene age

Kgbd — **Gabbroic dikes (Cretaceous)**—Relatively fine-grained, massive, black hornblende gabbro occurs as thin (few meters thick) dike on hill west of Menifee Road. Dike cuts granodiorite to tonalite (Kdvg) of Domenigoni Valley and adjacent metamorphic rock units

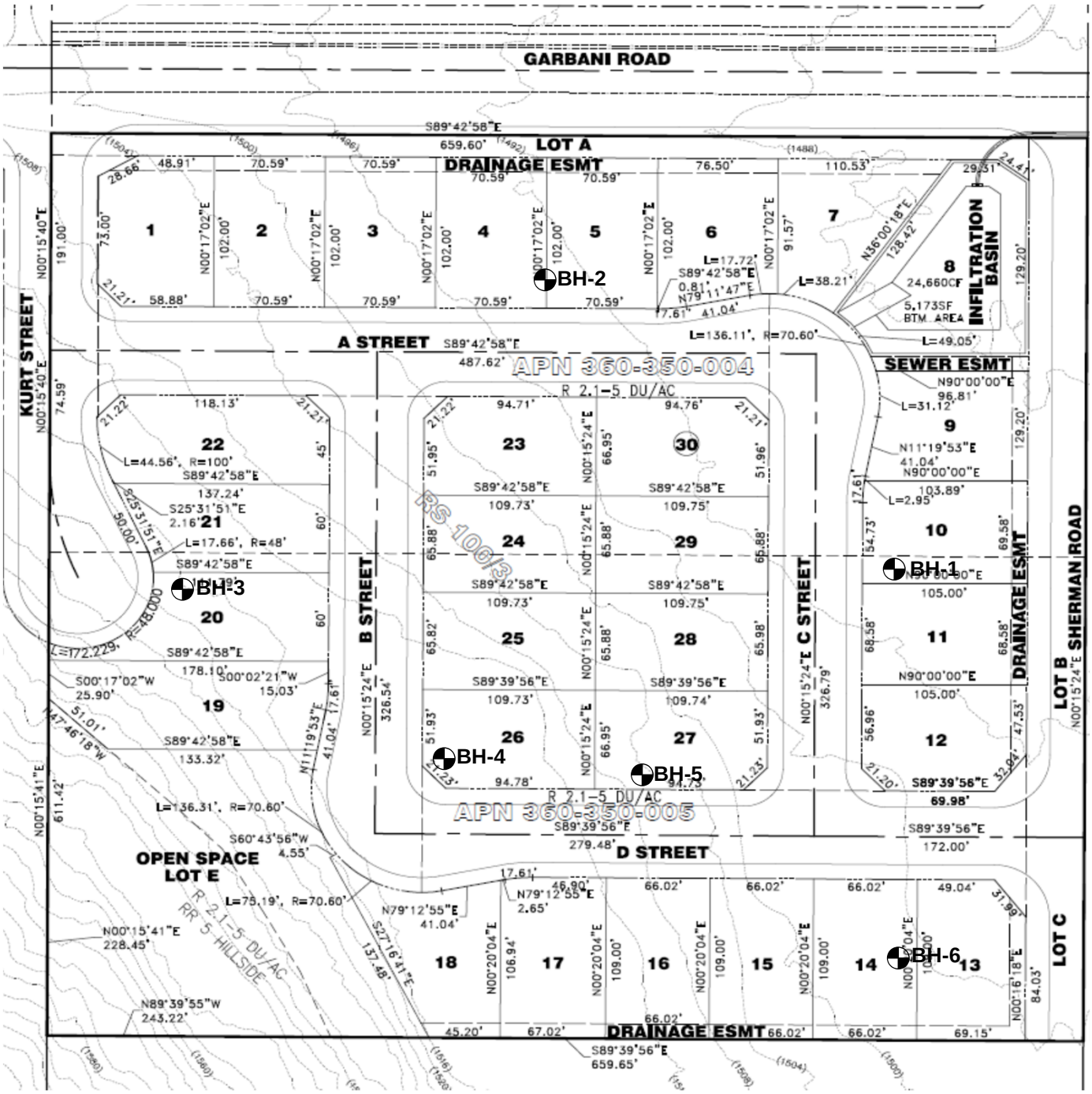
Kpvg — **Monzogranite to granodiorite**—Pale gray, massive, medium-grained hypidiomorphic-granular biotite monzogranite, and less abundant hornblende-biotite granodiorite forming older ring dike. Plagioclase is An_{20} to An_{35}, subhedral, tabular crystals. Contains inclusions of small to large stoped blocks of gabbro



Sladden Engineering	REGIONAL GEOLOGIC MAP	FIGURE 2
	Project Number: 644-17079	
	Report Number: 17-12-115	
	Date: December 12, 2017	

LEGEND

BH-6 Approximate Borehole Location



Kolibrien (2017)

Sladden Engineering	BOREHOLE LOCATION PLAN	FIGURE 3
	Project Number:	644-17079
	Report Number:	17-12-115
	Date:	December 12, 2017

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

For our field investigation, six (6) exploratory bores were excavated on October 31, 2017 utilizing a truck mounted hollow stem auger rig (Mobile B-61). Continuous logs of the materials encountered were made by a representative of Sladden Engineering. Materials encountered in the boreholes were classified in accordance with the Unified Soil Classification System which is presented in this appendix.

Representative undisturbed samples were obtained within our bores by driving a thin-walled steel penetration sampler (California split spoon sampler) or a Standard Penetration Test (SPT) sampler with a 140 pound automatic-trip hammer dropping approximately 30 inches (ASTM D1586). The number of blows required to drive the samplers 18 inches was recorded in 6-inch increments and blowcounts are indicated on the boring logs.

The California samplers are 3.0 inches in diameter, carrying brass sample rings having inner diameters of 2.5 inches. The standard penetration samplers are 2.0 inches in diameter with an inner diameter of 1.5 inches. Undisturbed samples were removed from the sampler and placed in moisture sealed containers in order to preserve the natural soil moisture content. Bulk samples were obtained from the excavation spoils and samples were then transported to our laboratory for further observations and testing.

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			TYPICAL NAMES	
COARSE GRAINED SOILS MORE THAN HALF IS LARGER THAN No.200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN No.4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY-GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN No.4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN HALF IS SMALLER THAN No.200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS & VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, CLEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS: LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

EXPLANATION OF BORE LOG SYMBOLS


California Split-spoon Sample


Unrecovered Sample


Standard Penetration Test Sample


Groundwater depth

Note: The stratification lines on the borelogs represent the approximate boundaries between the soil types; the transitions may be gradual.

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobil B-61	Date Drilled:	10/31/2017
Elevation:	1495 Ft (MSL)	Boring No:	BH-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		Clayey Sand (SC); dark yellowish brown, slightly moist, medium dense, fine-grained (Fill/Disturbed).
	13/13/28	1	46	35.2	11.2	123.2	2		
							4		
	35/50-2"			22.1	13.0	115.3	6		
							8		
	18/30/30			14.9	5.4		10		Bedrock (Granitoid); moderately hard, moderately strong, highly weathered; breaks down to clayey sand (SC/SP) soil type.
							12		
							14		
	38/50-6"			8.5	3.2	135.6	16		
							18		Practical Auger Refusal at -16.5 Feet bgs. Bedrock Encountered at -2.5 Feet bgs. No Groundwater or Seepage Encountered.
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED RESIDENTIAL DEVELOPMENT
SWC SHERMAN ROAD & GARBANI ROAD, MENIFEE

Project No: 644-17079
Report No: 17-12-115

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobil B-61	Date Drilled:	10/31/2017
Elevation:	1495 Ft (MSL)	Boring No:	BH-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2		Clayey Sand (SC); dark yellowish brown, slightly moist, fine-grained (Fill/Disturbed).
	26/30/25			11.4	4.1		4		
							6		Bedrock (Granitoid); moderately hard, moderately strong, highly weathered; breaks down to clayey sand (SC/SP) soil type.
	19/31/50-4"			17.9	7.9	130.1	8		
							10		
							12		Practical Auger Refusal at ~11.5 Feet bgs. Bedrock Encountered at ~3.5 Feet bgs. No Groundwater or Seepage Encountered.
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

PROPOSED RESIDENTIAL DEVELOPMENT
SWC SHERMAN ROAD & GARBANI ROAD, MENIFEE

Project No: 644-17079
Report No: 17-12-115

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobil B-61	Date Drilled:	10/31/2017
Elevation:	1510 Ft (MSL)	Boring No:	BH-3

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		Clayey Sand (SC); dark yellowish brown, slightly moist, fine to coarse grained with gravel (Fill/Disturbed).
	7/14/16			25.1	2.7	123.5	6		Clayey Sand (SC); dark yellowish brown, slightly moist, medium dense, fine to coarse grained with gravel (Qof).
	36/50-6"			17.6	5.0		10		Bedrock (Granitoid); moderately hard, moderately strong, highly weathered; breaks down to clayey sand (SC/SP) soil type.
	50-3"			18.9	3.4	117.7	16		Practical Auger Refusal at ~16.5 Feet bgs. Bedrock Encountered at ~6.5 Feet bgs. No Groundwater or Seepage Encountered.

Completion Notes:

PROPOSED RESIDENTIAL DEVELOPMENT
SWC SHERMAN ROAD & GARBANI ROAD, MENIFEE

Project No: 644-17079
Report No: 17-12-115

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobil B-61	Date Drilled:	10/31/2017
Elevation:	1515 Ft (MSL)	Boring No:	BH-4

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		Silty Sand (SM); dark yellowish brown, slightly moist, fine to coarse grained with gravel, wire and concrete debris (Fill).
	5/9/8			35.3	4.7		6		Silty Sand (SM); dark yellowish brown, slightly moist, medium dense, fine to coarse grained with gravel, wire and concrete debris (Fill).
	13/31/23			19.2	3.1	123.7	10		Clayey Sand (SC); dark yellowish brown, slightly moist, very dense, fine-grained (Qof).
	50-6"			13.2	3.6		16		Bedrock (Granitoid); moderately hard, moderately strong, highly weathered; breaks down to clayey sand (SC/SP) soil type.
							18		Practical Auger Refusal at ~16.5 Feet bgs. Bedrock Encountered at ~10.5 Feet bgs. No Groundwater or Seepage Encountered.

Completion Notes:

PROPOSED RESIDENTIAL DEVELOPMENT
SWC SHERMAN ROAD & GARBANI ROAD, MENIFEE

Project No: 644-17079
Report No: 17-12-115

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobil B-61	Date Drilled:	10/31/2017
Elevation:	1510 Ft (MSL)	Boring No:	BH-5

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0–2		Clayey Sand (SC); dark yellowish brown, slightly moist, fine to coarse grained with gravel (Fill/Disturbed).
	5/6/7			41.2	7.8	117.8	4–6		Clayey Sand (SC); dark yellowish brown, slightly moist, loose, fine-grained (Qof).
	22/50-6"			15.5	6.7		8–14		Bedrock (Granitoid); moderately hard, moderately strong, highly weathered; breaks down to clayey sand (SC/SP) soil type.
	50-1"			16.1	3.2		16–50		Practical Auger Refusal at ~16.5 Feet bgs. Bedrock Encountered at ~7.5 Feet bgs. No Groundwater or Seepage Encountered.

Completion Notes:

PROPOSED RESIDENTIAL DEVELOPMENT
SWC SHERMAN ROAD & GARBANI ROAD, MENIFEE

Project No: 644-17079
Report No: 17-12-115

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobil B-61	Date Drilled:	10/31/2017
Elevation:	1502 Ft (MSL)	Boring No:	BH-6

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0		Clayey Sand (SC); dark yellowish brown, slightly moist, fine to coarse grained with gravel (Fill/disturbed).
	6/13/45			43.3	11.7		6		Clayey Sand (SC); dark yellowish brown, slightly moist, very dense, fine to coarse grained Qof).
	28/50-6"			10.2	4.1	132.8	10		Bedrock (Granitoid); moderately hard, moderately strong, highly weathered; breaks down to clayey sand (SC/SP) soil type.
							12		Practical Auger Refusal at ~11.5 Feet bgs. Bedrock Encountered at ~5.5 Feet bgs. No Groundwater or Seepage Encountered.

Completion Notes:

PROPOSED RESIDENTIAL DEVELOPMENT
SWC SHERMAN ROAD & GARBANI ROAD, MENIFEE

Project No: 644-17079
Report No: 17-12-115

APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

Representative bulk and relatively undisturbed soil samples were obtained in the field and returned to our laboratory for additional observations and testing. Laboratory testing was generally performed in two phases. The first phase consisted of testing in order to determine the compaction of the existing natural soil and the general engineering classifications of the soils underlying the site. This testing was performed in order to estimate the engineering characteristics of the soil and to serve as a basis for selecting samples for the second phase of testing. The second phase consisted of soil mechanics testing. This testing including consolidation, shear strength and expansion testing was performed in order to provide a means of developing specific design recommendations based on the mechanical properties of the soil.

CLASSIFICATION AND COMPACTION TESTING

Unit Weight and Moisture Content Determinations: Each undisturbed sample was weighed and measured in order to determine its unit weight. A small portion of each sample was then subjected to testing in order to determine its moisture content. This was used in order to determine the dry density of the soil in its natural condition. The results of this testing are shown on the Bore Logs.

Maximum Density-Optimum Moisture Determinations: Representative soil types were selected for maximum density determinations. This testing was performed in accordance with the ASTM Standard D1557-91, Test Method A. The results of testing are presented graphically in this appendix. The maximum densities are compared to the field densities of the soil in order to determine the existing relative compaction to the soil.

Classification Testing: Soil samples were selected for classification testing. This testing consists of mechanical grain size analyses. This provides information for developing classifications for the soil in accordance with the Unified Soil Classification System which is presented in the preceding appendix. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing is very useful in detecting variations in the soils and in selecting samples for further testing.

SOIL MECHANIC'S TESTING

Expansion Testing: One (1) bulk sample was selected for Expansion testing. Expansion testing was performed in accordance with the UBC Standard 18-2. This testing consists of remolding 4-inch diameter by 1-inch thick test specimens to a moisture content and dry density corresponding to approximately 50 percent saturation. The samples are subjected to a surcharge of 144 pounds per square foot and allowed to reach equilibrium. At that point the specimens are inundated with distilled water. The linear expansion is then measured until complete (ASTM D4829).

Direct Shear Testing: One (1) bulk sample was selected for Direct Shear testing. This test measures the shear strength of the soil under various normal pressures and is used to develop parameters for foundation design and lateral design. Tests were performed using a recompacted test specimen that was saturated prior to tests. Tests were performed using a strain controlled test apparatus with normal pressures ranging from 800 to 2300 pounds per square foot (ASTM D3080-04).

Consolidation Testing: Two (2) relatively undisturbed samples were selected for consolidation testing. For this test, a one-inch thick test specimen was subjected to vertical loads varying from 575 psf to 11520 psf applied progressively. The consolidation at each load increment was recorded prior to placement of each subsequent load. The specimens were saturated at 575 psf or 720 psf load increment (ASTM D2435 & D5333).

Corrosion Series Testing: The soluble sulfate concentrations of the surface soil was determined in accordance with California Test Method Number (CA) 417. The pH and Minimum Resistivity were determined in accordance with CA 643. The soluble chloride concentrations were determined in accordance with CA 422.

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Maximum Density/Optimum Moisture

ASTM D698/D1557

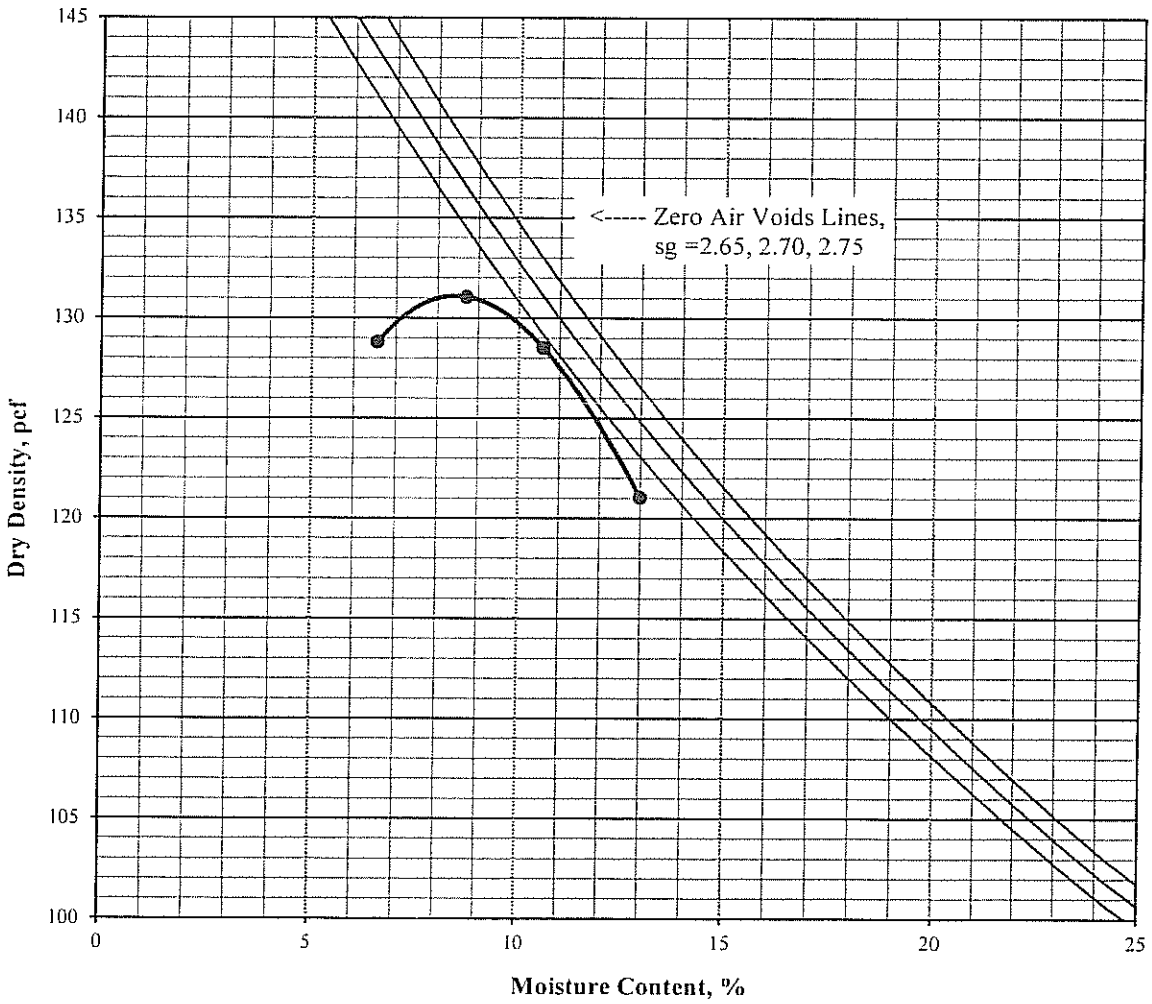
Project Number: 644-17079
Project Name: SWC Sherman Road & Garbani Road
Lab ID Number: LN6-17527
Sample Location: Bulk @ 0-5'
Description: Brown Clayey Sand (SC)

December 7, 2017

ASTM D-1557 A
Rammer Type: Machine

Maximum Density: 131.5 pcf
Optimum Moisture: 9%

Sieve Size	% Retained
3/4"	
3/8"	
#4	0.9



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Expansion Index

ASTM D 4829

December 7, 2017

Job Number: 644-17079
Job Name: SWC Sherman Road & Garbani Road
Lab ID Number: LN6-17527
Sample ID: Bulk @ 0-5'
Soil Description: Brown Clayey Sand (SC)

Wt of Soil + Ring:	581.0
Weight of Ring:	190.5
Wt of Wet Soil:	390.5
Percent Moisture:	8.8%
Sample Height, in	0.95
Wet Density, pcf:	124.6
Dry Denstiy, pcf:	114.5

% Saturation:	50.4

Expansion **Rack # 1**

Date/Time	12/5/2017	2:30 PM
Initial Reading	0.0000	
Final Reading	0.0457	

Expansion Index **46**

(Final - Initial) x 1000

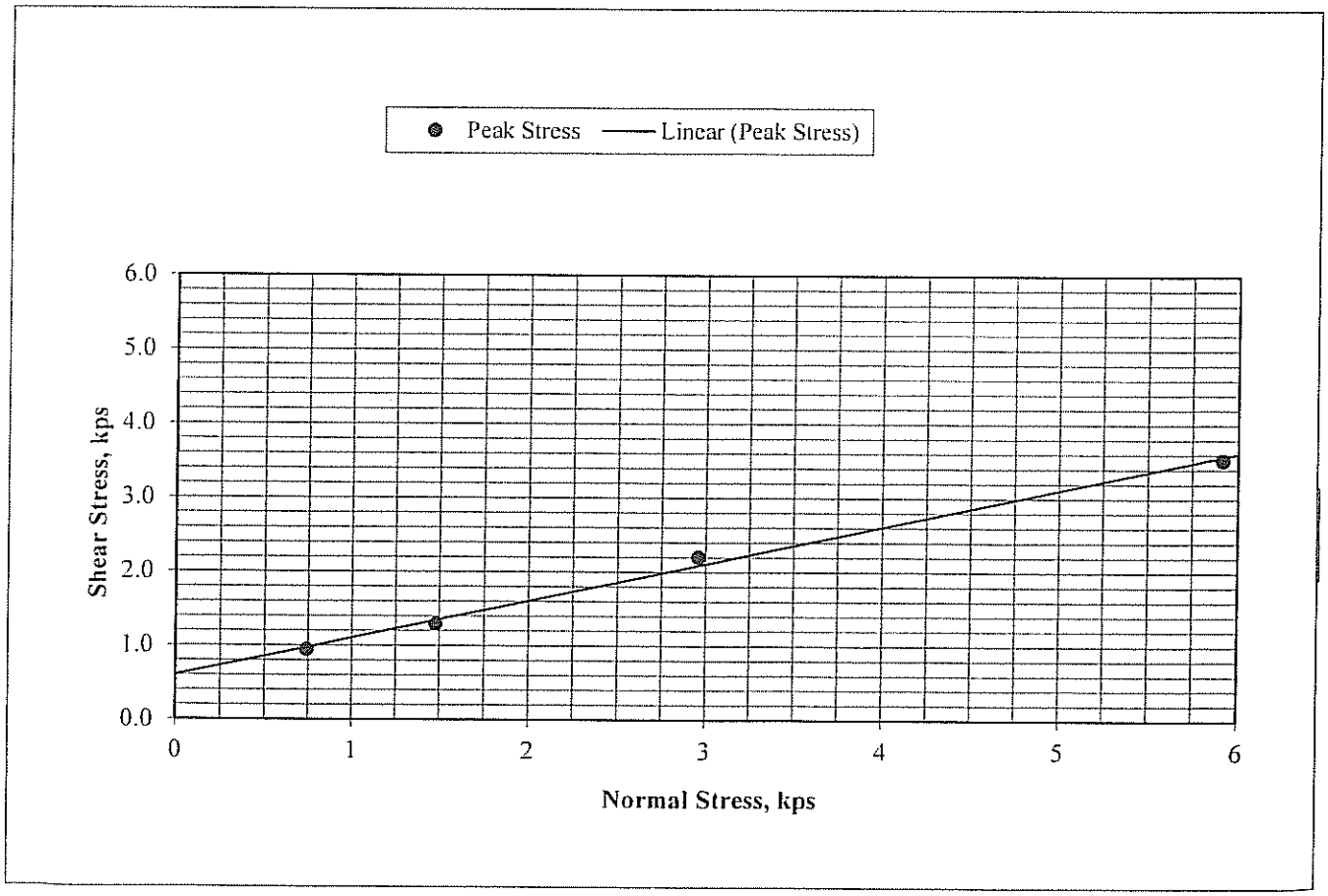
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Direct Shear ASTM D 3080-04
(modified for unconsolidated condition)

Job Number:	644-17079
Job Name	SWC Sherman Road & Garbani Road
Lab ID No.	LN6-17527
Sample ID	Bulk @ 0-5'
Classification	Brown Clayey Sand (SC)
Sample Type	Remolded @ 90% of Maximum Density

December 7, 2017
Initial Dry Density: 118.1 pcf
Initial Mosture Content: 9.2 %
Peak Friction Angle (Ø): 27°
Cohesion (c): 600 psf

Test Results	1	2	3	4	Average
Moisture Content, %	15.5	15.5	15.5	15.5	15.5
Saturation, %	98.4	98.4	98.4	98.4	98.4
Normal Stress, kps	0.739	1.479	2.958	5.916	
Peak Stress, kps	0.944	1.293	2.204	3.526	



Job Number: 644-17079
Job Name: SWC Sherman Road & Garbani Road
Date: 12/7/2017

Moisture Adjustment		Remolded Shear Weight	
Wt of Soil:	1,000	Max Dry Density:	131.5
Moist As Is:	6.7	Optimum Moisture:	9.0
Moist Wanted:	9.0		
ml of Water to Add:	21.6	Wt Soil per Ring, g:	155.1

UBC

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Gradation

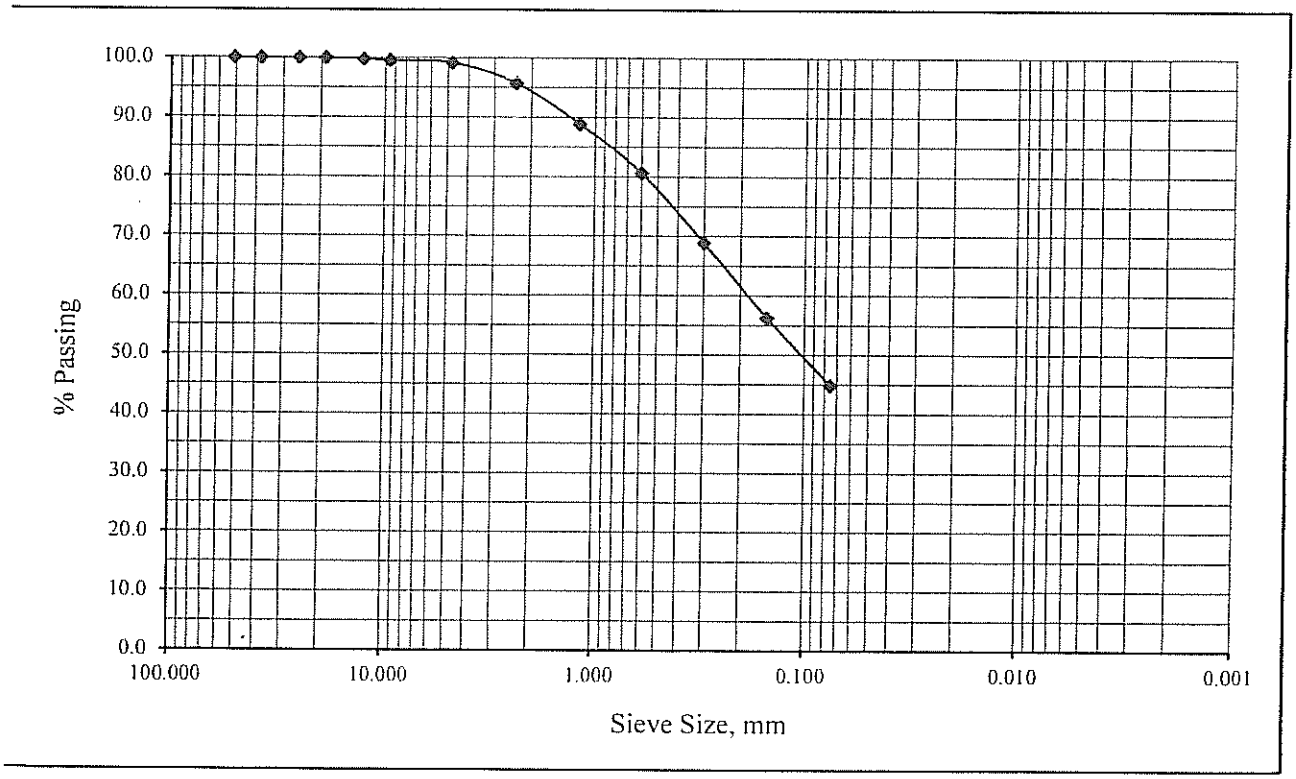
ASTM C117 & C136

Project Number: 644-17079
Project Name: SWC Sherman Road & Garbani Road
Lab ID Number: LN6-17527
Sample ID: Bulk @ 0-5'

December 7, 2017

Soil Classification: SC

Sieve Size, in	Sieve Size, mm	Percent Passing
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	99.8
3/8"	9.53	99.6
#4	4.75	99.1
#8	2.36	95.7
#16	1.18	88.8
#30	0.60	80.6
#50	0.30	68.9
#100	0.15	56.3
#200	0.075	44.9



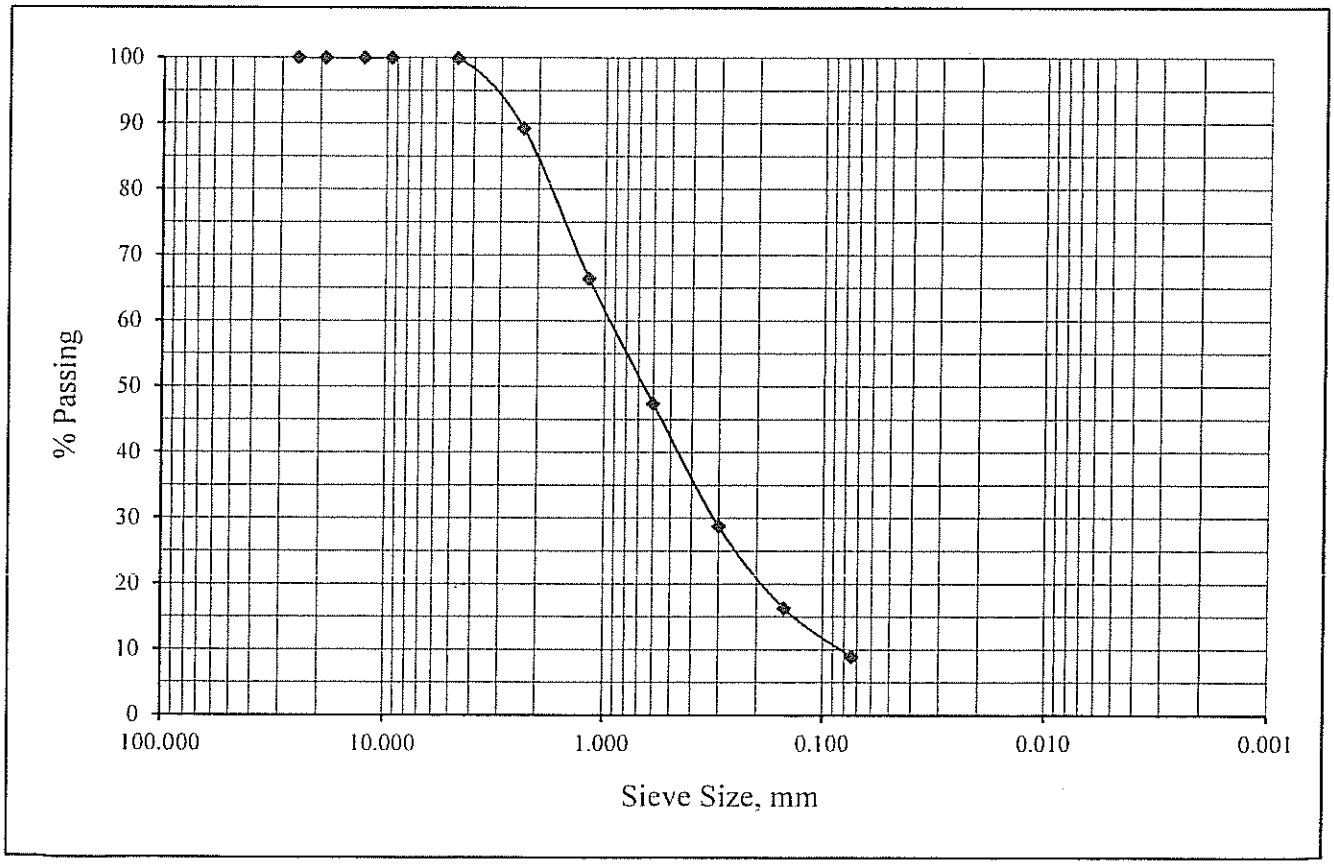
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Gradation

ASTM C117 & C136

Project Number: 644-17079 December 7, 2017
Project Name: SWC Sherman Road & Garbani Road
Lab ID Number: LN6-17527
Sample ID: BH-1 R-4 @ 15' Soil Classification: SW-SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	99.9
#8	2.36	89.3
#16	1.18	66.4
#30	0.60	47.4
#50	0.30	28.8
#100	0.15	16.3
#200	0.074	8.9



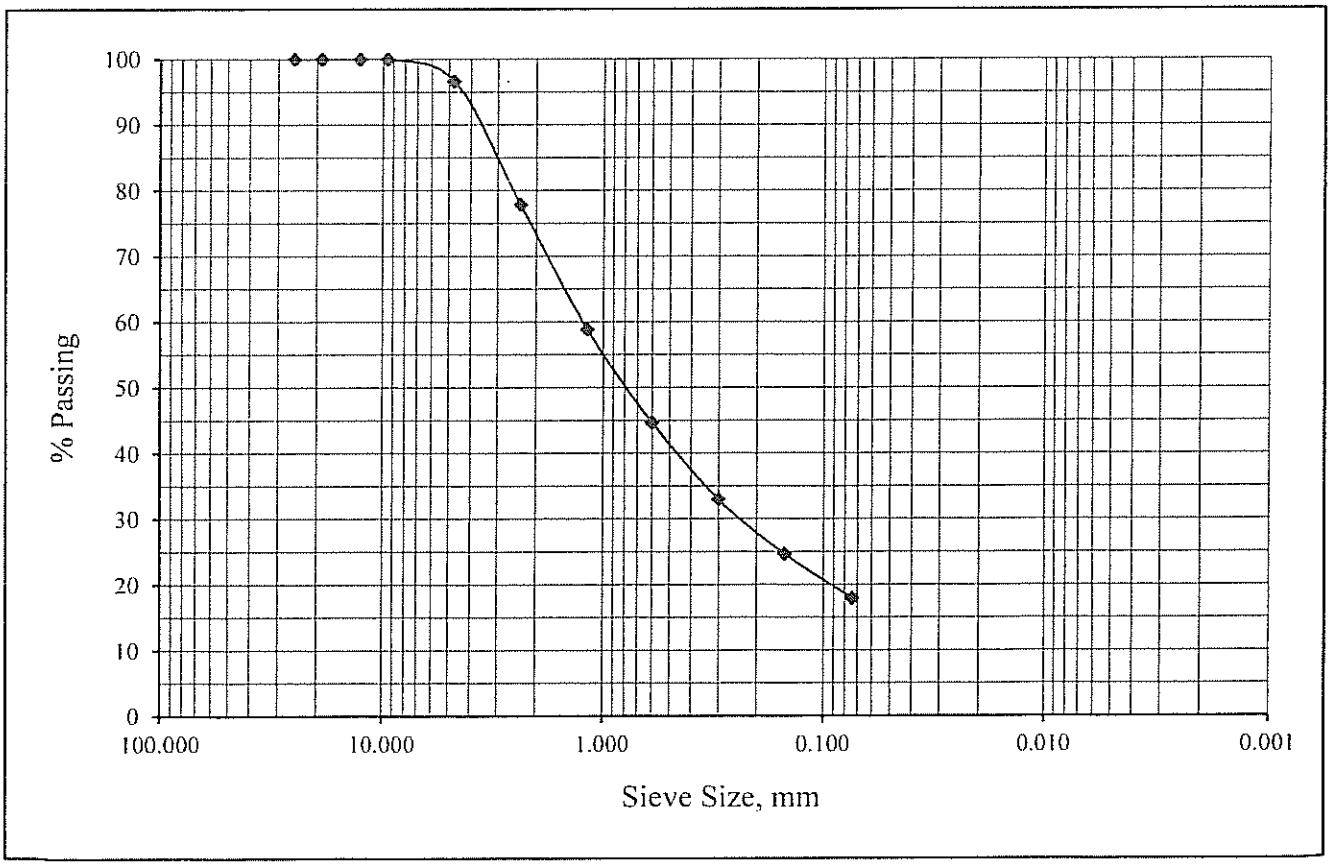
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Gradation

ASTM C117 & C136

Project Number: 644-17079 December 7, 2017
Project Name: SWC Sherman Road & Garbani Road
Lab ID Number: LN6-17527
Sample ID: BH-3 S-2 @ 10' Soil Classification: SC

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	96.7
#8	2.36	77.9
#16	1.18	58.9
#30	0.60	44.7
#50	0.30	33.0
#100	0.15	24.7
#200	0.074	17.9



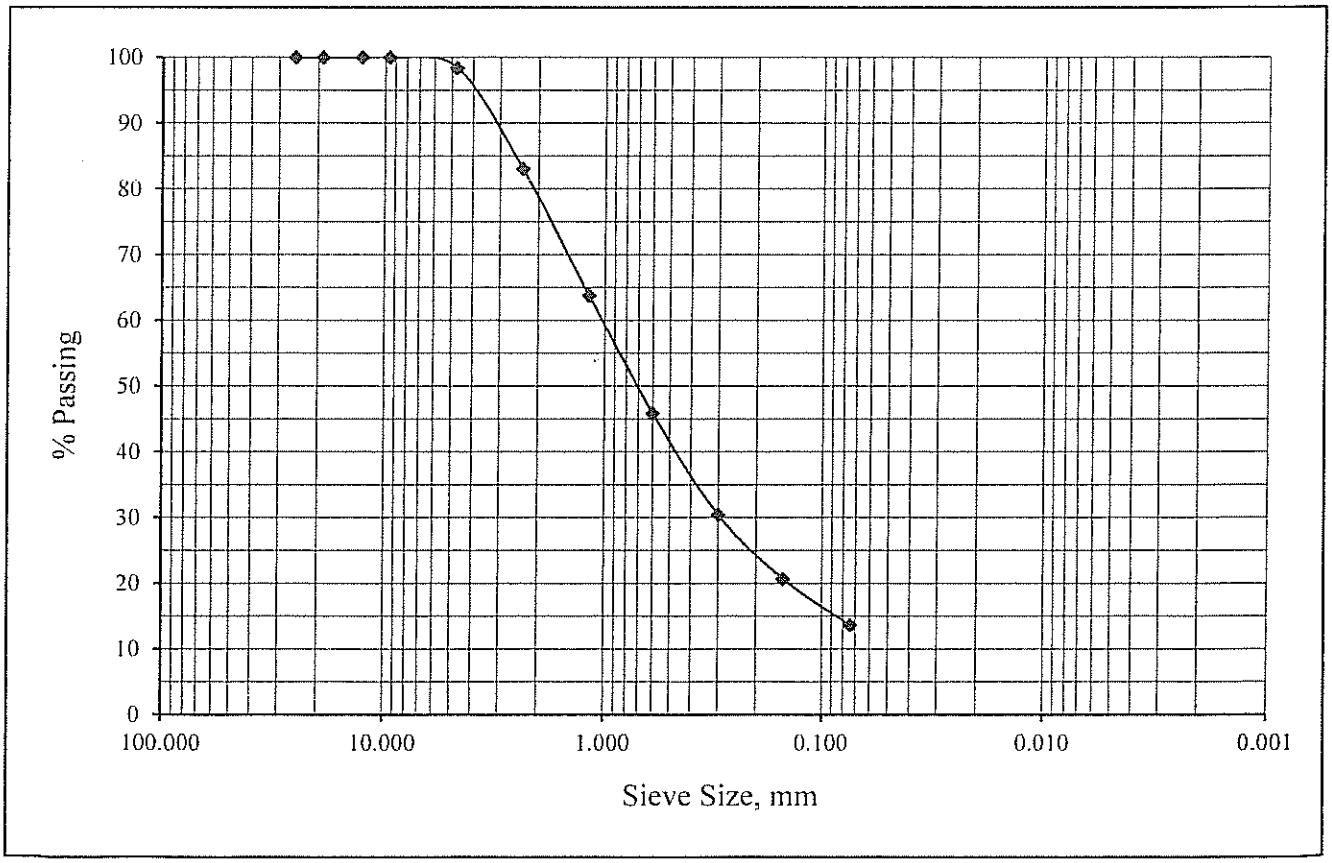
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Gradation

ASTM C117 & C136

Project Number: 644-17079 December 7, 2017
Project Name: SWC Sherman Road & Garbani Road
Lab ID Number: LN6-17527
Sample ID: BH-4 S-3 @ 15' Soil Classification: SC

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	98.4
#8	2.36	83.0
#16	1.18	63.8
#30	0.60	45.9
#50	0.30	30.5
#100	0.15	20.7
#200	0.074	13.6



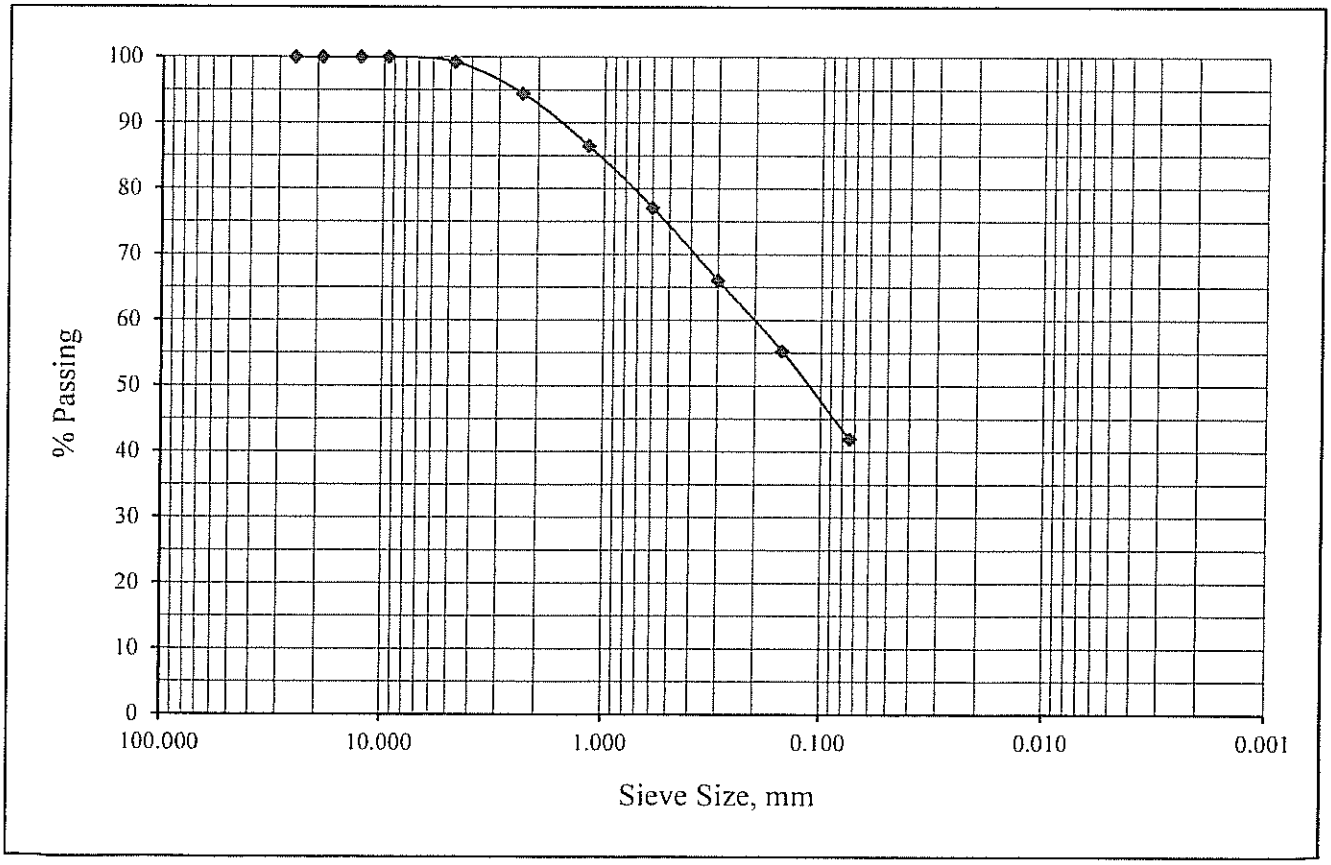
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Gradation

ASTM C117 & C136

Project Number: 644-17079 December 7, 2017
Project Name: SWC Sherman Road & Garbani Road
Lab ID Number: LN6-17527
Sample ID: BH-5 R-1 @ 5' Soil Classification: SC

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	99.2
#8	2.36	94.5
#16	1.18	86.5
#30	0.60	77.1
#50	0.30	66.1
#100	0.15	55.3
#200	0.074	41.9



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One Dimensional Consolidation

ASTM D2435 & D5333

Job Number: 644-17079
Job Name: SWC Sherman Road & Garbani Road

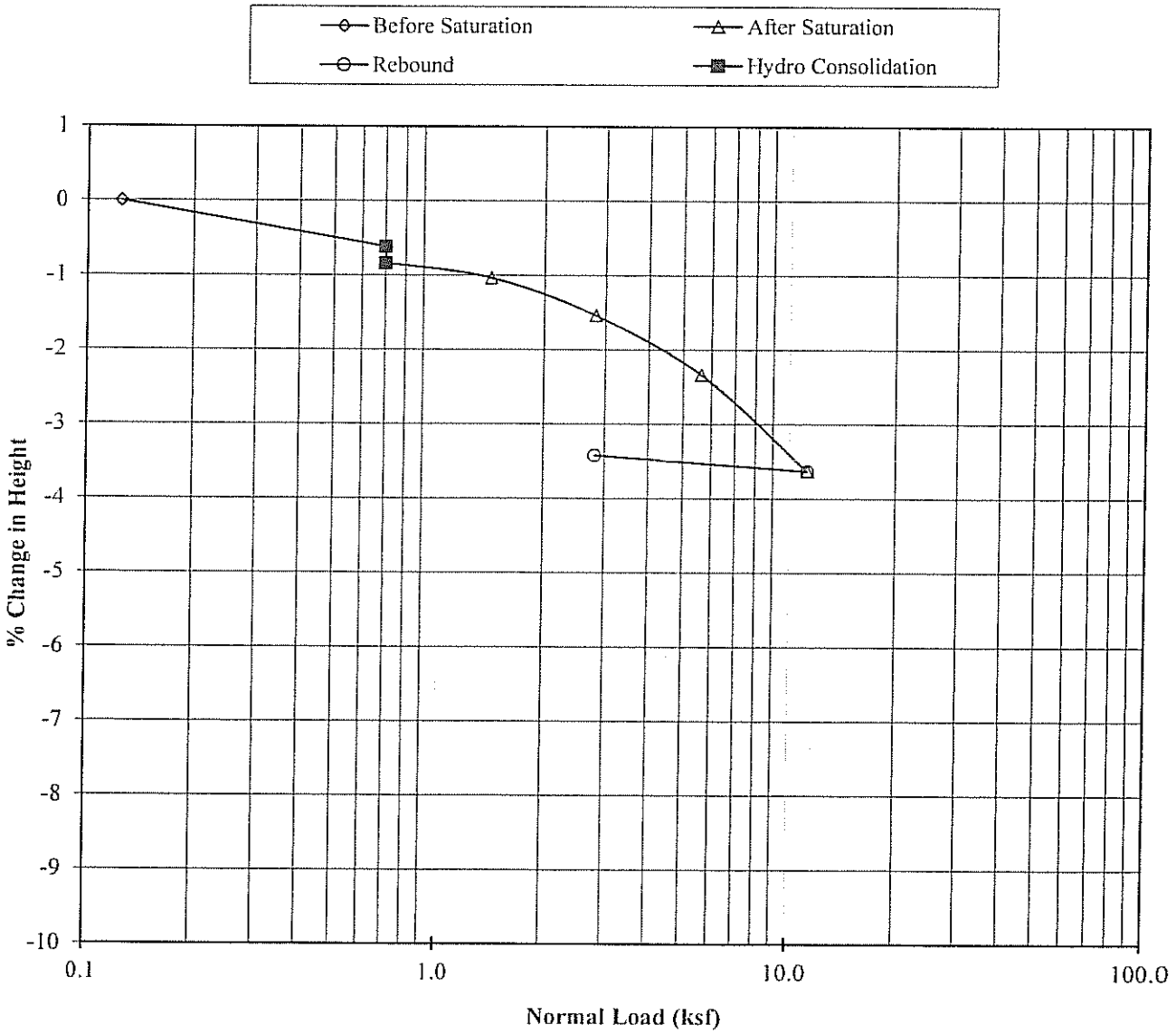
December 7, 2017

Lab ID Number: LN6-17527
Sample ID: BH-5 R-1 @ 5'
Soil Description: Red Brown Clayey Sand (SC)

Initial Dry Density, pcf:	115.8
Initial Moisture, %:	7.8
Initial Void Ratio:	0.440
Specific Gravity:	2.67

Hydrocollapse: 0.2% @ 0.702 ksf

% Change in Height vs Normal Presssure Diagram



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45090 Golf Center Pkwy., Suite F, Indio, CA 92201 (760) 863-0713 Fax (760) 863-0847
450 Egan Avenue, Beaumont, CA 92223 (951) 845-7743 Fax (951) 845-8863

Date: December 7, 2017

Account No.: 644-17079

Customer: Garbani 10, LLC

Location: SWC Sherman Road & Garbani Road

Analytical Report

Corrosion Series

	pH per CA 643	Soluble Sulfates per CA 417 ppm	Soluble Chloride per CA 422 ppm	Min. Resistivity per CA 643 ohm-cm
Bulk @ 0-5'	7.9	120	80	1400

APPENDIX C

SEISMIC DESIGN MAP AND REPORT
DEAGGREGATION OUTPUT

USGS Design Maps Summary Report

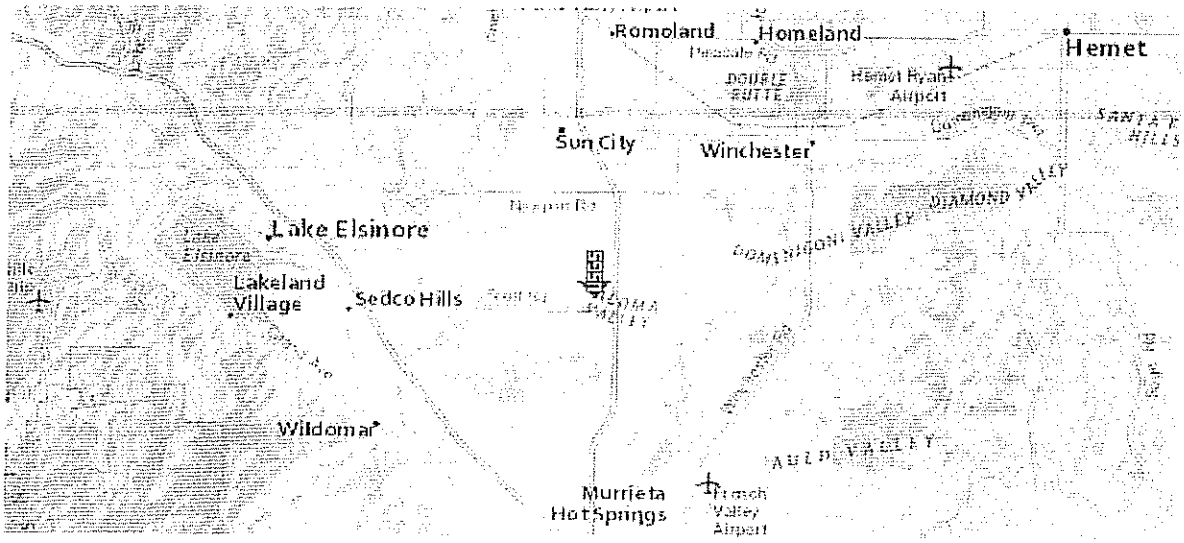
User–Specified Input

Building Code Reference Document ASCE 7-10 Standard
(which utilizes USGS hazard data available in 2008)

Site Coordinates 33.65534°N, 117.18117°W

Site Soil Classification Site Class C – "Very Dense Soil and Soft Rock"

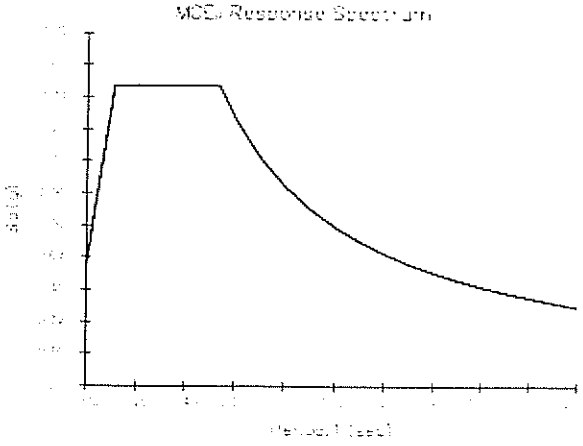
Risk Category I/II/III

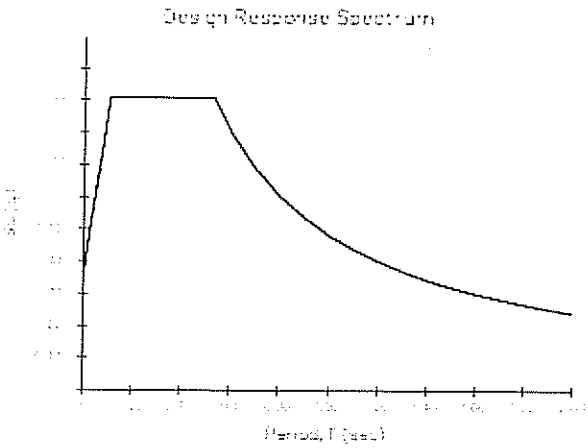


USGS–Provided Output

S_S =	1.501 g	S_{MS} =	1.501 g	S_{DS} =	1.000 g
S_1 =	0.611 g	S_{M1} =	0.795 g	S_{D1} =	0.530 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

USGS Design Maps Detailed Report

ASCE 7-10 Standard (33.65534°N, 117.18117°W)

Site Class C – "Very Dense Soil and Soft Rock", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_s) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1] $S_s = 1.501$ g

From Figure 22-2 [2] $S_1 = 0.611$ g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class C, based on the site soil properties in accordance with Chapter 20.

Table 20.3-1 Site Classification

Site Class	$\overline{v}_s$	$\overline{N}$ or $\overline{N}_{ch}$	$\overline{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content $w \geq 40\%$, and • Undrained shear strength $\overline{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk–Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4–1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_S

For Site Class = C and S_S = 1.501 g, F_a = 1.000

Table 11.4–2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1–s Period				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of S_1

For Site Class = C and S_1 = 0.611 g, F_v = 1.300

Equation (11.4–1): $S_{MS} = F_a S_S = 1.000 \times 1.501 = 1.501$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 1.300 \times 0.611 = 0.795$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

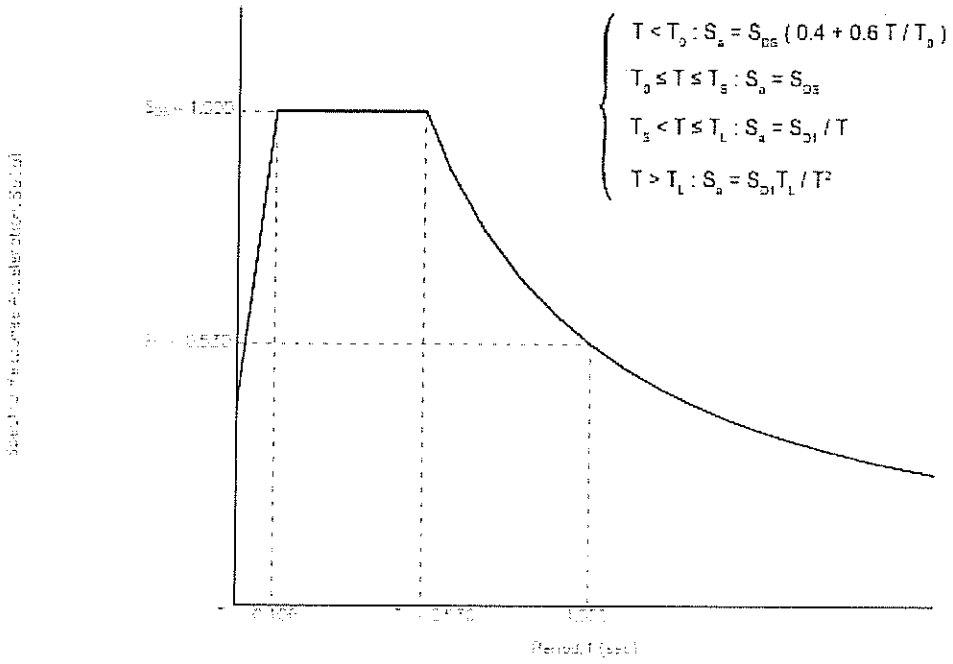
Equation (11.4–3): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 1.501 = 1.000$ g

Equation (11.4–4): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.795 = 0.530$ g

Section 11.4.5 — Design Response Spectrum

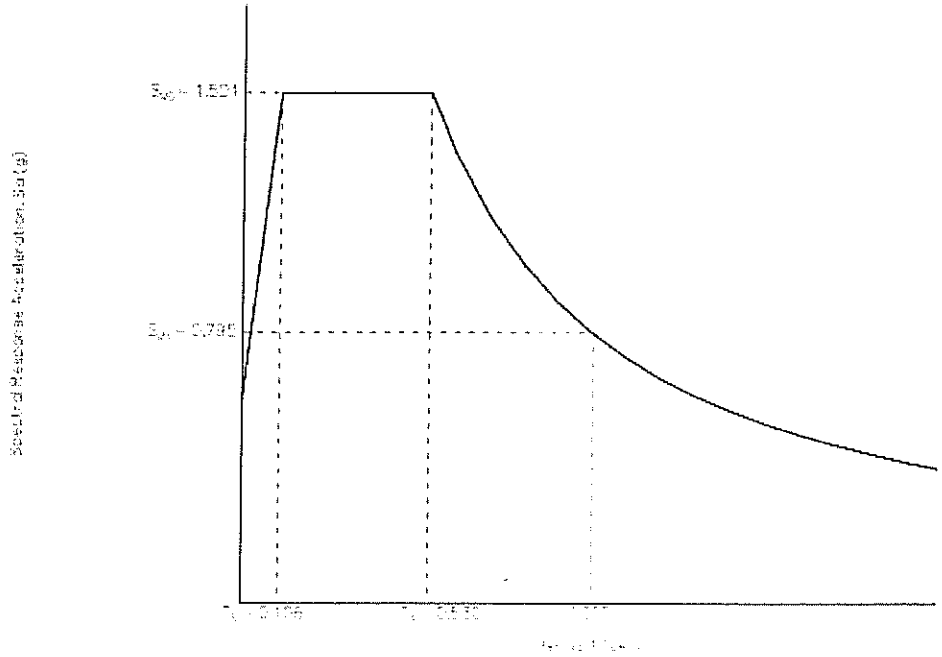
From Figure 22-12 [3] $T_L = 8$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.565

Equation (11.8-1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.565 = 0.565$ g

Table 11.8-1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of PGA

For Site Class = C and PGA = 0.565 g, F_{PGA} = 1.000

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 1.015

From Figure 22-18 [6] C_{R1} = 1.006

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 1.000 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.530 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (v4.1.

Spectral Period

Peak ground acceleration

Latitude

Decimal degrees

33.655338

Time Horizon

Return period in years

475

Longitude

Decimal degrees, negative values for western longitudes

-117.181171

Site Class

537 m/s (Site class C)

Hazard Curve

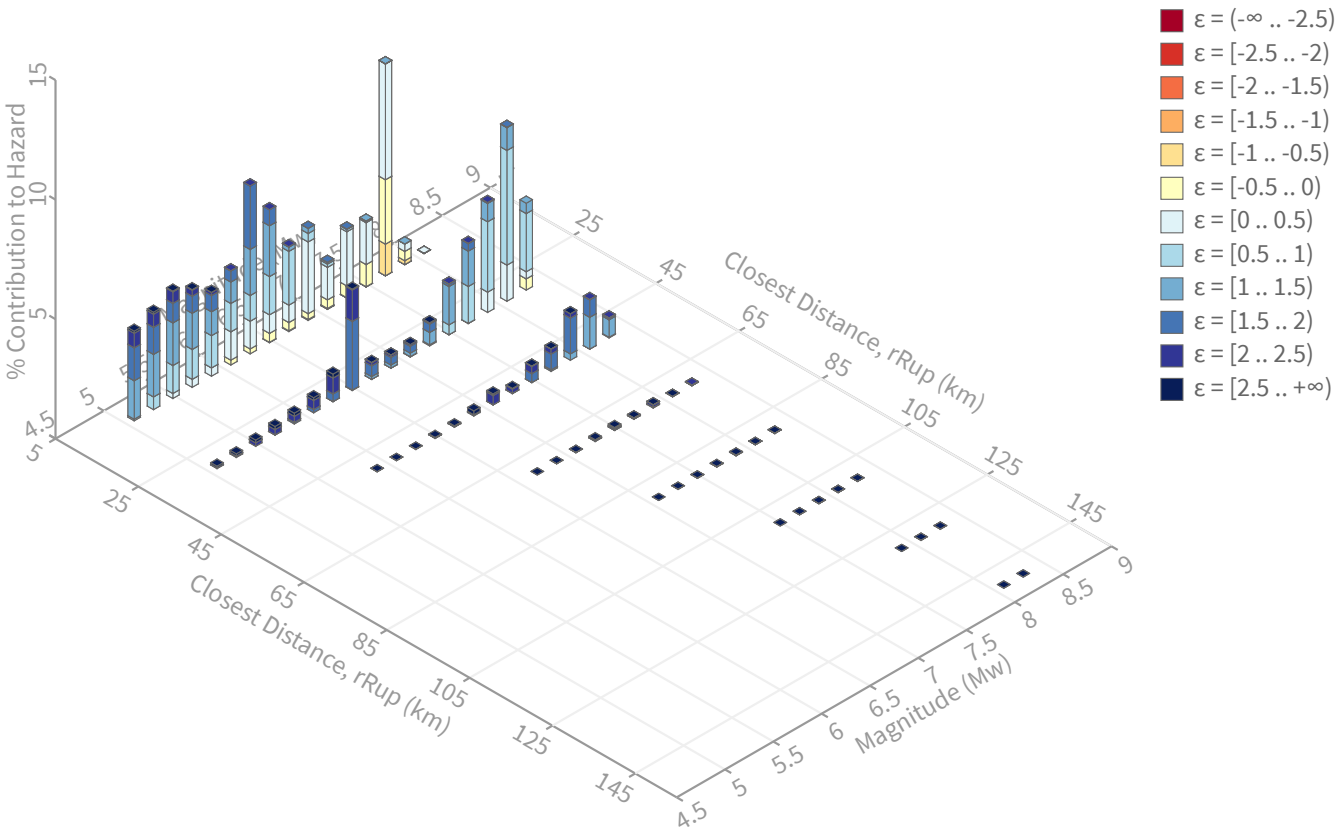
Please select “Edition”, “Location” & “Site Class” above to compute a hazard curve.

Compute Hazard Curve

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 475 yrs
Exceedance rate: 0.0021052632 yr^{-1}
PGA ground motion: 0.37936899 g

Recovered targets

Return period: 506.33526 yrs
Exceedance rate: 0.001974976 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.15 %

Mean (for all sources)

r: 18.63 km
m: 6.88
ε_0: 0.96 σ

Mode (largest r-m bin)

r: 9.75 km
m: 7.71
ε_0: -0.07 σ
Contribution: 8.86 %

Mode (largest ε_0 bin)

r: 9.75 km
m: 7.71
ε_0: 0.1 σ
Contribution: 4.84 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31	System							32.86
Elsinore (Temecula) rev [0]		9.74	7.38	0.11	117.249°W	33.590°N	220.88	10.26
San Jacinto (Stepovers Combined) [2]		24.57	7.98	0.74	116.983°W	33.802°N	48.17	9.81
Elsinore (Glen Ivy) rev [3]		18.08	6.42	1.51	117.373°W	33.685°N	280.67	2.77
Elsinore (Glen Ivy) rev [2]		24.00	6.49	1.88	117.428°W	33.721°N	287.76	2.33
San Andreas (San Bernardino S) [6]		47.51	7.91	1.64	116.820°W	33.959°N	44.57	2.09
Elsinore (Stepovers Combined) [1]		10.53	6.65	0.60	117.281°W	33.612°N	242.27	1.32
UC33brAvg_FM32	System							32.77
Elsinore (Temecula) rev [0]		9.74	7.42	0.08	117.249°W	33.590°N	220.88	10.13
San Jacinto (Stepovers Combined) [2]		24.57	7.98	0.74	116.983°W	33.802°N	48.17	9.76
Elsinore (Glen Ivy) rev [3]		18.08	6.42	1.52	117.373°W	33.685°N	280.67	2.83
Elsinore (Glen Ivy) rev [2]		24.00	6.51	1.86	117.428°W	33.721°N	287.76	2.40
San Andreas (San Bernardino S) [6]		47.51	7.91	1.63	116.820°W	33.959°N	44.57	2.10
Elsinore (Stepovers Combined) [1]		10.53	6.69	0.57	117.281°W	33.612°N	242.27	1.38
UC33brAvg_FM31 (opt)	Grid							17.19
PointSourceFinite: -117.181, 33.741		9.96	5.84	0.97	117.181°W	33.741°N	0.00	2.23
PointSourceFinite: -117.181, 33.741		9.96	5.84	0.97	117.181°W	33.741°N	0.00	2.23
PointSourceFinite: -117.181, 33.705		7.31	5.71	0.67	117.181°W	33.705°N	0.00	1.80
PointSourceFinite: -117.181, 33.705		7.31	5.71	0.67	117.181°W	33.705°N	0.00	1.80
PointSourceFinite: -117.181, 33.714		8.26	5.57	0.92	117.181°W	33.714°N	0.00	1.14
PointSourceFinite: -117.181, 33.714		8.26	5.57	0.92	117.181°W	33.714°N	0.00	1.14
PointSourceFinite: -117.181, 33.813		16.32	5.99	1.57	117.181°W	33.813°N	0.00	1.05
PointSourceFinite: -117.181, 33.813		16.32	5.99	1.57	117.181°W	33.813°N	0.00	1.05
UC33brAvg_FM32 (opt)	Grid							17.17
PointSourceFinite: -117.181, 33.741		9.97	5.84	0.97	117.181°W	33.741°N	0.00	2.23
PointSourceFinite: -117.181, 33.741		9.97	5.84	0.97	117.181°W	33.741°N	0.00	2.23
PointSourceFinite: -117.181, 33.705		7.31	5.71	0.67	117.181°W	33.705°N	0.00	1.80
PointSourceFinite: -117.181, 33.705		7.31	5.71	0.67	117.181°W	33.705°N	0.00	1.80
PointSourceFinite: -117.181, 33.714		8.26	5.57	0.92	117.181°W	33.714°N	0.00	1.14
PointSourceFinite: -117.181, 33.714		8.26	5.57	0.92	117.181°W	33.714°N	0.00	1.14
PointSourceFinite: -117.181, 33.813		16.32	5.99	1.57	117.181°W	33.813°N	0.00	1.05
PointSourceFinite: -117.181, 33.813		16.32	5.99	1.57	117.181°W	33.813°N	0.00	1.05

*** Deaggregation of Seismic Hazard at One Period of Spectral Acceleration ***
*** Data from Dynamic: Conterminous U.S. 2014 (v4.1.1) ****
PSHA Deaggregation. %contributions.
site: Test
longitude: 117.181°W
latitude: 33.655°E
imt: Peak ground acceleration
vs30 = 537 m/s (Site class C)
return period: 475 yrs.
#This deaggregation corresponds to: Total
Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:
Deaggregation targets:
Return period: 475 yrs
Exceedance rate: 0.0021052632 yr^{-1}
PGA ground motion: 0.37936899 g
Recovered targets:
Return period: 506.33526 yrs
Exceedance rate: 0.001974976 yr^{-1}
Totals:
Binned: 100 %
Residual: 0 %
Trace: 0.15 %
Mean (for all sources):
r: 18.63 km
m: 6.88
ε_0: 0.96 σ
Mode (largest r-m bin):
r: 9.75 km
m: 7.71
ε_0: -0.07 σ
Contribution: 8.86 %
Mode (largest ε_0 bin):
r: 9.75 km
m: 7.71
ε_0: 0.1 σ
Contribution: 4.84 %
Discretization:
r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ
Epsilon keys:
ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)

ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Closest Distance, rRup (km)	Magnitude (Mw)	ALL_ε	ε=[2.5,∞)	ε=[2,2.5)	ε=[1.5,2)	ε=[1,1.5)	ε=[0.5,1)	ε=(-∞,0.5)	ε=[-0.5,∞)	ε=[-1,-0.5)	ε=[-1.5,-1)	ε=[-2,-1.5)	ε=[-2.5,-2)	ε=(-∞,-2.5)
150	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150	8.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	7.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	8.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	7.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	7.7	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	7.9	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	8.3	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.5	0.004	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.7	0.018	0.004	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.9	0.034	0.012	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	8.1	0.004	0.000	0.004	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	8.3	0.013	0.003	0.010	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	6.7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	6.9	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	7.1	0.009	0.000	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	7.3	0.069	0.015	0.054	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

0.000	0.000	0.000	0.000								
70	7.5	0.114	0.000	0.061	0.053	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
70	7.7	0.054	0.004	0.038	0.012	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
70	7.9	0.133	0.028	0.100	0.005	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
70	8.1	0.019	0.013	0.006	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
70	8.3	0.024	0.001	0.021	0.002	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	5.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	6.1	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	6.3	0.011	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	6.5	0.034	0.001	0.033	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	6.7	0.052	0.008	0.044	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	6.9	0.207	0.053	0.154	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	7.1	0.452	0.002	0.388	0.062	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	7.3	0.214	0.018	0.174	0.022	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	7.5	0.682	0.001	0.372	0.299	0.010	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	7.7	0.932	0.065	0.659	0.207	0.001	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	7.9	1.941	0.264	1.497	0.180	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	8.1	2.068	0.000	1.329	0.729	0.009	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	8.3	0.832	0.029	0.728	0.075	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	5.1	0.098	0.031	0.067	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	5.3	0.145	0.060	0.085	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	5.5	0.254	0.143	0.111	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	5.7	0.356	0.013	0.218	0.125	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	5.9	0.446	0.069	0.251	0.126	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	6.1	0.626	0.135	0.385	0.105	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								

30	6.3	1.143	0.005	0.318	0.665	0.155	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	6.5	4.234	0.020	2.870	1.314	0.030	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	6.7	0.701	0.000	0.116	0.448	0.127	0.011	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	6.9	0.548	0.005	0.127	0.320	0.092	0.004	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	7.1	0.518	0.016	0.147	0.285	0.070	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	7.3	0.960	0.046	0.515	0.349	0.050	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	7.5	2.121	0.001	0.412	1.604	0.099	0.006	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	7.7	3.348	0.009	1.544	1.478	0.315	0.002	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	7.9	4.592	0.848	2.944	0.766	0.034	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	8.1	7.270	1.512	4.797	0.953	0.008	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	8.3	3.631	0.470	0.298	2.434	0.430	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	5.1	3.742	0.067	1.609	1.375	0.610	0.080	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	5.3	4.069	0.532	1.780	1.132	0.550	0.075	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	5.5	4.483	0.208	1.171	1.782	0.817	0.480	0.024	0.000	0.000
0.000		0.000	0.000	0.000						
10	5.7	4.078	0.334	1.251	1.514	0.711	0.249	0.019	0.000	0.000
0.000		0.000	0.000	0.000						
10	5.9	3.498	0.346	1.351	0.997	0.678	0.127	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.1	3.935	0.203	1.185	1.187	0.896	0.461	0.004	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.3	7.020	0.205	1.160	1.075	1.928	2.652	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.5	5.559	0.018	0.373	0.777	1.600	2.123	0.668	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.7	3.545	0.031	0.346	0.728	2.249	0.172	0.019	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.9	3.844	0.037	0.244	3.002	0.352	0.210	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.1	1.955	0.002	0.029	0.361	1.360	0.133	0.069	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.3	2.885	0.003	0.014	0.495	2.262	0.092	0.019	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.5	2.748	0.001	0.008	0.926	1.751	0.058	0.004	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.7	8.860	0.000	0.000	1.322	2.693	4.841	0.004	0.000	0.000

0.000		0.000	0.000	0.000							
10	7.9	0.860	0.000	0.000	0.161	0.391	0.307	0.001	0.000	0.000	
0.000		0.000	0.000	0.000							
10	8.1	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.000		0.000	0.000	0.000							

Principal Sources (faults, subduction, random seismicity having > 3% contribution
UC33brAvg_FM31:
Percent Contributed: 32.86
Distance (km): null
Magnitude: null
Epsilon (mean values): null
Elsinore (Temecula) rev [0]:
Percent Contributed: 10.26
Distance (km): 9.7411202
Magnitude: 7.3778576
Epsilon (mean values): 0.10600919
Azimuth: 220.88047
Latitude: 33.589792
Longitude: -117.24926
San Jacinto (Stepovers Combined) [2]:
Percent Contributed: 9.81
Distance (km): 24.568702
Magnitude: 7.9789132
Epsilon (mean values): 0.73585997
Azimuth: 48.17305
Latitude: 33.802499
Longitude: -116.98307
Elsinore (Glen Ivy) rev [3]:
Percent Contributed: 2.77
Distance (km): 18.081327
Magnitude: 6.4239123
Epsilon (mean values): 1.5147146
Azimuth: 280.67093
Latitude: 33.68522
Longitude: -117.3727
Elsinore (Glen Ivy) rev [2]:
Percent Contributed: 2.33
Distance (km): 23.997644
Magnitude: 6.4862353
Epsilon (mean values): 1.8830013
Azimuth: 287.76176
Latitude: 33.72083
Longitude: -117.4279
San Andreas (San Bernardino S) [6]:
Percent Contributed: 2.09
Distance (km): 47.511788
Magnitude: 7.908257
Epsilon (mean values): 1.6359348
Azimuth: 44.567261

Latitude: 33.95911
Longitude: -116.8198
Elsinore (Stepovers Combined) [1]:
Percent Contributed: 1.32
Distance (km): 10.532427
Magnitude: 6.6505304
Epsilon (mean values): 0.60452375
Azimuth: 242.27106
Latitude: 33.6116
Longitude: -117.28099
UC33brAvg_FM32:
Percent Contributed: 32.77
Distance (km): null
Magnitude: null
Epsilon (mean values): null
Elsinore (Temecula) rev [0]:
Percent Contributed: 10.13
Distance (km): 9.7411202
Magnitude: 7.4223076
Epsilon (mean values): 0.080182155
Azimuth: 220.88047
Latitude: 33.589792
Longitude: -117.24926
San Jacinto (Stepovers Combined) [2]:
Percent Contributed: 9.76
Distance (km): 24.568702
Magnitude: 7.9758141
Epsilon (mean values): 0.73819
Azimuth: 48.17305
Latitude: 33.802499
Longitude: -116.98307
Elsinore (Glen Ivy) rev [3]:
Percent Contributed: 2.83
Distance (km): 18.081327
Magnitude: 6.4194796
Epsilon (mean values): 1.5171134
Azimuth: 280.67093
Latitude: 33.68522
Longitude: -117.3727
Elsinore (Glen Ivy) rev [2]:
Percent Contributed: 2.4
Distance (km): 23.997644
Magnitude: 6.5132589
Epsilon (mean values): 1.8595695
Azimuth: 287.76176
Latitude: 33.72083
Longitude: -117.4279
San Andreas (San Bernardino S) [6]:
Percent Contributed: 2.1

Distance (km): 47.511788
Magnitude: 7.9109207
Epsilon (mean values): 1.6339778
Azimuth: 44.567261
Latitude: 33.95911
Longitude: -116.8198
Elsinore (Stepovers Combined) [1]:
Percent Contributed: 1.38
Distance (km): 10.532427
Magnitude: 6.6875457
Epsilon (mean values): 0.57465367
Azimuth: 242.27106
Latitude: 33.6116
Longitude: -117.28099
UC33brAvg_FM31 (opt):
Percent Contributed: 17.19
Distance (km): null
Magnitude: null
Epsilon (mean values): null
PointSourceFinite: -117.181, 33.741:
Percent Contributed: 2.23
Distance (km): 9.9638883
Magnitude: 5.8386712
Epsilon (mean values): 0.97401884
Azimuth: 0
Latitude: 33.740773
Longitude: -117.18117
PointSourceFinite: -117.181, 33.741:
Percent Contributed: 2.23
Distance (km): 9.9638851
Magnitude: 5.8386723
Epsilon (mean values): 0.97401754
Azimuth: 0
Latitude: 33.740773
Longitude: -117.18117
PointSourceFinite: -117.181, 33.705:
Percent Contributed: 1.8
Distance (km): 7.3071047
Magnitude: 5.7075514
Epsilon (mean values): 0.66882479
Azimuth: 0
Latitude: 33.704801
Longitude: -117.18117
PointSourceFinite: -117.181, 33.705:
Percent Contributed: 1.8
Distance (km): 7.3071047
Magnitude: 5.7075514
Epsilon (mean values): 0.66882479
Azimuth: 0

Latitude: 33.704801
Longitude: -117.18117
PointSourceFinite: -117.181, 33.714:
Percent Contributed: 1.14
Distance (km): 8.2648514
Magnitude: 5.5712992
Epsilon (mean values): 0.92323308
Azimuth: 0
Latitude: 33.713794
Longitude: -117.18117
PointSourceFinite: -117.181, 33.714:
Percent Contributed: 1.14
Distance (km): 8.2648514
Magnitude: 5.5712992
Epsilon (mean values): 0.92323308
Azimuth: 0
Latitude: 33.713794
Longitude: -117.18117
PointSourceFinite: -117.181, 33.813:
Percent Contributed: 1.05
Distance (km): 16.317243
Magnitude: 5.9929076
Epsilon (mean values): 1.5672703
Azimuth: 0
Latitude: 33.812719
Longitude: -117.18117
PointSourceFinite: -117.181, 33.813:
Percent Contributed: 1.05
Distance (km): 16.317272
Magnitude: 5.9929014
Epsilon (mean values): 1.5672776
Azimuth: 0
Latitude: 33.812719
Longitude: -117.18117
UC33brAvg_FM32 (opt):
Percent Contributed: 17.17
Distance (km): null
Magnitude: null
Epsilon (mean values): null
PointSourceFinite: -117.181, 33.741:
Percent Contributed: 2.23
Distance (km): 9.9651473
Magnitude: 5.83814
Epsilon (mean values): 0.97461225
Azimuth: 0
Latitude: 33.740773
Longitude: -117.18117
PointSourceFinite: -117.181, 33.741:
Percent Contributed: 2.23

Distance (km): 9.9651441
Magnitude: 5.8381411
Epsilon (mean values): 0.97461095
Azimuth: 0
Latitude: 33.740773
Longitude: -117.18117
PointSourceFinite: -117.181, 33.705:
Percent Contributed: 1.8
Distance (km): 7.3076388
Magnitude: 5.7070967
Epsilon (mean values): 0.66926547
Azimuth: 0
Latitude: 33.704801
Longitude: -117.18117
PointSourceFinite: -117.181, 33.705:
Percent Contributed: 1.8
Distance (km): 7.3076388
Magnitude: 5.7070967
Epsilon (mean values): 0.66926547
Azimuth: 0
Latitude: 33.704801
Longitude: -117.18117
PointSourceFinite: -117.181, 33.714:
Percent Contributed: 1.14
Distance (km): 8.2648749
Magnitude: 5.5712844
Epsilon (mean values): 0.92324818
Azimuth: 0
Latitude: 33.713794
Longitude: -117.18117
PointSourceFinite: -117.181, 33.714:
Percent Contributed: 1.14
Distance (km): 8.2648749
Magnitude: 5.5712844
Epsilon (mean values): 0.92324818
Azimuth: 0
Latitude: 33.713794
Longitude: -117.18117
PointSourceFinite: -117.181, 33.813:
Percent Contributed: 1.05
Distance (km): 16.319249
Magnitude: 5.9924082
Epsilon (mean values): 1.5678376
Azimuth: 0
Latitude: 33.812719
Longitude: -117.18117
PointSourceFinite: -117.181, 33.813:
Percent Contributed: 1.05
Distance (km): 16.319277

Magnitude: 5.992402
Epsilon (mean values): 1.5678449
Azimuth: 0
Latitude: 33.812719
Longitude: -117.18117
PSHA Deaggregation. %contributions.
site: Test
longitude: 117.181°W
latitude: 33.655°E
imt: Peak ground acceleration
vs30 = 537 m/s (Site class C)
return period: 475 yrs.
#This deaggregation corresponds to: Abrahamson, Silva & Kamai (2014)
Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:
Deaggregation targets:
Return period: 475 yrs
Exceedance rate: 0.0021052632 yr^{-1}
PGA ground motion: 0.37936899 g
Recovered targets:
Return period: 506.33526 yrs
Exceedance rate: 0.001974976 yr^{-1}
Totals:
Binned: 23.12 %
Residual: 0 %
Trace: 0.09 %
Mean (for all sources):
r: 19.49 km
m: 6.84
ε_0: 1.06 σ
Mode (largest r-m bin):
r: 9.75 km
m: 7.71
ε_0: 0.03 σ
Contribution: 1.85 %
Mode (largest ε_0 bin):
r: 24.59 km
m: 8.1
ε_0: 0.7 σ
Contribution: 1.59 %
Discretization:
r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ
Epsilon keys:
ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)

ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Closest Distance, rRup (km)	Magnitude (Mw)	ALL_ε	ε=[2.5,∞)	ε=[2,2.5)	ε=[1.5,2)	ε=[1,1.5)	ε=[0.5,1)	ε=(-∞,0.5)	ε=[-0.5,∞)	ε=[-1,-0.5)	ε=[-1.5,-1)	ε=[-2,-1.5)	ε=[-2.5,-2)	ε=(-∞,-2.5)
150	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
150	8.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	7.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	8.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	7.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	7.7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	7.9	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	8.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.5	0.003	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.7	0.007	0.002	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.9	0.014	0.009	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	8.1	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	8.3	0.005	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	6.7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	6.9	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	7.1	0.005	0.000	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

0.000	0.000	0.000	0.000								
70	7.3	0.035	0.012	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
70	7.5	0.046	0.000	0.032	0.015	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
70	7.7	0.018	0.001	0.014	0.003	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
70	7.9	0.043	0.018	0.025	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
70	8.1	0.006	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
70	8.3	0.008	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
50	6.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
50	6.3	0.005	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
50	6.5	0.009	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
50	6.7	0.014	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
50	6.9	0.069	0.023	0.046	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
50	7.1	0.139	0.000	0.130	0.009	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
50	7.3	0.064	0.007	0.056	0.001	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
50	7.5	0.213	0.000	0.161	0.052	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
50	7.7	0.284	0.018	0.260	0.006	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
50	7.9	0.546	0.048	0.497	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
50	8.1	0.580	0.562	0.018	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
50	8.3	0.230	0.000	0.230	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	5.1	0.035	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	5.3	0.050	0.018	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	5.5	0.069	0.038	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	5.7	0.094	0.058	0.036	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	5.9	0.118	0.007	0.072	0.039	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	6.1	0.172	0.029	0.115	0.028	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								

30	6.3	0.262	0.076	0.119	0.066	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	6.5	0.876	0.001	0.823	0.047	0.004	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	6.7	0.161	0.002	0.122	0.035	0.002	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	6.9	0.126	0.017	0.091	0.018	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	7.1	0.123	0.028	0.080	0.015	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	7.3	0.230	0.003	0.134	0.093	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	7.5	0.486	0.012	0.452	0.022	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	7.7	0.779	0.361	0.343	0.075	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	7.9	1.021	0.958	0.063	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	8.1	1.614	1.593	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	8.3	0.811	0.811	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	5.1	1.349	0.656	0.509	0.177	0.007	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	5.3	1.184	0.118	0.552	0.342	0.172	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	5.5	1.039	0.279	0.460	0.124	0.174	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	5.7	0.908	0.318	0.347	0.149	0.093	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	5.9	0.771	0.273	0.314	0.184	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	6.1	0.853	0.233	0.320	0.208	0.093	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	6.3	1.367	0.282	0.152	0.336	0.597	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	6.5	1.130	0.057	0.131	0.368	0.461	0.113	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	6.7	0.730	0.037	0.101	0.536	0.050	0.005	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	6.9	0.802	0.062	0.601	0.081	0.058	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	7.1	0.406	0.030	0.333	0.028	0.015	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	7.3	0.599	0.012	0.557	0.027	0.002	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	7.5	0.575	0.006	0.558	0.011	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	7.7	1.851	0.000	0.421	1.430	0.001	0.000	0.000	0.000	0.000	0.000

0.000	0.000	0.000	0.000						
10 7.9	0.181	0.000	0.180	0.001	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
10 8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						

Principal Sources (faults, subduction, random seismicity having > 3% contribution
UC33brAvg_FM31:
Percent Contributed: 7.3
Distance (km): null
Magnitude: null
Epsilon (mean values): null
San Jacinto (Stepovers Combined) [2]:
Percent Contributed: 2.18
Distance (km): 24.568702
Magnitude: 7.9783476
Epsilon (mean values): 0.7830177
Azimuth: 48.17305
Latitude: 33.802499
Longitude: -116.98307
Elsinore (Temecula) rev [0]:
Percent Contributed: 2.13
Distance (km): 9.7411202
Magnitude: 7.3844399
Epsilon (mean values): 0.19251362
Azimuth: 220.88047
Latitude: 33.589792
Longitude: -117.24926
UC33brAvg_FM32:
Percent Contributed: 7.28
Distance (km): null
Magnitude: null
Epsilon (mean values): null
San Jacinto (Stepovers Combined) [2]:
Percent Contributed: 2.17
Distance (km): 24.568702
Magnitude: 7.9752155
Epsilon (mean values): 0.78541017
Azimuth: 48.17305
Latitude: 33.802499
Longitude: -116.98307
Elsinore (Temecula) rev [0]:
Percent Contributed: 2.1
Distance (km): 9.7411202
Magnitude: 7.4269742
Epsilon (mean values): 0.17330131
Azimuth: 220.88047
Latitude: 33.589792
Longitude: -117.24926
UC33brAvg_FM31 (opt):

Percent Contributed: 4.27
Distance (km): null
Magnitude: null
Epsilon (mean values): null
UC33brAvg_FM32 (opt):
Percent Contributed: 4.26
Distance (km): null
Magnitude: null
Epsilon (mean values): null
PSHA Deaggregation. %contributions.
site: Test
longitude: 117.181°W
latitude: 33.655°E
imt: Peak ground acceleration
vs30 = 537 m/s (Site class C)
return period: 475 yrs.
#This deaggregation corresponds to: Boore, Stewart, Seyhan & Atkinson (2014)
Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:
Deaggregation targets:
Return period: 475 yrs
Exceedance rate: 0.0021052632 yr^{-1}
PGA ground motion: 0.37936899 g
Recovered targets:
Return period: 506.33526 yrs
Exceedance rate: 0.001974976 yr^{-1}
Totals:
Binned: 23.33 %
Residual: 0 %
Trace: 0.1 %
Mean (for all sources):
r: 18.68 km
m: 6.81
ε_0: 1.01 σ
Mode (largest r-m bin):
r: 14.57 km
m: 6.27
ε_0: 1.13 σ
Contribution: 1.77 %
Mode (largest ε_0 bin):
r: 9.74 km
m: 7.71
ε_0: 0.09 σ
Contribution: 1.75 %
Discretization:
r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ
Epsilon keys:
ε0: [-∞ .. -2.5)

ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Closest Distance, rRup (km)	Magnitude (Mw)	ALL_ε	ε=[2.5,∞)	ε=[2,2.5)	ε=[1.5,2)	ε=[1,1.5)	ε=[0.5,1)	ε=(-∞,0.5)	ε=[-0.5,∞)	ε=[-1,-0.5)	ε=[-1.5,-1)	ε=[-2,-1.5)	ε=[-2.5,-2)	ε=(-∞,-2.5)
130	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	8.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	7.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	8.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.7	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.9	0.007	0.001	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	8.1	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	8.3	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	6.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	7.1	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	7.3	0.014	0.000	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	7.5	0.026	0.010	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	7.7	0.009	0.006	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	7.9	0.031	0.001	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	8.1	0.004	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	8.3	0.005	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

0.000	0.000	0.000	0.000							
50 6.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
50 6.3	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
50 6.5	0.009	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
50 6.7	0.016	0.000	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
50 6.9	0.061	0.010	0.051	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
50 7.1	0.116	0.102	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
50 7.3	0.055	0.000	0.052	0.003	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
50 7.5	0.164	0.097	0.066	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
50 7.7	0.211	0.177	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
50 7.9	0.473	0.013	0.457	0.003	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
50 8.1	0.482	0.255	0.226	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
50 8.3	0.189	0.187	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
30 5.3	0.013	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
30 5.5	0.076	0.047	0.029	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
30 5.7	0.116	0.076	0.040	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
30 5.9	0.138	0.024	0.078	0.036	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
30 6.1	0.169	0.036	0.108	0.025	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
30 6.3	0.329	0.001	0.054	0.258	0.017	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
30 6.5	1.127	0.001	1.070	0.048	0.008	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
30 6.7	0.170	0.004	0.132	0.032	0.001	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
30 6.9	0.127	0.019	0.092	0.016	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
30 7.1	0.120	0.001	0.040	0.063	0.016	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
30 7.3	0.213	0.001	0.118	0.093	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							
30 7.5	0.463	0.001	0.443	0.019	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000							

30	7.7	0.733	0.297	0.335	0.102	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	7.9	0.994	0.000	0.935	0.059	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	8.1	1.587	1.568	0.019	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	8.3	0.792	0.792	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	5.1	0.532	0.160	0.270	0.077	0.024	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	5.3	0.970	0.178	0.446	0.231	0.086	0.030	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	5.5	1.493	0.208	0.508	0.455	0.183	0.139	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	5.7	1.311	0.334	0.334	0.425	0.205	0.013	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	5.9	1.021	0.333	0.365	0.129	0.194	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.1	1.039	0.203	0.343	0.179	0.259	0.056	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.3	1.770	0.153	0.216	0.223	0.274	0.904	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.5	1.226	0.078	0.138	0.355	0.582	0.073	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.7	0.726	0.048	0.087	0.541	0.049	0.002	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.9	0.771	0.036	0.585	0.096	0.055	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.1	0.391	0.028	0.310	0.034	0.019	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.3	0.572	0.014	0.534	0.020	0.004	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.5	0.537	0.003	0.512	0.022	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.7	1.754	0.000	0.000	1.752	0.002	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.9	0.168	0.000	0.006	0.162	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						

Principal Sources (faults, subduction, random seismicity having > 3% contribution
UC33brAvg_FM31:
Percent Contributed: 7.28
Distance (km): null
Magnitude: null
Epsilon (mean values): null
San Jacinto (Stepovers Combined) [2]:
Percent Contributed: 2.14
Distance (km): 24.568702

Magnitude: 7.9786717
Epsilon (mean values): 0.79905319
Azimuth: 48.17305
Latitude: 33.802499
Longitude: -116.98307
Elsinore (Temecula) rev [0]:
Percent Contributed: 2.04
Distance (km): 9.7411202
Magnitude: 7.3723809
Epsilon (mean values): 0.24916237
Azimuth: 220.88047
Latitude: 33.589792
Longitude: -117.24926
UC33brAvg_FM32:
Percent Contributed: 7.25
Distance (km): null
Magnitude: null
Epsilon (mean values): null
San Jacinto (Stepovers Combined) [2]:
Percent Contributed: 2.12
Distance (km): 24.568702
Magnitude: 7.9756494
Epsilon (mean values): 0.80131809
Azimuth: 48.17305
Latitude: 33.802499
Longitude: -116.98307
Elsinore (Temecula) rev [0]:
Percent Contributed: 2.01
Distance (km): 9.7411202
Magnitude: 7.4177102
Epsilon (mean values): 0.22887896
Azimuth: 220.88047
Latitude: 33.589792
Longitude: -117.24926
UC33brAvg_FM31 (opt):
Percent Contributed: 4.4
Distance (km): null
Magnitude: null
Epsilon (mean values): null
UC33brAvg_FM32 (opt):
Percent Contributed: 4.4
Distance (km): null
Magnitude: null
Epsilon (mean values): null
PSHA Deaggregation. %contributions.
site: Test
longitude: 117.181°W
latitude: 33.655°E
imt: Peak ground acceleration

vs30 = 537 m/s (Site class C)
return period: 475 yrs.
#This deaggregation corresponds to: Campbell & Bozorgnia (2014)
Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:
Deaggregation targets:
Return period: 475 yrs
Exceedance rate: 0.0021052632 yr^{-1}
PGA ground motion: 0.37936899 g
Recovered targets:
Return period: 506.33526 yrs
Exceedance rate: 0.001974976 yr^{-1}
Totals:
Binned: 15.06 %
Residual: 0 %
Trace: 0.06 %
Mean (for all sources):
r: 16.82 km
m: 6.93
ε_0: 1.04 σ
Mode (largest r-m bin):
r: 9.75 km
m: 7.71
ε_0: 0.16 σ
Contribution: 1.66 %
Mode (largest ε_0 bin):
r: 9.74 km
m: 7.71
ε_0: 0.16 σ
Contribution: 1.65 %
Discretization:
r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ
Epsilon keys:
ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]
Closest Distance, rRup (km) Magnitude (Mw) ALL_ε ε=[2.5,∞) ε=[2,2.5) ε=[1.5,2) ε=[1,1.5) ε=[0.5,1) ε=(-∞,0.5) ε=[-0.5,∞) ε=[-1,-0.5) ε=[-1.5,-1) ε=[-2,-1.5) ε=[-2.5,-2) ε=(-∞,-2.5)

110 7.7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
110 7.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
110 8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
110 8.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
90 7.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
90 7.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
90 7.7	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
90 7.9	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
90 8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
90 8.3	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
70 6.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
70 7.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
70 7.3	0.003	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
70 7.5	0.007	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
70 7.7	0.005	0.002	0.003	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
70 7.9	0.011	0.006	0.005	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
70 8.1	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
70 8.3	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
50 6.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
50 6.5	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
50 6.7	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
50 6.9	0.016	0.000	0.016	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
50 7.1	0.061	0.045	0.016	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
50 7.3	0.023	0.012	0.011	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000						
50 7.5	0.065	0.002	0.056	0.006	0.000	0.000	0.000	0.000	0.000

0.000	0.000	0.000	0.000								
50	7.7	0.089	0.013	0.076	0.001	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	7.9	0.176	0.014	0.162	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	8.1	0.182	0.173	0.009	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
50	8.3	0.071	0.071	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	5.5	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	5.7	0.006	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	5.9	0.019	0.009	0.010	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	6.1	0.059	0.003	0.037	0.018	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	6.3	0.169	0.023	0.100	0.046	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	6.5	0.837	0.001	0.039	0.788	0.010	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	6.7	0.119	0.001	0.086	0.028	0.004	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	6.9	0.088	0.007	0.053	0.028	0.001	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	7.1	0.078	0.009	0.049	0.021	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	7.3	0.144	0.000	0.030	0.089	0.024	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	7.5	0.309	0.000	0.287	0.015	0.006	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	7.7	0.447	0.000	0.399	0.046	0.002	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	7.9	0.591	0.000	0.569	0.022	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	8.1	0.895	0.000	0.887	0.008	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	8.3	0.430	0.000	0.430	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	5.1	0.194	0.093	0.084	0.017	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	5.3	0.292	0.034	0.177	0.074	0.006	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	5.5	0.431	0.236	0.133	0.039	0.023	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	5.7	0.472	0.057	0.242	0.120	0.034	0.019	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	5.9	0.495	0.187	0.157	0.087	0.063	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								

10	6.1	0.698	0.190	0.248	0.120	0.136	0.004	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.3	1.445	0.024	0.255	0.272	0.221	0.672	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.5	1.260	0.120	0.093	0.440	0.477	0.130	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.7	0.777	0.121	0.041	0.587	0.024	0.005	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	6.9	0.792	0.064	0.606	0.073	0.049	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.1	0.386	0.030	0.310	0.028	0.019	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.3	0.557	0.011	0.522	0.013	0.011	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.5	0.524	0.003	0.500	0.017	0.004	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.7	1.661	0.005	1.654	0.001	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.9	0.160	0.000	0.016	0.144	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						

Principal Sources (faults, subduction, random seismicity having > 3% contribution
UC33brAvg_FM31:
Percent Contributed: 5.35
Distance (km): null
Magnitude: null
Epsilon (mean values): null
Elsinore (Temecula) rev [0]:
Percent Contributed: 2.02
Distance (km): 9.7411202
Magnitude: 7.3467666
Epsilon (mean values): 0.27658013
Azimuth: 220.88047
Latitude: 33.589792
Longitude: -117.24926
San Jacinto (Stepovers Combined) [2]:
Percent Contributed: 1.26
Distance (km): 24.568702
Magnitude: 7.9601794
Epsilon (mean values): 1.1602125
Azimuth: 48.17305
Latitude: 33.802499
Longitude: -116.98307
UC33brAvg_FM32:
Percent Contributed: 5.33
Distance (km): null
Magnitude: null
Epsilon (mean values): null

Elsinore (Temecula) rev [0]:
Percent Contributed: 1.99
Distance (km): 9.7411202
Magnitude: 7.3949539
Epsilon (mean values): 0.2532041
Azimuth: 220.88047
Latitude: 33.589792
Longitude: -117.24926
San Jacinto (Stepovers Combined) [2]:
Percent Contributed: 1.25
Distance (km): 24.568702
Magnitude: 7.958108
Epsilon (mean values): 1.1616037
Azimuth: 48.17305
Latitude: 33.802499
Longitude: -116.98307
UC33brAvg_FM31 (opt):
Percent Contributed: 2.19
Distance (km): null
Magnitude: null
Epsilon (mean values): null
UC33brAvg_FM32 (opt):
Percent Contributed: 2.19
Distance (km): null
Magnitude: null
Epsilon (mean values): null
PSHA Deaggregation. %contributions.
site: Test
longitude: 117.181°W
latitude: 33.655°E
imt: Peak ground acceleration
vs30 = 537 m/s (Site class C)
return period: 475 yrs.
#This deaggregation corresponds to: Chiou & Youngs (2014)
Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:
Deaggregation targets:
Return period: 475 yrs
Exceedance rate: 0.0021052632 yr^{-1}
PGA ground motion: 0.37936899 g
Recovered targets:
Return period: 506.33526 yrs
Exceedance rate: 0.001974976 yr^{-1}
Totals:
Binned: 19.78 %
Residual: 0 %
Trace: 0.11 %
Mean (for all sources):
r: 18.1 km
m: 6.99

ε_0: 0.89 σ
Mode (largest r-m bin):
r: 9.75 km
m: 7.71
ε_0: -0.15 σ
Contribution: 2.13 %
Mode (largest ε_0 bin):
r: 9.74 km
m: 7.71
ε_0: -0.15 σ
Contribution: 2.11 %
Discretization:
r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ
Epsilon keys:
ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Closest Distance, rRup (km)	Magnitude (Mw)	ALL_ε	ε=[2.5,∞)	ε=[2,2.5)	ε=[1.5,2)	ε=[1,1.5)	ε=[0.5,1)	ε=(-∞,0.5)	ε=[-0.5,∞)	ε=[-1,-0.5)	ε=[-1.5,-1)	ε=[-2,-1.5)	ε=[-2.5,-2)	ε=(-∞,-2.5)
130	7.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	8.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	7.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	7.7	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	7.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	8.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

90	7.5	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
90	7.7	0.006	0.002	0.004	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
90	7.9	0.007	0.002	0.005	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
90	8.1	0.001	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
90	8.3	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	6.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	7.1	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	7.3	0.010	0.003	0.007	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	7.5	0.021	0.000	0.013	0.008	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	7.7	0.016	0.002	0.012	0.001	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	7.9	0.028	0.003	0.024	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	8.1	0.004	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	8.3	0.005	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	6.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	6.7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	6.9	0.006	0.000	0.006	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	7.1	0.052	0.000	0.032	0.020	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	7.3	0.033	0.004	0.023	0.006	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	7.5	0.131	0.000	0.027	0.099	0.004	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	7.7	0.198	0.031	0.093	0.074	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	7.9	0.386	0.008	0.363	0.015	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	8.1	0.430	0.122	0.308	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	8.3	0.177	0.175	0.002	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	5.1	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	5.3	0.008	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000

0.000	0.000	0.000	0.000								
30	5.5	0.018	0.002	0.016	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	5.7	0.032	0.018	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	5.9	0.049	0.031	0.019	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	6.1	0.079	0.006	0.056	0.017	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	6.3	0.111	0.022	0.069	0.019	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	6.5	0.426	0.001	0.019	0.398	0.007	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	6.7	0.086	0.001	0.061	0.021	0.004	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	6.9	0.085	0.014	0.045	0.023	0.003	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	7.1	0.092	0.004	0.021	0.048	0.019	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	7.3	0.188	0.014	0.108	0.041	0.025	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	7.5	0.451	0.000	0.019	0.403	0.029	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	7.7	0.730	0.003	0.314	0.325	0.088	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	7.9	1.046	0.052	0.932	0.050	0.012	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	8.1	1.652	0.009	1.626	0.017	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
30	8.3	0.831	0.831	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	5.1	0.662	0.223	0.310	0.097	0.032	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	5.3	0.766	0.403	0.242	0.083	0.039	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	5.5	0.786	0.121	0.385	0.187	0.091	0.002	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	5.7	0.755	0.292	0.266	0.089	0.108	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	5.9	0.684	0.288	0.252	0.080	0.064	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	6.1	0.808	0.230	0.308	0.112	0.159	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	6.3	1.216	0.012	0.268	0.146	0.311	0.478	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	6.5	0.990	0.067	0.145	0.317	0.110	0.352	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000								
10	6.7	0.733	0.006	0.091	0.059	0.532	0.038	0.007	0.000	0.000	0.000
0.000	0.000	0.000	0.000								

10	6.9	0.850	0.014	0.061	0.686	0.041	0.048	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.1	0.452	0.012	0.029	0.377	0.019	0.016	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.3	0.681	0.008	0.015	0.634	0.022	0.001	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.5	0.660	0.002	0.490	0.161	0.006	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.7	2.126	0.000	0.010	2.113	0.003	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.9	0.209	0.000	0.020	0.189	0.001	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						

Principal Sources (faults, subduction, random seismicity having > 3% contribution
UC33brAvg_FM31:
Percent Contributed: 6.7
Distance (km): null
Magnitude: null
Epsilon (mean values): null
Elsinore (Temecula) rev [0]:
Percent Contributed: 2.38
Distance (km): 9.7411202
Magnitude: 7.3991692
Epsilon (mean values): 0.048420072
Azimuth: 220.88047
Latitude: 33.589792
Longitude: -117.24926
San Jacinto (Stepovers Combined) [2]:
Percent Contributed: 2.21
Distance (km): 24.568702
Magnitude: 7.9850983
Epsilon (mean values): 0.76495312
Azimuth: 48.17305
Latitude: 33.802499
Longitude: -116.98307
UC33brAvg_FM32:
Percent Contributed: 6.69
Distance (km): null
Magnitude: null
Epsilon (mean values): null
Elsinore (Temecula) rev [0]:
Percent Contributed: 2.36
Distance (km): 9.7411202
Magnitude: 7.4416077
Epsilon (mean values): 0.018510271
Azimuth: 220.88047
Latitude: 33.589792
Longitude: -117.24926

San Jacinto (Stepovers Combined) [2]:
Percent Contributed: 2.2
Distance (km): 24.568702
Magnitude: 7.9815833
Epsilon (mean values): 0.76682779
Azimuth: 48.17305
Latitude: 33.802499
Longitude: -116.98307
UC33brAvg_FM31 (opt):
Percent Contributed: 3.2
Distance (km): null
Magnitude: null
Epsilon (mean values): null
UC33brAvg_FM32 (opt):
Percent Contributed: 3.19
Distance (km): null
Magnitude: null
Epsilon (mean values): null
PSHA Deaggregation. %contributions.
site: Test
longitude: 117.181°W
latitude: 33.655°E
imt: Peak ground acceleration
vs30 = 537 m/s (Site class C)
return period: 475 yrs.
#This deaggregation corresponds to: Idriss (2014)
Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:
Deaggregation targets:
Return period: 475 yrs
Exceedance rate: 0.0021052632 yr^{-1}
PGA ground motion: 0.37936899 g
Recovered targets:
Return period: 506.33526 yrs
Exceedance rate: 0.001974976 yr^{-1}
Totals:
Binned: 18.71 %
Residual: 0 %
Trace: 0.1 %
Mean (for all sources):
r: 19.51 km
m: 6.87
ε_0: 0.79 σ
Mode (largest r-m bin):
r: 24.74 km
m: 8.1
ε_0: 0.21 σ
Contribution: 1.52 %
Mode (largest ε_0 bin):
r: 24.58 km

m: 8.1
ε_0: 0.2 σ
Contribution: 1.5 %
Discretization:
r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ
Epsilon keys:
ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Closest Distance, rRup (km)	Magnitude (Mw)	ALL_ε	ε=[2.5,∞)	ε=[2,2.5)	ε=[1.5,2)	ε=[1,1.5)	ε=[0.5,1)	ε=(-∞,0.5)	ε=[-0.5,∞)	ε=[-1,-0.5)	ε=[-1.5,-1)	ε=[-2,-1.5)	ε=[-2.5,-2)	ε=(-∞,-2.5)
130	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
130	8.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	7.7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	7.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
110	8.3	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.7	0.002	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	7.9	0.004	0.001	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	8.1	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
90	8.3	0.002	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	6.7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
70	6.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

70	7.1	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	7.3	0.007	0.000	0.007	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	7.5	0.014	0.006	0.007	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	7.7	0.007	0.000	0.005	0.001	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	7.9	0.020	0.006	0.014	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	8.1	0.003	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
70	8.3	0.004	0.001	0.004	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	5.9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	6.1	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	6.3	0.004	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	6.5	0.013	0.001	0.011	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	6.7	0.019	0.007	0.011	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	6.9	0.055	0.020	0.035	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	7.1	0.084	0.001	0.080	0.003	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	7.3	0.039	0.006	0.032	0.001	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	7.5	0.110	0.000	0.085	0.026	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	7.7	0.150	0.015	0.117	0.018	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	7.9	0.359	0.194	0.166	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	8.1	0.394	0.000	0.390	0.003	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
50	8.3	0.164	0.028	0.136	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	5.1	0.062	0.031	0.031	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	5.3	0.075	0.042	0.033	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	5.5	0.090	0.056	0.033	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	5.7	0.106	0.013	0.065	0.028	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
30	5.9	0.121	0.039	0.061	0.022	0.000	0.000	0.000	0.000	0.000

0.000	0.000	0.000	0.000								
30	6.1	0.147	0.061	0.069	0.017	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	6.3	0.273	0.004	0.143	0.119	0.007	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	6.5	0.969	0.016	0.919	0.033	0.001	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	6.7	0.166	0.000	0.108	0.047	0.010	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	6.9	0.122	0.005	0.072	0.038	0.008	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	7.1	0.105	0.011	0.049	0.046	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	7.3	0.186	0.028	0.125	0.033	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	7.5	0.412	0.000	0.380	0.018	0.013	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	7.7	0.659	0.007	0.572	0.076	0.004	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	7.9	0.941	0.796	0.119	0.025	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	8.1	1.522	1.503	0.010	0.009	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
30	8.3	0.767	0.470	0.298	0.000	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	5.1	1.005	0.067	0.570	0.193	0.175	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	5.3	0.857	0.236	0.345	0.140	0.135	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	5.5	0.735	0.263	0.245	0.190	0.036	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	5.7	0.631	0.250	0.233	0.148	0.000	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	5.9	0.528	0.013	0.239	0.145	0.131	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	6.1	0.537	0.189	0.133	0.197	0.018	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	6.3	1.221	0.015	0.139	0.281	0.785	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	6.5	0.952	0.018	0.051	0.271	0.121	0.492	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	6.7	0.579	0.025	0.049	0.440	0.054	0.011	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	6.9	0.630	0.023	0.020	0.524	0.062	0.000	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	7.1	0.320	0.002	0.017	0.245	0.031	0.025	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								
10	7.3	0.476	0.003	0.005	0.443	0.015	0.010	0.000	0.000	0.000	
0.000	0.000	0.000	0.000								

10	7.5	0.452	0.001	0.006	0.425	0.020	0.001	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.7	1.468	0.000	0.000	1.312	0.154	0.001	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	7.9	0.142	0.000	0.000	0.141	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						
10	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000		0.000	0.000	0.000						

Principal Sources (faults, subduction, random seismicity having > 3% contribution
UC33brAvg_FM31:
Percent Contributed: 6.23
Distance (km): null
Magnitude: null
Epsilon (mean values): null
San Jacinto (Stepovers Combined) [2]:
Percent Contributed: 2.02
Distance (km): 24.568702
Magnitude: 7.984709
Epsilon (mean values): 0.32168773
Azimuth: 48.17305
Latitude: 33.802499
Longitude: -116.98307
Elsinore (Temecula) rev [0]:
Percent Contributed: 1.68
Distance (km): 9.7411202
Magnitude: 7.3833462
Epsilon (mean values): -0.30070363
Azimuth: 220.88047
Latitude: 33.589792
Longitude: -117.24926
UC33brAvg_FM32:
Percent Contributed: 6.22
Distance (km): null
Magnitude: null
Epsilon (mean values): null
San Jacinto (Stepovers Combined) [2]:
Percent Contributed: 2.01
Distance (km): 24.568702
Magnitude: 7.9813663
Epsilon (mean values): 0.32523728
Azimuth: 48.17305
Latitude: 33.802499
Longitude: -116.98307
Elsinore (Temecula) rev [0]:
Percent Contributed: 1.66
Distance (km): 9.7411202
Magnitude: 7.4273405
Epsilon (mean values): -0.33699308
Azimuth: 220.88047

Latitude: 33.589792
Longitude: -117.24926
UC33brAvg_FM31 (opt):
Percent Contributed: 3.13
Distance (km): null
Magnitude: null
Epsilon (mean values): null
UC33brAvg_FM32 (opt):
Percent Contributed: 3.13
Distance (km): null
Magnitude: null
Epsilon (mean values): null

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

This appendix is not applicable because infiltration has been deemed infeasible by watershed location in Section D.

WQMP Project Report

County of Riverside Stormwater Program

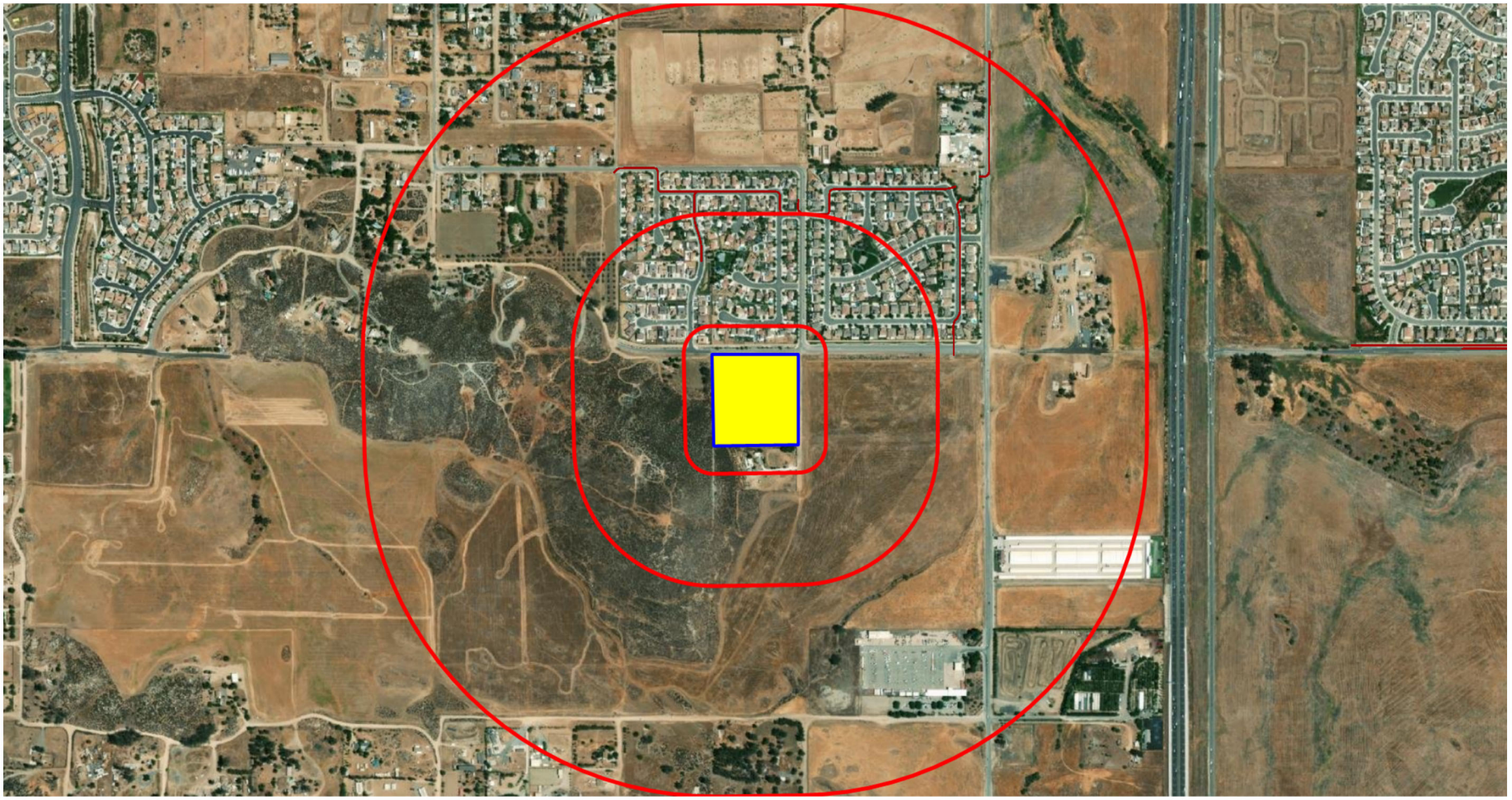
Santa Ana River Watershed Geodatabase

Monday, February 28, 2022

Note: The information provided in this report and on the Stormwater Geodatabase for the County of Riverside Stormwater Program is intended to provide basic guidance in the preparation of the applicantï¿½s Water Quality Management Plan (WQMP) and should not be relied upon without independent verification.

Project Site Parcel Number(s):	RW, RW, 360350005, 360350004
Latitude/Longitude:	33.6551, -117.1812
Thomas Brothers Page:	
Project Site Acreage:	9.11
Watershed(s):	SANTA ANA
This Project Site Resides in the following Hydrologic Unit(s) (HUC):	**HUC Name** - HUC Number **Menifee Valley** - 180702020303
The HUCs Contribute stormwater to the following 303d listed water bodies and TMDLs which may include drainage from your proposed Project Site:	**WBID Name** - WBID Number **Canyon Lake (Railroad Canyon Reservoir)** - CAL8021100019990208151525 **Elsinore, Lake** - CAL8023100019990208151100
These 303d listed Water bodies and TMDLs have the following Pollutants of Concern (POC):	**Bacterial Indicators** - Pathogens **Nutrients** - Nutrients, Organic Enrichment/Low Dissolved Oxygen **Other Organics** - PCBs (Polychlorinated biphenyls) **Toxicity** - Sediment Toxicity, Unknown Toxicity
Is the Site subject to Hydromodification:	Yes
Limitations on Infiltration:	**Project Site Onsite Soils Group(s)** - C, D **Known Groundwater Contamination Plumes within 1000'** - No **Adjacent Water Supply Wells(s)** - No information available please contact your local water agency for more information. Your local contact agency is EASTERN MUNICIPAL W.D.. Your local wholesaler contact agency is METROPOLITAN WATER DISTRICT.
Environmentally Sensitive Areas within 200'(Fish and Wildlife Habitat/Species):	None
	None

Environmentally Sensitive Areas within 200'(CVMSHCP):	
Environmentally Sensitive Areas within 200'(WRMSHCP):	Burrowing Owl Survey Required Area
Groundwater elevation from Mean Sea Level:	No Data
85th Percentile Design Storm Depth (in):	0.6
Groundwater Basin:	No Data
MSHCP/CVMSHCP Criteria Cell (s):	No Data
Retention Ordinance Information:	No Data
Studies and Reports Related to Project Site:	Comprehensive Nutrient Reduction Plan IBI Scores - Southern Cal bulletin118_4-sc water_fact_3_7.11 8039-SAR-Hydromodification West San Jacinto GW Basin Management Plan



Riverside County
SWCTT

Garbini South SWC

Site Address: rivco.permitrack.com

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

R 07 W | R 06 W | R 05 W | R 04 W | R 03 W | R 02 W | R 01 W | R 01 E | R 02 E | R 03 E | R 04 E | R 05 E

T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S

0.85 MiraLoma
0.61 RiversideNorth
0.68 PigeonPass
0.54 RiversideSouth
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.90 HurkeyCreek
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed
Santa Margarita Watershed

APPROX SITE LOCATION 0.6

N

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, 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	Ventura Engineering, Inland	Date	3/3/2022
Designed by	Robert	Case No	DEV2021-009
Company Project Number/Name	Garbani South		

BMP Identification

BMP NAME / ID: DMA1 - BMP1 - EDB1

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}= 0.60 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)
DMA1: ROOF	69300	Roofs	1	0.89	61815.6			
DMA1: PCC	147577	Concrete or Asphalt	1	0.89	131638.7			
DMA1: LS	201493	Ornamental Landscaping	0.1	0.11	22256.5			
	418370	Total			215710.8	0.60	10785.5	36000

Notes:

Bioretention Facility - Design Procedure	BMP ID: BMP1	Legend:	Required Entries / Calculated Cells

Company Name: Ventura Engineering Inland, Inc. Date: 3-Mar

Designed by: County/City Case No.: DEV2021-009

Design Volume

Enter the area tributary to this feature A_T = 9.604 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook V_{BMP} = 10,786 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 = 60.0 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 = 5,993 ft^2

Proposed Surface Area A= 6,000 ft^2

Minimum Required Length of Bioretention Facility, L L = 99.9 ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility z = 4 :1

Diameter of Underdrain 6 inches

Longitudinal Slope of Site (3% maximum) 1 %

6" Check Dam Spacing 25 feet

Describe Vegetation: Natural Grasses

Notes:

3.5 Bioretention Facility

Type of BMP	LID – Bioretention
Treatment Mechanisms	Infiltration, Evapotranspiration, Evaporation, Biofiltration
Maximum Drainage Area	This BMP is intended to be integrated into a project's landscaped area in a distributed manner. Typically, contributing drainage areas to Bioretention Facilities range from less than 1 acre to a maximum of around 10 acres.
Other Names	Rain Garden, Bioretention Cell, Bioretention Basin, Biofiltration Basin, Landscaped Filter Basin, Porous Landscape Detention

Description

Bioretention Facilities are shallow, vegetated basins underlain by an engineered soil media. Healthy plant and biological activity in the root zone maintain and renew the macro-pore space in the soil and maximize plant uptake of pollutants and runoff. This keeps the Best Management Practice (BMP) from becoming clogged and allows more of the soil column to function as both a sponge (retaining water) and a highly effective and self-maintaining biofilter. In most cases, the bottom of a Bioretention Facility is unlined, which also provides an opportunity for infiltration to the extent the underlying onsite soil can accommodate. When the infiltration rate of the underlying soil is exceeded, fully biotreated flows are discharged via underdrains. Bioretention Facilities therefore will inherently achieve the maximum feasible level of infiltration and evapotranspiration and achieve the minimum feasible (but highly biotreated) discharge to the storm drain system.

Siting Considerations

These facilities work best when they are designed in a relatively level area. Unlike other BMPs, Bioretention Facilities can be used in smaller landscaped spaces on the site, such as:

- ✓ Parking islands
- ✓ Medians
- ✓ Site entrances

Landscaped areas on the site (such as may otherwise be required through minimum landscaping ordinances), can often be designed as Bioretention Facilities. This can be accomplished by:

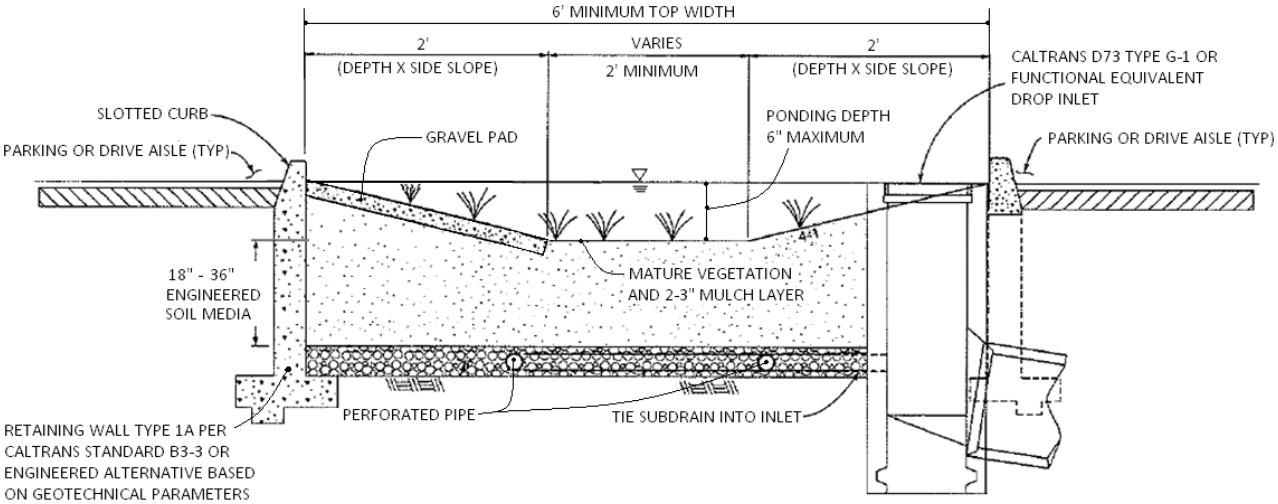
- *Depressing* landscaped areas below adjacent impervious surfaces, rather than elevating those areas
- Grading the site to direct runoff from those impervious surfaces *into* the Bioretention Facility, rather than away from the landscaping
- Sizing and designing the depressed landscaped area as a Bioretention Facility as described in this Fact Sheet

Bioretention Facilities should however not be used downstream of areas where large amounts of sediment can clog the system. Placing a Bioretention Facility at the toe of a steep slope should also be avoided due to the potential for clogging the engineered soil media with erosion from the slope, as well as the potential for damaging the vegetation.

Design and Sizing Criteria

The recommended cross section necessary for a Bioretention Facility includes:

- Vegetated area
- 18' minimum depth of engineered soil media
- 12' minimum gravel layer depth with 6' perforated pipes (added flow control features such as orifice plates may be required to mitigate for HCOC conditions)



While the 18-inch minimum engineered soil media depth can be used in some cases, it is recommended to use 24 inches or a preferred 36 inches to provide an adequate root zone for the chosen plant palate. Such a design also provides for improved removal effectiveness for nutrients. The recommended ponding depth inside of a Bioretention Facility is 6 inches; measured from the flat bottom surface to the top of the water surface as shown in Figure 1.

Because this BMP is filled with an engineered soil media, pore space in the soil and gravel layer is assumed to provide storage volume. However, several considerations must be noted:

- Surcharge storage above the soil surface (6 inches) is important to assure that design flows do not bypass the BMP when runoff exceeds the soil's absorption rate.
- In cases where the Bioretention Facility contains engineered soil media deeper than 36 inches, the pore space within the engineered soil media can only be counted to the 36-inch depth.
- A maximum of 30 percent pore space can be used for the soil media whereas a maximum of 40 percent pore space can be use for the gravel layer.

Figure 1: Standard Layout for a Bioretention Facility

Engineered Soil Media Requirements

The engineered soil media shall be comprised of 85 percent mineral component and 15 percent organic component, by volume, drum mixed prior to placement. The mineral component shall be a Class A sandy loam topsoil that meets the range specified in Table 1 below. The organic component shall be nitrogen stabilized compost[1], such that nitrogen does not leach from the media.

Table 1: Mineral Component Range Requirements

Percent Range	Component
70-80	Sand
15-20	Silt
5-10	Clay

The trip ticket, or certificate of compliance, shall be made available to the inspector to prove the engineered mix meets this specification.

Vegetation Requirements

Vegetative cover is important to minimize erosion and ensure that treatment occurs in the Bioretention Facility. The area should be designed for at least 70 percent mature coverage throughout the Bioretention Facility. To prevent the BMP from being used as walkways, Bioretention Facilities shall be planted with a combination of small trees, densely planted shrubs, and natural grasses. Grasses shall be native or ornamental; preferably ones that do not need to be mowed. The application of fertilizers and pesticides should be minimal. To maintain oxygen levels for the vegetation and promote biodegradation, it is important that vegetation not be completely submerged for any extended period of time. Therefore, a maximum of 6 inches of ponded water shall be used in the design to ensure that plants within the Bioretention Facility remain healthy.

A 2 to 3-inch layer of standard shredded aged hardwood mulch shall be placed as the top layer inside the Bioretention Facility. The 6-inch ponding depth shown in Figure 1 above shall be measured from the top surface of the 2 to 3-inch mulch layer.

Curb Cuts

To allow water to flow into the Bioretention Facility, 1-foot-wide (minimum) curb cuts should be placed approximately every 10 feet around the perimeter of the Bioretention Facility. Figure 2 shows a curb cut in a Bioretention Facility. Curb cut flow lines must be at or above the V_{BMP} water surface level.

[1] For more information on compost, visit the US Composting Council website at: http://compostingcouncil.org/



Figure 2: Curb Cut located in a Bioretention Facility

To reduce erosion, a gravel pad shall be placed at each inlet point to the Bioretention Facility. The gravel should be 1- to 1.5-inch diameter in size. The gravel should overlap the curb cut opening a minimum of 6 inches. The gravel pad inside the Bioretention Facility should be flush with the finished surface at the curb cut and extend to the bottom of the slope.

In addition, place an apron of stone or concrete, a foot square or larger, inside each inlet to prevent vegetation from growing up and blocking the inlet. See Figure 3.

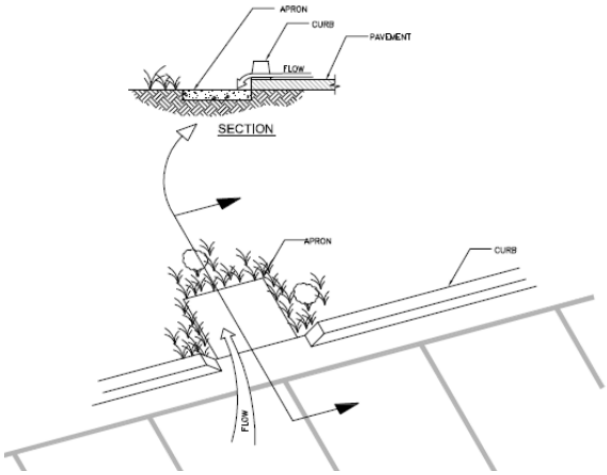


Figure 3: Apron located in a Bioretention Facility

Terracing the Landscaped Filter Basin

It is recommended that Bioretention Facilities be level. In the event the facility site slopes and lacks proper design, water would fill the lowest point of the BMP and then discharge from the basin without being treated. To ensure that the water will be held within the Bioretention Facility on sloped sites, the BMP must be terraced with nonporous check dams to provide the required storage and treatment capacity.

The terraced version of this BMP shall be used on non-flat sites with no more than a 3 percent slope. The surcharge depth cannot exceed 0.5 feet, and side slopes shall not exceed 4:1. Table 2 below shows the spacing of the check dams, and slopes shall be rounded up (i.e., 2.5 percent slope shall use 10' spacing for check dams).

Table 2: Check Dam Spacing

6" Check Dam Spacing	
Slope	**Spacing**
1%	*25'*
2%	*15'*
3%	*10'*

Roof Runoff

Roof downspouts may be directed towards Bioretention Facilities. However, the downspouts must discharge onto a concrete splash block to protect the Bioretention Facility from erosion.

Retaining Walls

It is recommended that Retaining Wall Type 1A, per Caltrans Standard B3-3 or equivalent, be constructed around the entire perimeter of the Bioretention Facility. This practice will protect the sides of the Bioretention Facility from collapsing during construction and maintenance or from high service loads adjacent to the BMP. Where such service loads would not exist adjacent to the BMP, an engineered alternative may be used if signed by a licensed civil engineer.

Side Slope Requirements

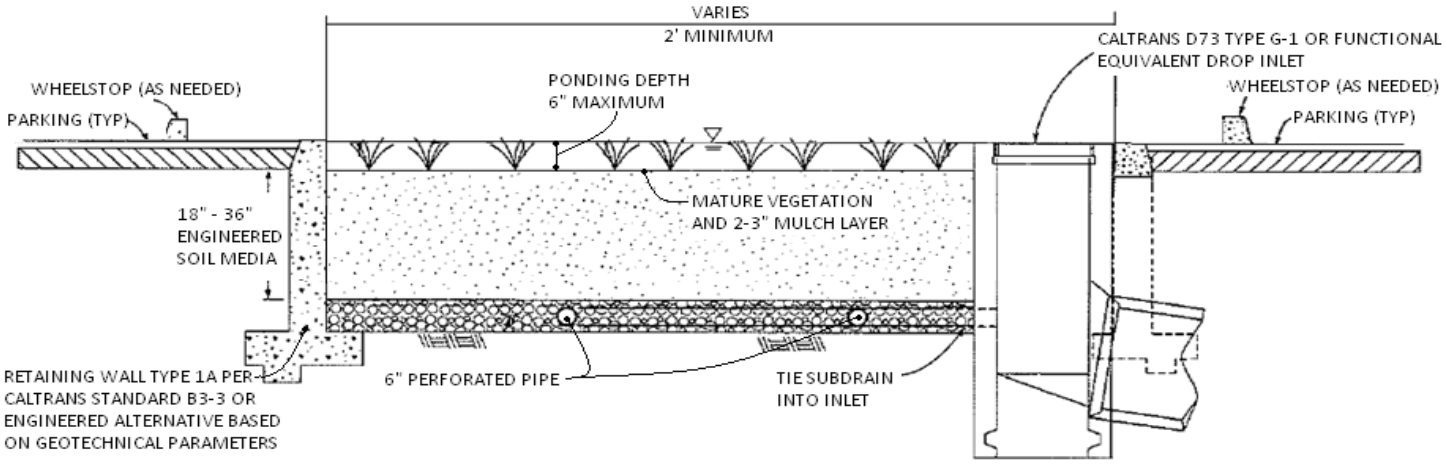
Bioretention Facilities Requiring Side Slopes

The design should assure that the Bioretention Facility does not present a tripping hazard. Bioretention Facilities proposed near pedestrian areas, such as areas parallel to parking spaces or along a walkway, must have a gentle slope to the bottom of the facility. Side slopes inside of a Bioretention Facility shall be 4:1. A typical cross section for the Bioretention Facility is shown in Figure 1.

Bioretention Facilities Not Requiring Side Slopes

Where cars park perpendicular to the Bioretention Facility, side slopes are not required. A 6-inch maximum drop may be used, and the Bioretention Facility must be planted with trees and shrubs to prevent pedestrian access. In this case, a curb is not placed around the Bioretention Facility,

but wheel stops shall be used to prevent vehicles from entering the Bioretention Facility, as shown in Figure 4.



Planter Boxes

Bioretention Facilities can also be placed above ground as planter boxes. Planter boxes must have a minimum width of 2 feet, a maximum surcharge depth of 6 inches, and no side slopes are necessary. Planter boxes must be constructed so as to ensure that the top surface of the engineered soil media will remain level. This option may be constructed of concrete, brick, stone or other stable materials that will not warp or bend. Chemically treated wood or galvanized steel, which has the ability to contaminate stormwater, should not be used. Planter boxes must be lined with an impermeable liner on all sides, including the bottom. Due to the impermeable liner, the inside bottom of the planter box shall be designed and constructed with a cross fall, directing treated flows within the subdrain layer toward the point where subdrain exits the planter box, and subdrains shall be oriented with drain holes oriented down. These provisions will help avoid excessive stagnant water within the gravel underdrain layer. Similar to the in-ground Bioretention Facility versions, this BMP benefits from healthy plants and biological activity in the root zone. Planter boxes should be planted with appropriately selected vegetation.



Figure 5: Planter Box
Source: LA Team Effort

Overflow

An overflow route is needed in the Bioretention Facility design to bypass stored runoff from storm events larger than V_{BMP} or in the event of facility or subdrain clogging. Overflow systems must connect to an acceptable discharge point, such as a downstream conveyance system as shown in Figure 1 and Figure 4. The inlet to the overflow structure shall be elevated inside the Bioretention Facility to be flush with the ponding surface for the design capture volume (V_{BMP}) as shown in Figure 4. This will allow the design capture volume to be fully treated by the Bioretention Facility, and for larger events to safely be conveyed to downstream systems. The overflow inlet shall **not** be located in the entrance of a Bioretention Facility, as shown in Figure 6.

Underdrain Gravel and Pipes

An underdrain gravel layer and pipes shall be provided in accordance with Appendix B – Underdrains.



Figure 6: Incorrect Placement of an Overflow Inlet.

Inspection and Maintenance Schedule

The Bioretention Facility area shall be inspected for erosion, dead vegetation, soggy soils, or standing water. The use of fertilizers and pesticides on the plants inside the Bioretention Facility should be minimized.

Schedule	Activity
Ongoing	• Keep adjacent landscape areas maintained. Remove clippings from landscape maintenance activities. • Remove trash and debris • Replace damaged grass and/or plants • Replace surface mulch layer as needed to maintain a 2-3 inch soil cover.
After storm events	• Inspect areas for ponding
Annually	• Inspect/clean inlets and outlets

Bioretention Facility Design Procedure

1) Enter the area tributary, A_T, to the Bioretention Facility.

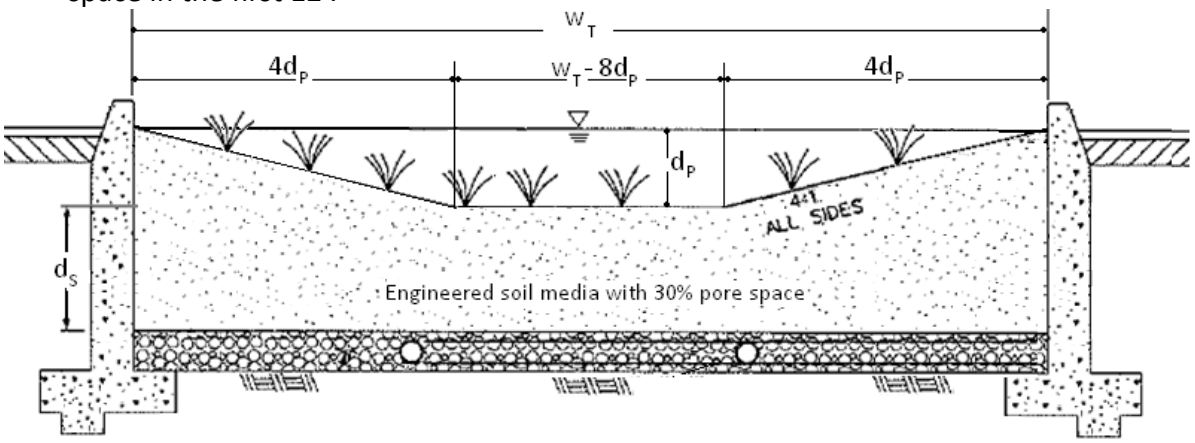
2) Enter the Design Volume, $V_{BMP,}$ determined from Section 2.1 of this Handbook.

3) Select the type of design used. There are two types of Bioretention Facility designs: the standard design used for most project sites that include side slopes, and the modified design used when the BMP is located perpendicular to the parking spaces or with planter boxes that do not use side slopes.

4) Enter the depth of the engineered soil media, d_S. The minimum depth for the engineered soil media can be 18' in limited cases, but it is recommended to use 24' or a preferred 36' to provide an adequate root zone for the chosen plant palette. Engineered soil media deeper than 36' will only get credit for the pore space in the first 36'.

5) Enter the top width of the Bioretention Facility.

6) Calculate the total effective depth, d_E, within the Bioretention Facility. The maximum allowable pore space of the soil media is 30% while the maximum allowable pore space for the gravel layer is 40%. Gravel layer deeper than 12' will only get credit for the pore space in the first 12'.



a. For the design with side slopes the following equation shall be used to determine the total effective depth. Where, d_P is the depth of ponding within the basin.

$$d_E(\text{ft}) = \frac{0.3 \times \left[\left(w_T(\text{ft}) \times d_S(\text{ft})\right) + 4\left(d_P(\text{ft})\right)^2\right] + 0.4 \times 1(\text{ft}) + d_P(\text{ft})\left[4d_P(\text{ft}) + \left(w_T(\text{ft}) - 8d_P(\text{ft})\right)\right]}{w_T(\text{ft})}$$

This above equation can be simplified if the maximum ponding depth of 0.5' is used. The equation below is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = (0.3 \times d_S(\text{ft}) + 0.4 \text{ x } 1(\text{ft})) - \left(\frac{0.7\ (\text{ft}^2)}{w_T(\text{ft})}\right) + 0.5(\text{ft})$$

b. For the design without side slopes the following equation shall be used to determine the total effective depth:

$$d_E(\text{ft}) = d_P(\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

The equation below, using the maximum ponding depth of 0.5', is used on the worksheet to find the minimum area required for the Bioretention Facility:

$$d_E(\text{ft}) = 0.5\ (\text{ft}) + [(0.3) \times d_S(\text{ft}) + (0.4) \times 1(\text{ft})]$$

7) Calculate the minimum surface area, A_M, required for the Bioretention Facility. This does not include the curb surrounding the Bioretention Facility or side slopes.

$$A_M(\text{ft}^2) = \frac{V_{BMP}(\text{ft}^3)}{d_E\ (\text{ft})}$$

8) Enter the proposed surface area. This area shall not be less than the minimum required surface area.

9) Verify that side slopes are no steeper than 4:1 in the standard design, and are not required in the modified design.

10) Provide the diameter, minimum 6 inches, of the perforated underdrain used in the Bioretention Facility. See Appendix B for specific information regarding perforated pipes.

11) Provide the slope of the site around the Bioretention Facility, if used. The maximum slope is 3 percent for a standard design.

12) Provide the check dam spacing, if the site around the Bioretention Facility is sloped.

13) Describe the vegetation used within the Bioretention Facility.

References Used to Develop this Fact Sheet

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Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

This appendix is not applicable because the project site meets exemption from HCOC per Section F.1 Exemption 3.

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ A. **On-site storm drain inlets**	☑ **Locations of inlets.**	☑ **Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.**	☑ **Maintain and periodically repaint or replace inlet markings.** ☑ **Provide stormwater pollution prevention information to new site owners, lessees, or operators.** ☑ **See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** ☑ **Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."**
☐ B. **Interior floor drains and elevator shaft sump pumps**		☐ **State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.**	☐ **Inspect and maintain drains to prevent blockages and overflow.**
☐ C. **Interior parking garages**		☐ **State that parking garage floor drains will be plumbed to the sanitary sewer.**	☐ **Inspect and maintain drains to prevent blockages and overflow.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
☑ D1. **Need for future indoor & structural pest control**		☑ **Note building design features that discourage entry of pests.**	☑ **Provide Integrated Pest Management information to owners, lessees, and operators.**
☑ D2. **Landscape/ Outdoor Pesticide Use**	☑ **Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained.** ☑ **Show self-retaining landscape areas, if any.** ☑ **Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)**	**State that final landscape plans will accomplish all of the following.** ☑ **Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.** ☑ **Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution.** **Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.** **Consider using pest-resistant plants, especially adjacent to hardscape.** **To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.**	☑ **Maintain landscaping using minimum or no pesticides.** ☑ **See applicable operational BMPs in "What you should know for…..Landscape and Gardening"** at http://rcflood.org/stormwater/**Error! Hyperlink reference not valid.** ☑ **Provide IPM information to new owners, lessees and operators.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ E. **Pools, spas, ponds, decorative fountains, and other water features.**	❑ **Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)**	**If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.**	❑ **See applicable operational BMPs in** "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
❑ F. **Food service**	❑ **For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment.** ❑ **On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.**	❑ **Describe the location and features of the designated cleaning area.** ❑ **Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.**	❑ **See the brochure, "**The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ **Provide this brochure to new site owners, lessees, and operators.**
❑ G. **Refuse areas**	❑ **Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas.** ❑ **If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area.** ❑ **Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.**	❑ **State how site refuse will be handled and provide supporting detail to what is shown on plans.** ❑ **State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.**	❑ **State how the following will be implemented:** **Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at** www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ H. **Industrial processes.**	❑ **Show process area.**	❑ **If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."**	❑ **See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com** See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ I. **Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)**	❑ **Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area.** ❑ **Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults.** ❑ **Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.**	**Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains.** **Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for:** ▪ **Hazardous Waste Generation** ▪ **Hazardous Materials Release Response and Inventory** ▪ **California Accidental Release (CalARP)** ▪ **Aboveground Storage Tank** ▪ **Uniform Fire Code Article 80 Section 103(b) & (c) 1991** ▪ **Underground Storage Tank** www.cchealth.org/groups/hazmat/	❑ **See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ J. **Vehicle and Equipment Cleaning**	❑ **Show on drawings as appropriate:** **(1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses.** **(2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use).** **(3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer.** **(4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.**	❑ **If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.**	**Describe operational measures to implement the following (if applicable):** ❑ **Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system.** Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ❑**Car dealerships and similar may rinse cars with water only.**

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	2 Permanent Controls—Show on WQMP Drawings	3 Permanent Controls—List in WQMP Table and Narrative	4 Operational BMPs—Include in WQMP Table and Narrative
❑ K. **Vehicle/Equipment Repair and Maintenance**	❑ **Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater.** ❑ **Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.** ❑ **Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.**	❑ **State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.** ❑ **State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.** ❑ **State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.**	**In the Stormwater Control Plan, note that all of the following restrictions apply to use the site:** ❑ **No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.** ❑ **No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately.** ❑ **No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.** Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

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❑ L. **Fuel Dispensing Areas**	❑ **Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable.** ❑ **Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.**		❑ **The property owner shall dry sweep the fueling area routinely.** ❑ **See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

[6] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

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❑ M. **Loading Docks**	❑ **Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer.** ❑ **Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation.** ❑ **Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.**		❑ **Move loaded and unloaded items indoors as soon as possible.** ❑ **See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**

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❑ N. **Fire Sprinkler Test Water**		❑ **Provide a means to drain fire sprinkler test water to the sanitary sewer.**	❑ **See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com**
O. **Miscellaneous Drain or Wash Water or Other Sources** ❑ **Boiler drain lines** ✓ **Condensate drain lines** ❑ **Rooftop equipment** ❑ **Drainage sumps** ✓ **Roofing, gutters, and trim.** ❑ **Other sources**		❑ **Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.** ✓ **Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.** ❑ **Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment.** ❑ **Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.** ✓ **Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.** **Include controls for other sources as specified by local reviewer.**	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
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☑ P. **Plazas, sidewalks, and parking lots.**			☑ **Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.**

Appendix 9: O&M

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

Not required as part of a Preliminary WQMP. Appendix to be completed during the Final WQMP during the final engineering phase.

Appendix 10: Educational Materials

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

Not required as part of a Preliminary WQMP. Appendix to be completed during the Final WQMP during the final engineering phase.