Ventura Engineering Inland INC
VEI

WATER QUALITY MANAGEMENT PLAN
SANTA MARGARITA REGION OF RIVERSIDE COUNTY

MONARCH WINERY
APN: 941-180-032

NEC DE PORTOLA ROAD AND MONTE DE ORO
TEMECULA, CALIFORNIA 92592
PAR01536

PREPARED FOR:

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REV3: *August 27, 2019* ***REV2:*** *March 18, 2019*
REV1: *September 17, 2018* ***ORIGINAL DATE:*** *January 15, 2018*

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.

REGISTERED PROFESSIONAL ENGINEER
WILFREDO S.D. VENTURA
No. 66532
Exp. 6-30-20
CIVIL
STATE OF CALIFORNIA

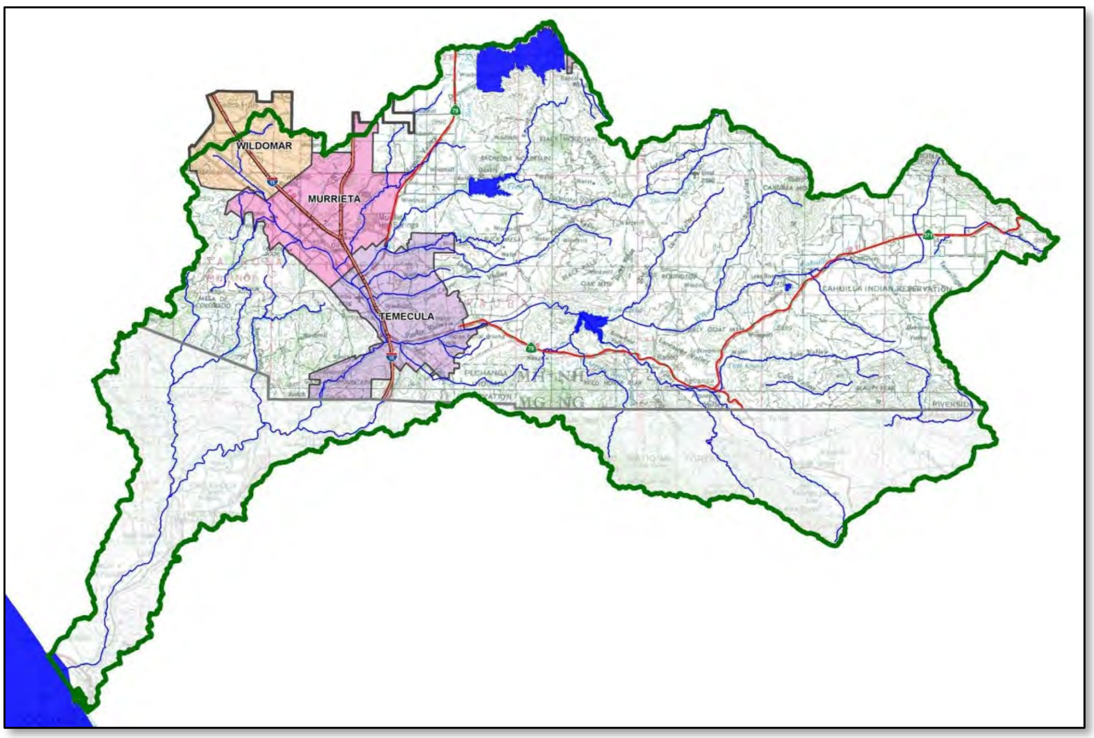
8/27/19

WILFREDO VENTURA *DATE*
R.C.E. NO. 66532
EXPIRES 6/30/20

County Project Specific Water Quality Management Plan

A Template for preparing Project Specific WQMPs for Priority Development Projects only for use in the ***unincorporated portions of Riverside County*** *located within the* ***Santa Margarita Region****.*

Project Title: Monarch Winery
Development No: APN 941-180-032
Design Review/Case No: PPT180003, PAR01536
BMP$_i$ (Latitude, Longitude): Multiple BMPs, Use Genal for the Site: 33^{O} 12' 25.95" N, 117^{O} 0' 43.65" W



☒ **Preliminary**
☐ **Final**

Original Date Prepared: 1/15/18

Revision Date(s): 8/27/19, 3/18/19, 9/17/18

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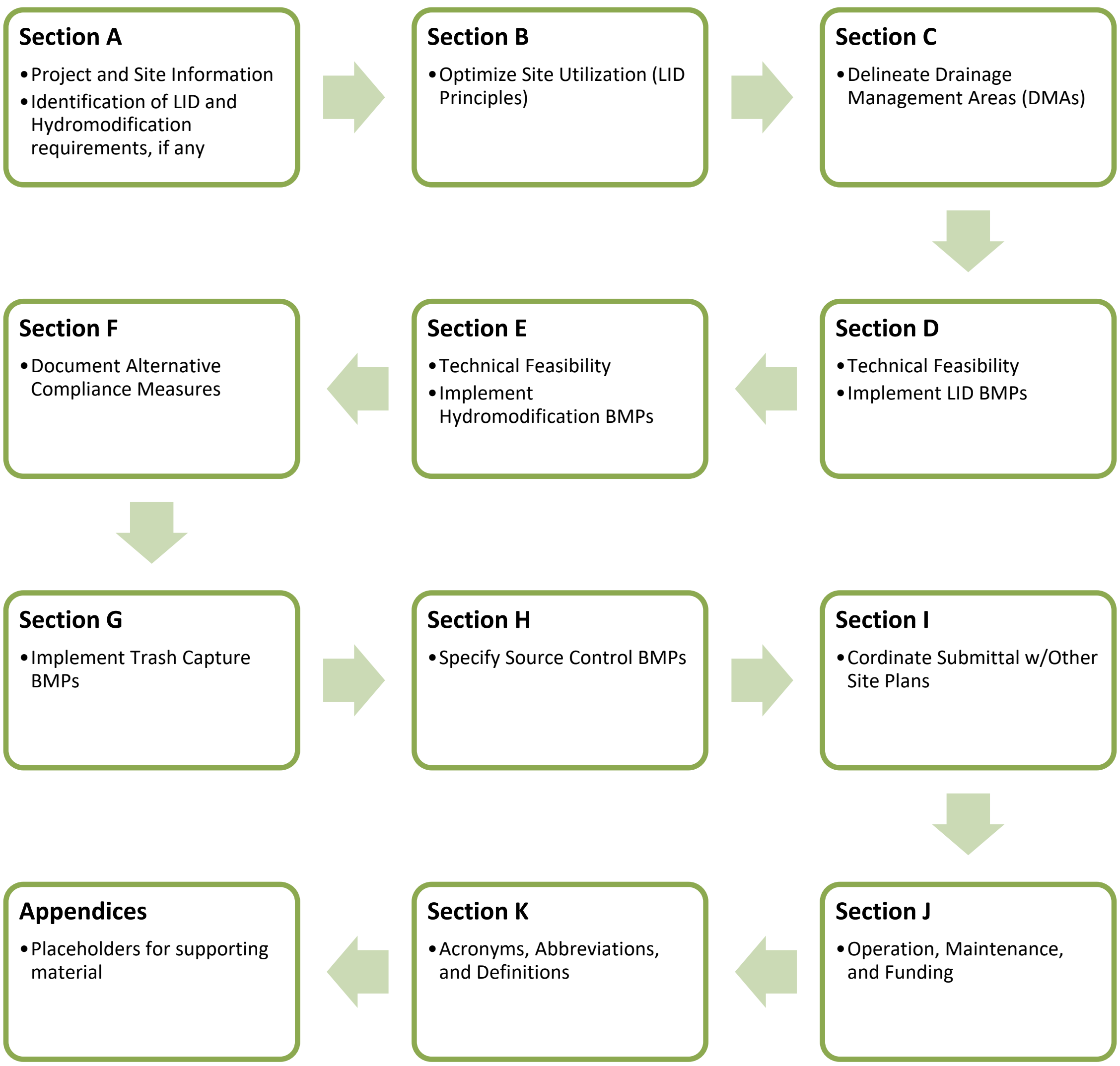
Based on 2018 WQMP, prepared for Compliance with Regional Board Order No. **R9-2013-0001** *as amended by Order No.* **R9-2015-0001** *and Order No.* **R9-2015-0100**

The County updated this template on July 24, 2018

A Brief Introduction

The Regional Municipal Separate Stormwater Sewer System (MS4) Permit[1] requires that a Project-Specific WQMP be prepared for all development projects within the Santa Margarita Region (SMR) that meet the 'Priority Development Project' categories and thresholds listed in the SMR Water Quality Management Plan (WQMP). This Project-Specific WQMP Template for Development Projects in the **Santa Margarita Region** has been prepared to help document compliance and prepare a WQMP submittal. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



[1] Order No. R9-2013-0001 as amended by Order Nos. R9-2015-0001 and R9-2015-0100, NPDES No. CAS0109266, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the MS4s Draining the Watersheds within the San Diego Region, California Regional Water Quality Control Board, May 8, 2013.

OWNER'S CERTIFICATION

This Project-Specific WQMP has been prepared for Fertile Soils, LLC by Ventura Engineering, Inland for the Monarch Winery project located at the NEC of De Portola Road and Monte de Oro in Temecula, California 92592.

This WQMP is intended to comply with the requirements of Riverside County for County Ordinance No. 754 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 Best Management Practices 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 Riverside County Water Quality Ordinance (No. 754).

"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 Best Management Practices in this plan meet the requirements of Regional Water Quality Control Board Order No. **R9-2013-0001** as amended by Order Nos. **R9-2015-0001 and R9-2015-0100**."

Preparer's Signature	Date
Wilfredo S.D. Ventura	Engineer of Record
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information

Use the table below to compile and summarize basic site information that will be important for completing subsequent steps. Subsections A.1 through A.4 provide additional detail on documentation of additional project and site information. The Regional MS4 Permit has effectively removed the ability for a project to be grandfathered from WQMP requirements. Even if a project were able to meet all the requirements stated in Section 1.2 of the WQMP, the 2014 WQMP requirements would apply.

PROJECT INFORMATION			
Type of PDP:	New Development		
Type of Project:	Commercial Winery		
Planning Case Number:	PAR01536, PPT180003		
Rough Grade Permit No.:	To Be Determined		
Development Name:	Not Applicable		
PROJECT LOCATION			
Latitude & Longitude (DMS):	33^{O} 12’ 25.95” N, 117^{O} 0’ 43.65” W		
Project Watershed and Sub-Watershed:	902.42, Santa Margarita HU, Auld, HU, Gertrudis HSA		
24-Hour 85th Percentile Storm Depth (inches):	0.57		
Is project subject to Hydromodification requirements?	☒ Y ☐ N (Select based on Section A.3)		
APN(s):	957-261-011		
Map Book and Page No.:	Page 75/22		
PROJECT CHARACTERISTICS			
Proposed or Potential Land Use(s)	Commercial Winery		
Proposed or Potential SIC Code(s)	31213		
Existing Impervious Area of Project Footprint (SF)	0		
Total area of <u>proposed</u> Impervious Surfaces within the Project Limits (SF)/or Replacement	360,976		
Total Project Area (ac)	42.63 acre		
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	
Has preparation of Project-Specific WQMP included coordination with other site plans?	☐ Y	☒ N	
EXISTING SITE CHARACTERISTICS			
Is the project located within any Multi-Species Habitat Conservation Plan area (MSHCP Criteria Cell?)	☐ Y n/a	☒ N	
Is a Geotechnical Report attached?	☒ Y	☐ N	
If no Geotech. Report, list the Natural Resources Conservation Service (NRCS) soils type(s) present on the site (A, B, C and/or D)	A, C, D		
<u>Provide a brief description of the project:</u> The project proposes to add a commercial winery, accessory buildings, hotel, landscaping, infiltration areas, vineyards, paved areas, and other associated elements on an existing vineyard.			

Paver and dirt roads are considered pervious for determining WQMP applicability.

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the Project 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:

- Vicinity and location maps
- Parcel Boundary and Project Footprint
- Existing and Proposed Topography
- Drainage Management Areas (DMAs)
- Proposed Structural Best Management Practices (BMPs)
- Drainage Paths
- Drainage infrastructure, inlets, overflows
- Source Control BMPs
- Site Design BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Pervious Surfaces (i.e. Landscaping)
- Standard Labeling
- Cross Section and Outlet details

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 Copermittee plan reviewer must be able to easily analyze your Project utilizing this template and its associated site plans and maps. Complete the checklists in Appendix 1 to verify that all exhibits and components are included.

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. This map should identify the path of the stormwater discharged from the site all the way to the outlet of the Santa Margarita River to the Pacific Ocean. Use the most recent 303(d) list available from the State Water Resources Control Board Website.
(http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/)

Table A-1 Identification of Receiving Waters

Receiving Waters	USEPA Approved 303(d) List Impairments	Designated Beneficial Uses	Approximate Distance From Site to RARE Beneficial Use
Santa Gertrudis Creek (902.42 - 902.32)	Chlorpyrifos (Pesticides), Copper, Iron, Manganese (Metals/Metalloids), E. Coli, Fecal Coliform (Fecal Indicator Bacteria), Phosphorus (Nutrients)	MUN, AGR, IND, PROC, GWR, REC1, REC2, WARM, COLD, WILD	N/A
Murrieta Creek (902.32)	Copper, Iron, Manganese (Metals/Metalloids), Nitrogen, Phosphorus (Nutrients), Toxicity (Toxicity)	MUN, AGR, IND, REC1, REC2, WARM, COLD, WILD, RARE	+/- 14 miles
Santa Margarita River-Upper portion (902.22 - 902.21)	Phosphorous, Toxicity (Nutrients)	MUN, AGR, IND, REC1, REC2, WARM, COLD, WILD, RARE	+/- 17 miles
Santa Margarita River-Lower portion (902.11 - 902.12- 902.13)	Enterococcus, Fecal Coliform, Phosphorus, Total Nitrogen as N	MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD, WILD, RARE	+/- 30 miles
Santa Margarita Lagoon (902.11)	Eutrophic (Nutrients, Oxygen Demanding Substances)	REC1, REC2, EST, WILD, RARE, MAR, MIGR, SPWN	+/- 35 miles

A.3 Drainage System Susceptibility to Hydromodification

Using Table A-2 below, list in order of the point of discharge at the project site down to the Santa Margarita River[2], each drainage system or receiving water that the project site is tributary to. Continue to fill each row with the material of the drainage system, and any exemption (if applicable). Based on the results, summarize the applicable hydromodification performance standards that will be documented in Section E. Exempted categories of receiving waters include:

- Existing storm drains that discharge directly to water storage reservoirs, lakes, or enclosed embayments, or
- Conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- Other water bodies identified in an approved WMAA (See Exhibit G to the WQMP)

Include a map exhibiting each drainage system and the associated susceptibility in Appendix 1.

Table A-2 Identification of Susceptibility to Hydromodification

Drainage System	Drainage System Material	Hydromodification Exemption	Hydromodification Exempt
Santa Gertrudis Creek	Partially NAT and Partially EEM	None	☐ Y ☒ N
Santa Margarita River	Natural	None	☐ Y ☒ N
Summary of Performance Standards			
☐ **Hydromodification Exempt** – Select if "Y" is selected in the Hydromodification Exempt column above, project is exempt from hydromodification requirements. ☒ **Not Exempt**-Select if "N" is selected in any row of the Hydromodification Exempt column above. Project is subject to hydrologic control requirements and may be subject to sediment supply requirements.			

[2] Refer to Exhibit G of the WQMP for a map of exempt and potentially exempt areas. These maps are from the Draft SMR WMAA as of January 5, 2018 and will be replaced upon acceptance of the SMR WMAA.

A.4 Additional Permits/Approvals required for the Project:

Table A-3 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 Section 401 Water Quality Certification	☐ Y	☒ N
US Army Corps of Engineers, Clean Water Act Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☒ Y	☐ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)*		
- County of Riverside Building Permit	☒ Y	☐ N
- County of Riverside Grading Permit	☒ Y	☐ N
- State General Construction Permit Coverage (WDID#)	☒ Y	☐ N

If yes is answered to any of the questions above, the Copermittee 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 LID 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 Low Impact Development (LID) design and explain your design decisions to others.

Apply the following LID Principles to the layout of the PDP to the extent they are applicable and feasible. Putting thought upfront about how best to organize the various elements of a site can help to significantly reduce the PDP's potential impact on the environment and reduce the number and size of Structural LID BMPs that must be implemented. Integrate opportunities to accommodate the following LID Principles within the preliminary PDP site layout to maximize implementation of LID Principles.

Site Optimization

Complete checklist below to determine applicable Site Design BMPs for your site.

Project- Specific WQMP Site Design BMP Checklist	
The following questions below are based upon Section 3.2 of the SMR WQMP will help you determine how to best optimize your site and subsequently identify opportunities and/or constraints, and document compliance.	
SITE DESIGN REQUIREMENTS	
Answer the following questions below by indicating "Yes," "No," or "N/A" (Not Applicable). Justify all "No" and "N/A" answers by inserting a narrative at the end of the section. The narrative should include identification and justification of any constraints that would prevent the use of those categories of LID BMPs. Upon identifying Site Design BMP opportunities, include these on your WQMP Site plan in Appendix 1.	
☒ Yes ☐ No ☐ N/A	**Did you identify and preserve existing drainage patterns?** Integrating existing drainage patterns into the site plan helps to maintain the time of concentration and infiltration rates of runoff, decreasing peak flows, and may also help preserve the contribution of Critical Coarse Sediment (i.e., Bed Sediment Supply) from the PDP to the Receiving Water. Preserve existing drainage patterns by: • Minimizing unnecessary site grading that would eliminate small depressions, where appropriate add additional "micro" storage throughout the site landscaping. • Where possible conform the PDP site layout along natural landforms, avoid excessive grading and disturbance of vegetation and soils, preserve or replicate the sites natural drainage features and patterns. • Set back PDP improvements from creeks, wetlands, riparian habitats and any other natural water bodies. • Use existing and proposed site drainage patterns as a natural design element, rather than using expensive impervious conveyance systems. Use depressed landscaped areas, vegetated buffers, and bioretention areas as amenities and focal points within the site and landscape design.
Discuss how this was included or provide a discussion/justification for "No" or "N/A" answer. *There is an existing 100-Year FEMA determined flood plan on the project site that is being respected and is not being any further disturbed than it already is (existing driveway crossing).*	
☒ Yes ☐ No ☐ N/A	**Did you identify and protect existing vegetation?** Identify any areas containing dense native vegetation or well-established trees, and try to avoid disturbing these areas. Soils with thick, undisturbed vegetation have a much higher capacity to store and infiltrate runoff than do disturbed soils. Reestablishment of a mature vegetative community may take decades. Sensitive areas, such as streams and floodplains should also be avoided. • Define the development envelope and protected areas, identifying areas that are most suitable for development and areas that should be left undisturbed. • Establish setbacks and buffer zones surrounding sensitive areas. • Preserve significant trees and other natural vegetation where possible.
Discuss how this was included or provide a discussion/justification for "No" or "N/A" answer. *Existing vegetation in the FEMA drainage course is being left natural and some existing groves will also remain in place and not be disturbed.*	

Project- Specific WQMP Site Design BMP Checklist	
☒ Yes ☐ No ☐ N/A	**Did you identify and preserve natural infiltration capacity?** A key component of LID is taking advantage of a site's natural infiltration and storage capacity. A site survey and geotechnical investigation can help define areas with high potential for infiltration and surface storage. • Identify opportunities to locate LID Principles and Structural BMPs in highly pervious areas. Doing so will maximize infiltration and limit the amount of runoff generated. • Concentrate development on portions of the site with less permeable soils, and preserve areas that can promote infiltration.
Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. *Infiltration testing has been performed. The site is agricultural and has great infiltration rates all over. Infiltration areas have been spread out to utilize as much infiltration capacity as feasible on the project site.*	
☒ Yes ☐ No ☐ N/A	**Did you minimize impervious area?** Look for opportunities to limit impervious cover through identification of the smallest possible land area that can be practically impacted or disturbed during site development. • Limit overall coverage of paving and roofs. This can be accomplished by designing compact, taller structures, narrower and shorter streets and sidewalks, clustering buildings and sharing driveways, smaller parking lots (fewer stalls, smaller stalls, and more efficient lanes), and indoor or underground parking. • Inventory planned impervious areas on your preliminary site plan. Identify where permeable pavements, or other permeable materials, such as crushed aggregate, turf block, permeable modular blocks, pervious concrete or pervious asphalt could be substituted for impervious concrete or asphalt paving. This will help reduce the amount of Runoff that may need to be addressed through Structural BMPs. • Examine site layout and circulation patterns and identify areas where landscaping can be substituted for pavement, such as for overflow parking. • Consider green roofs. Green roofs are roofing systems that provide a layer of soil/vegetative cover over a waterproofing membrane. A green roof mimics pre-development conditions by filtering, absorbing, and evapotranspiring precipitation to help manage the effects of an otherwise impervious rooftop.
Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. *Impervious areas have been designed with minimal widths were allowed. Roofs have been designed to drain to adjacent landscaping. All impervious areas on the site drain to the project’s infiltration areas.*	

Project- Specific WQMP Site Design BMP Checklist	
☒ Yes ☐ No ☐ N/A	**Did you identify and disperse runoff to adjacent pervious areas or small collection areas?** Look for opportunities to direct runoff from impervious areas to adjacent landscaping, other pervious areas, or small collection areas where such runoff may be retained. This is sometimes referred to as reducing Directly Connected Impervious Areas. • Direct roof runoff into landscaped areas such as medians, parking islands, planter boxes, etc., and/or areas of pervious paving. Instead of having landscaped areas raised above the surrounding impervious areas, design them as depressed areas that can receive Runoff from adjacent impervious pavement. For example, a lawn or garden depressed 3"-4" below surrounding walkways or driveways provides a simple but quite functional landscape design element. • Detain and retain runoff throughout the site. On flatter sites, smaller Structural BMPs may be interspersed in landscaped areas among the buildings and paving. • On hillside sites, drainage from upper areas may be collected in conventional catch basins and piped to landscaped areas and LID BMPs and/or Hydrologic Control BMPs in lower areas. Low retaining walls may also be used to create terraces that can accommodate LID BMPs. Wherever possible, direct drainage from landscaped slopes offsite and not to impervious surfaces like parking lots. • Reduce curb maintenance and provide for allowances for curb cuts. • Design landscaped areas or other pervious areas to receive and infiltrate runoff from nearby impervious areas. • Use Tree Wells to intercept, infiltrate, and evapotranspire precipitation and runoff before it reaches structural BMPs. Tree wells can be used to limit the size of Drainage Management Areas that must be treated by structural BMPs. Guidelines for Tree Wells are included in the Tree Well Fact Sheet in the LID BMP Design Handbook.
Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. *Impervious areas have been designed to drain to localized landscaping areas that have been designed with infiltration areas incorporated into them.*	
☒ Yes ☐ No ☐ N/A	**Did you utilize native or drought tolerant species in site landscaping?** Wherever possible, use native or drought tolerant species within site landscaping instead of alternatives. These plants are uniquely suited to local soils and climate and can reduce the overall demands for potable water use associated with irrigation.
Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. *Landscaping is designed per the landscaped architectural plans and will be per the County standard plants that meet the criteria of native or drought tolerant species.*	

Project- Specific WQMP Site Design BMP Checklist	
☐ Yes ☒ No ☐ N/A	**Did implement harvest and use of runoff?** Under the Regional MS4 Permit, Harvest and Use BMPs must be employed to reduce runoff on any site where they are applicable and feasible. However, Harvest and Use BMPs are effective for retention of stormwater runoff only when there is adequate demand for non-potable water during the wet season. If demand for non-potable water is not sufficiently large, the actual retention of stormwater runoff will be diminished during larger storms or during back-to-back storms. For the purposes of planning level Harvest and Use BMP feasibility screening, Harvest and Use is only considered to be a feasible if the total average wet season demand for non-potable water is sufficiently large to use the entire DCV within 72 hours. If the average wet season demand for non-potable water is not sufficiently large to use the entire DCV within 72 hours, then Harvest and Use is not considered to be feasible and need not be considered further. The general feasibility and applicability of Harvest and Use BMPs should consider: • Any downstream impacts related to water rights that could arise from capturing stormwater (not common). • Conflicts with recycled water used – where the project is conditioned to use recycled water for irrigation, this should be given priority over stormwater capture as it is a year-round supply of water. • Code Compliance - If a particular use of captured stormwater, and/or available methods for storage of captured stormwater would be contrary to building codes in effect at the time of approval of the preliminary Project-Specific WQMP, then an evaluation of harvesting and use for that use would not be required. • Wet season demand – the applicant shall demonstrate, to the acceptance of the County of Riverside, that there is adequate demand for harvested water during the wet season to drain the system in a reasonable amount of time.
Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. *The wet season demand does not warrant harvest and use.*	
☐ Yes ☐ No ☒ N/A	**Did you keep the runoff from sediment producing pervious area hydrologically separate from developed areas that require treatment?** Pervious area that qualify as self-treating areas or off-site open space should be kept separate from drainage to structural BMPs whenever possible. This helps limit the required size of structural BMPs, helps avoid impacts to sediment supply, and helps reduce clogging risk to BMPs.
Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. *There are no sediment producing pervious areas. Other areas that can be called Self-Treating have been annotated and utilized as self-treating areas.*	

Section C: Delineate Drainage Management Areas (DMAs) & Green Streets

This section provides streamlined guidance and documentation of the DMA delineation and categorization process, for additional information refer to the procedure in Section 3.3 of the SMR WQMP which discusses the methods of delineating and mapping your project site into individual DMAs. Complete Steps 1 to 4 to successfully delineate and categorize DMAs.

Step 1: Identify Surface Types and Drainage Pathways

Carefully delineate pervious areas and impervious areas (including roofs) throughout site and identify overland flow paths and above ground and below ground conveyances. Also identify common points (such as BMPs) that these areas drain to.

Step 2: DMA Delineation

Use the information in Step 1 to divide the entire PDP site into individual, discrete DMAs. Typically, lines delineating DMAs follow grade breaks and roof ridge lines. Where possible, establish separate DMAs for each surface type (e.g., landscaping, pervious paving, or roofs). Assign each DMA a unique code and determine its size in square feet. The total area of your site should total the sum of all of your DMAs (unless water from outside the project limits comingles with water from inside the project limits, i.e. run-on). Complete Table C-1

Table C-1 DMA Identification

Table C.1 DMA Classifications - DMA1				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA1/LS1	LANDSCAPE	11585	TYPE D – DRAINS TO BMP	58
DMA1/LS2	LANDSCAPE	370	TYPE D – DRAINS TO BMP	2
DMA1/LS3	LANDSCAPE	1570	TYPE D – DRAINS TO BMP	8
DMA1/LS4	LANDSCAPE	3815	TYPE D – DRAINS TO BMP	19
DMA1/LS6	LANDSCAPE	2934	TYPE D – DRAINS TO BMP	15
DMA1/LS7	LANDSCAPE	279	TYPE D – DRAINS TO BMP	1
DMA1/IP1	IMPERVIOUS PAVING	23036	TYPE D – DRAINS TO BMP	979
DMA1/DG1	DG SURFACE	3384	TYPE D – DRAINS TO BMP	37
DMA1/IB1	INFILTRATION AREA	6905	TYPE D – DRAINS TO BMP	35
		53879		1154

Table C.1 DMA Classifications - DMA2				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA2/LS5	LANDSCAPE	3350	TYPE D – DRAINS TO BMP	11
DMA2/LS8	LANDSCAPE	3401	TYPE D – DRAINS TO BMP	17
DMA2/LS10	LANDSCAPE	30054	TYPE D – DRAINS TO BMP	150
DMA2/LS11	LANDSCAPE	38050	TYPE D – DRAINS TO BMP	190
DMA2/LS12	LANDSCAPE	609	TYPE D – DRAINS TO BMP	3
DMA2/LS13	LANDSCAPE	260	TYPE D – DRAINS TO BMP	1
DMA2/LS14	LANDSCAPE	1103	TYPE D – DRAINS TO BMP	5
DMA2/LS15	LANDSCAPE	3470	TYPE D – DRAINS TO BMP	17
DMA2/LS16	LANDSCAPE	662	TYPE D – DRAINS TO BMP	3
DMA2/LS17	LANDSCAPE	7190	TYPE D – DRAINS TO BMP	36
DMA2/R1	ROOF	7340	TYPE D – DRAINS TO BMP	311
DMA2/R9	ROOF	1263	TYPE D – DRAINS TO BMP	54
DMA2/IP2	IMPERVIOUS PAVING	2012	TYPE D – DRAINS TO BMP	85
DMA2/IP3	IMPERVIOUS PAVING	65676	TYPE D – DRAINS TO BMP	2792
DMA2/PL	POOL	2234	TYPE D – DRAINS TO BMP	0
DMA2/DG2	DG SURFACE	10319	TYPE D – DRAINS TO BMP	112
DMA2/IB2	INFILTRATION AREA	10140	TYPE D – DRAINS TO BMP	51
		186034		3838

Table C.1 DMA Classifications - DMA3				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA3/LS18	LANDSCAPE	1089	TYPE D – DRAINS TO BMP	5
DMA3/LS19	LANDSCAPE	623	TYPE D – DRAINS TO BMP	3
DMA3/LS20	LANDSCAPE	292	TYPE D – DRAINS TO BMP	2
DMA3/LS21	LANDSCAPE	347	TYPE D – DRAINS TO BMP	2
DMA3/LS22	LANDSCAPE	716	TYPE D – DRAINS TO BMP	3
DMA3/LS23	LANDSCAPE	455	TYPE D – DRAINS TO BMP	2
DMA3/LS24	LANDSCAPE	8771	TYPE D – DRAINS TO BMP	44
DMA3/LS25	LANDSCAPE	1936	TYPE D – DRAINS TO BMP	10
DMA3/LS26	LANDSCAPE	1832	TYPE D – DRAINS TO BMP	9
DMA3/LS27	LANDSCAPE	2271	TYPE D – DRAINS TO BMP	11
DMA3/LS28	LANDSCAPE	3449	TYPE D – DRAINS TO BMP	17
DMA3/LS29	LANDSCAPE	2436	TYPE D – DRAINS TO BMP	12
DMA3/LS30	LANDSCAPE	2934	TYPE D – DRAINS TO BMP	15
DMA3/R2	ROOF	17732	TYPE D – DRAINS TO BMP	753
DMA3/R3	ROOF	5514	TYPE D – DRAINS TO BMP	235
DMA3/R4	ROOF	5358	TYPE D – DRAINS TO BMP	228
DMA3/R5	ROOF	3849	TYPE D – DRAINS TO BMP	163
DMA3/IP4	IMPERVIOUS PAVING	9484	TYPE D – DRAINS TO BMP	404
DMA3/IP5	IMPERVIOUS PAVING	7247	TYPE D – DRAINS TO BMP	307
DMA3/IB3(V)	INFILTRATION	68030	TYPE D – DRAINS TO BMP	340
		144364		2565

Table C.1 DMA Classifications - DMA4				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA4/LS31	LANDSCAPE	11451	TYPE D – DRAINS TO BMP	57
DMA4/LS32	LANDSCAPE	11945	TYPE D – DRAINS TO BMP	60
DMA4/LS33	LANDSCAPE	3505	TYPE D – DRAINS TO BMP	17
DMA4/LS34	LANDSCAPE	2009	TYPE D – DRAINS TO BMP	10
DMA4/LS35	LANDSCAPE	381	TYPE D – DRAINS TO BMP	2
DMA4/LS36	LANDSCAPE	1417	TYPE D – DRAINS TO BMP	7
DMA4/R6	ROOF	21552	TYPE D – DRAINS TO BMP	916
DMA4/IP6	IMPERVIOUS PAVING	84310	TYPE D – DRAINS TO BMP	3582
DMA4/IB4A	INFILTRATION	2702	TYPE D – DRAINS TO BMP	
DMA4/IB4B	INFILTRATION	2714	TYPE D – DRAINS TO BMP	41
DMA4/IB4C	INFILTRATION	2829	TYPE D – DRAINS TO BMP	
		144815		4692

Table C.1 DMA Classifications - DMA5				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA5/LS37	LANDSCAPE	17907	TYPE D – DRAINS TO BMP	90
DMA5/LS38	LANDSCAPE	5412	TYPE D – DRAINS TO BMP	27
DMA5/LS9	LANDSCAPE	12822	TYPE D – DRAINS TO BMP	64
DMA5/LS40	LANDSCAPE	1572	TYPE D – DRAINS TO BMP	8
DMA5/R7	ROOF	17741	TYPE D – DRAINS TO BMP	753
DMA5/R8	ROOF	5865	TYPE D – DRAINS TO BMP	250
DMA5/IP7	IMPERVIOUS PAVING	24481	TYPE D – DRAINS TO BMP	1040
DMA5/IB5	INFILTRATION	2608	TYPE D – DRAINS TO BMP	13
		88407		2245

Table C.1 DMA Classifications - DMA6				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA6/IP8	IMPERVIOUS PAVING	12594	TYPE D – DRAINS TO BMP	535
DMA6/IB6	INFILTRATION	350	TYPE D – DRAINS TO BMP	2
		12944		537

Table C.1 DMA Classifications - DMA7				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA7/LS41	LANDSCAPE	869	TYPE D – DRAINS TO BMP	4
DMA7/LS42	LANDSCAPE	1346	TYPE D – DRAINS TO BMP	7
DMA7/IP9	IMPERVIOUS PAVING	8817	TYPE D – DRAINS TO BMP	374
DMA7/IB7	INFILTRATION	750	TYPE D – DRAINS TO BMP	4
		11782		389

Table C.1 DMA Classifications - DMA8				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA8/IP10	IMPERVIOUS PAVING	24989	TYPE D – DRAINS TO BMP	1063
DMA8/IB8	INFILTRATION	825	TYPE D – DRAINS TO BMP	4
		25815		1067

Step 3: DMA Classification

Determine how drainage from each DMA will be handled by using information from Steps 1 and 2 and by completing Steps 3.A to 3.C. Each DMA will be classified as one of the following four types:

- Type 'A': Self-Treating Areas:
- Type 'B': Self-Retaining Areas
- Type 'C': Areas Draining to Self-Retaining Areas
- Type 'D': Areas Draining to BMPs

Step 3.A – Identify Type 'A' Self-Treating Area

Indicate if the DMAs meet the following criteria by answering "Yes" or "No".

☒ Yes ☐ No Area is undisturbed from their natural condition OR restored with Native and/or California Friendly vegetative covers.

☒ Yes ☐ No Area is irrigated, if at all, with appropriate low water use irrigation systems to prevent irrigation runoff.

☒ Yes ☐ No Runoff from the area will not comingle with runoff from the developed portion of the site, or across other landscaped areas that do not meet the above criteria.

If all answers indicate "Yes," complete Table C-2 to document the DMAs that are classified as Self-Treating Areas.

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

Table C.2 Type 'A', Self-Treating Areas			
DMA Name or Identification	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
ST/A	6332	LANDSCAPE	CONSERVATIVE
ST/B	589	LANDSCAPE	CONSERVATIVE
ST/C	15374	LANDSCAPE	CONSERVATIVE
ST/D	53397	LANDSCAPE	CONSERVATIVE
ST/E	923	LANDSCAPE	CONSERVATIVE
ST/F	10493	LANDSCAPE	CONSERVATIVE
ST/G	4070	LANDSCAPE	CONSERVATIVE

Step 3.B – Identify Type 'B' Self-Retaining Area and Type 'C' Areas Draining to Self-Retaining Areas

Type 'B' Self-Retaining Area: A Self-Retaining Area is shallowly depressed 'micro infiltration' areas designed to retain the Design Storm rainfall that reaches the area, without producing any Runoff.

Indicate if the DMAs meet the following criteria by answering "Yes," "No," or "N/A".

☐ Yes ☐ No ☒ N/A	Inlet elevations of area/overflow drains, if any, should be clearly specified to be three inches or more above the low point to promote ponding.
☐ Yes ☐ No ☒ N/A	Soils will be freely draining to not create vector or nuisance conditions.
☐ Yes ☐ No ☒ N/A	Pervious pavements (e.g., crushed stone, porous asphalt, pervious concrete, or permeable pavers) can be self-retaining when constructed with a gravel base course four or more inches deep below any underdrain discharge elevation.

If all answers indicate "Yes," DMAs may be categorized as Type 'B', proceed to identify Type 'C' Areas Draining to Self-Retaining Areas.

Type 'C' Areas Draining to Self-Retaining Areas: Runoff from impervious or partially pervious areas can be managed by routing it to Self-Retaining Areas consistent with the LID Principle discussed in SMR WQMP Section 3.2.5 for 'Dispersing Runoff to Adjacent Pervious Areas'.
Indicate if the DMAs meet the following criteria by answering "Yes" or "No".

☐ Yes ☒ No	The drainage from the tributary area must be directed to and dispersed within the Self-Retaining Area.
☐ Yes ☒ No	The maximum ratio of Tributary Area to Self-Retaining area is (2 ÷ Impervious Fraction): 1

If all answers indicate "Yes," DMAs may be categorized as Type 'C'.

Complete Table C-3 and Table C-4 to identify Type 'B' Self-Retaining Areas and Type 'C' Areas Draining to 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) [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 Proposed At This Time						

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

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet)	Post-project surface type	Runoff factor	Product		Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]	DMA name /ID	[D]	[C]/[D]
None Proposed At This Time							

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:

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

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

Step 3.B.1 – Document the use of Green Street Exemption (see Section 3.11 of the WQMP Guidance)

The Regional MS4 Permit specifies that projects that consist of **retrofitting or redevelopment of existing paved alleys, streets, or roads** may be exempted from classification as PDPs if they are designed and constructed in accordance with USEPA Green Streets Guidance. This does not apply for interior roads for PDP projects. For projects with road frontage improvements, Green Street standards can be used in the frontage road right-of-way. The remainder of the project is subject to full WQMP and Hydromodification requirements. See excerpt from Section 3.11 of the WQMP Guidance below:

3.11.4 BMP Sizing Targets for Applicable Green Streets Projects

Applicable green street projects are not required to meet the same sizing requirements for BMPs as other projects, but should attempt to meet a sizing target to the MEP. The following steps are used to size BMPs for applicable Green Streets projects:

1. Delineate drainage areas tributary to BMP locations and compute imperviousness.
2. Determine sizing goal by referring to sizing criteria presented in Section 2.3.2 (V_{BMP}).
3. Attempt to provide the target BMP sizing according to Step 2.
4. If the target criteria cannot be achieved, document the constraints that override the application of BMPs, and provide the largest portion of the sizing criteria that can be reasonably provided given constraints.

Even if BMPs cannot be sized to meet the target sizing criteria, it is still important to design the BMP inlet, energy dissipation, and overflow capacity for the full tributary area to ensure that flooding and scour is avoided. It is strongly recommended that BMPs which are designed to less than their target design volume be designed to bypass peak flows.

Table C-4.1 – Green Streets

DMA Name or ID	Street Name	BMP Sizing Targets Calculations and documenting constraints included in Appendix 6*
	Does Not Apply	☐ Yes ☐ No
*WQMP shall not be approved without calculations or documenting constraints for Green Street Exemption.		

Step 3.C – Identify Type 'D' Areas Draining to BMPs

Areas draining to BMPs are those that could not be fully managed through LID Principles (DMA Types A through C) and will instead drain to an LID BMP and/or a Conventional Treatment BMP designed to manage water quality impacts from that area, and Hydromodification where necessary.

Complete Table C-5 to document which DMAs are classified as Areas Draining to BMPs

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

DMA Name or ID	BMP Name or ID Receiving Runoff from DMA
DMA1	IB1 – INFILTRATION TRENCH
DMA2	IB2 – INFILTRATION TRENCH
DMA3	IB3 – INFILTRATION TRENCH
DMA4	IB4 – INFILTRATION TRENCH
DMA5	IB5 – INFILTRATION TRENCH
DMA6	IB6 – INFILTRATION TRENCH
DMA7	IB7 – INFILTRATION TRENCH
DMA8	IB8 – INFILTRATION TRENCH
Note: More than one DMA may drain to a single LID BMP; however, one DMA may not drain to more than one BMP.	

Section D: Implement LID BMPs

The Regional MS4 Permit requires the use of LID BMPs to provide retention or treatment of the DCV and includes a BMP hierarchy which requires Full Retention BMPs (Priority 1) to be considered before Biofiltration BMPs (Priority 2) and Flow-Through Treatment BMPs and Alternative Compliance BMPs (Priority 3). LID BMP selection must be based on technical feasibility and should be considered early in the site planning and design process. Use this section to document the selection of LID BMPs for each DMA. Note that feasibility is based on the DMA scale and may vary between DMAs based on site conditions.

D.1 Full Infiltration Applicability

An assessment of the feasibility of utilizing full infiltration BMPs is required for all projects, *except where it can be shown that site design LID principles fully retain the DCV (i.e., all DMAs are Type A, B, or C), or where Harvest and Use BMPs fully retain the DCV. Check the following box if applicable:*

☐ Site design LID principles fully retain the DCV (i.e., all DMAs are Type A, B, or C), (Proceed to Section E).

If the above box remains unchecked, perform a site-specific evaluation of the feasibility of Infiltration BMPs using each of the applicable criteria identified in Chapter 2.3.3 of the SMR WQMP and complete the remainder of Section D.1.

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 Copermittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the SMR WQMP. 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.

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 SMR WQMP in Chapter 2.3.3. 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

Downstream Impacts (SMR WQMP Section 2.3.3.a)		
Does the project site…	**YES**	**NO**
…have any DMAs where infiltration would negatively impact downstream water rights or other Beneficial Uses[3]?		X
If Yes, list affected DMAs:		
Groundwater Protection (SMR WQMP Section 2.3.3.b)		
Does the project site…	**YES**	**NO**
…have any DMAs with industrial, and other land uses that pose a high threat to water quality, which cannot be treated by Bioretention BMPs? Or have DMAs with active industrial process areas?		X
If Yes, list affected DMAs:		
…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 horizontally of a water supply well?		X
If Yes, list affected DMAs:		
…have any DMAs that would restrict BMP locations to within a 2:1 (horizontal: vertical) influence line extending from any septic leach line?		X
If Yes, list affected DMAs:		
…have any DMAs been evaluated by a licensed Geotechnical Engineer, or Environmental Engineer, who has concluded that the soils do not have adequate physical and chemical characteristics for the protection of groundwater, and has treatment provided by amended media layers in Bioretention BMPs been considered in evaluating this factor?		X
If Yes, list affected DMAs:		
Public Safety and Offsite Improvements (SMR WQMP Section 2.3.3.c)		
Does the project site…	**YES**	**NO**
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact, such as potential seepage through fill conditions?		X
If Yes, list affected DMAs:		
Infiltration Characteristics For LID BMPs (SMR WQMP Section 2.3.3.d)		
Does the project site…	**YES**	**NO**
…have measured infiltration rates of less than 2.4 inches / hour? Riverside County may allow measure rates as low as 0.8in/hr to support infiltration BMPs, if the Engineer believes infiltration is appropriate and sustainable. Mark no, if this is the case.		X
If Yes, list affected DMAs:		
Cut/Fill Conditions (SMR WQMP Section 2.3.3.e)		
Does the project site…	**YES**	**NO**
…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:		
Other Site-Specific Factors (SMR WQMP Section 2.3.3.f)		
Does the project site…	**YES**	**NO**
…have DMAs where the geotechnical investigation discovered other site-specific factors that would preclude effective and/or safe infiltration?		X
Describe here:		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs that rely solely on infiltration should not be used for those DMAs and you should proceed to the assessment for Biofiltration BMPs below. Biofiltration BMPs that provide partial infiltration may still be feasible and should be assessed in Section D.2. Summarize concerns identified in the Geotechnical Report, if any, that resulted in a "YES" response above in the table below.

[3] Such a condition must be substantiated by sufficient modeling to demonstrate an impact and would be subject to County of Riverside discretion. There is not a standardized method for assessing this criterion. Water rights evaluations should be site-specific.

Table D-2 Geotechnical Concerns for Onsite Infiltration

Type of Geotechnical Concern	DMAs Feasible (By Name or ID)	DMAs Infeasible (By Name or ID)
Collapsible Soil	N/A	N/A
Expansive Soil	N/A	N/A
Slopes	N/A	N/A
Liquefaction	N/A	N/A
Other	N/A	N/A

D.2 Biofiltration Applicability

This section should document the applicability of biofiltration BMPs for Type D DMAs that are not feasible for full infiltration BMPs. The key decisions to be documented in this section include:

1. Are biofiltration BMPs with partial infiltration feasible?

    a. Biofiltration BMPs must be designed to maximize incidental infiltration via a partial infiltration design unless it is demonstrated that this design is not feasible.

    b. These designs can be used at sites with low infiltration rates where other feasibility factors do not preclude incidental infiltration.

    Document summary in Table D-3.

2. If not, what are the factors that require the use of biofiltration with no infiltration? This may include:

    a. Geotechnical hazards

    b. Water rights issues

    c. Water balance issues

    d. Soil contamination or groundwater quality issues

    e. Very low infiltration rates (factored rates < 0.1 in/hr)

    f. Other factors, demonstrated to the acceptance of the local jurisdiction

    If this applies to any DMAs, then rationale must be documented in Table D-3.

3. Are biofiltration BMPs infeasible?

    a. If yes, then provide 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 with jurisdiction over the Project site to discuss this option. Proceed below.

Table D-3 Evaluation of Biofiltration BMP Feasibility

DMA ID	Is Partial/ Incidental Infiltration Allowable? (Y/N)	Basis for Infeasibility of Partial Infiltration (provide summary and include supporting basis if partial infiltration not feasible)
N/A – Infiltration Feasible		

Proprietary Biofiltration BMP Approval Criteria

Does the Co-Permittee allow Proprietary BMPs as an equivalent to Biofiltration, if specific criteria is met?

☐ Yes or ☐ No, if no skip to Section F to document your alternative compliance measures.

If the project will use proprietary BMPs as biofiltration BMPs, then this section and Appendix 5 shall be completed to document that the proprietary BMPs are selected in accordance with Section 2.3.6 of the SMR WQMP and County requirements. Proprietary Biofiltration BMPs must meet both of the following approval criteria:

1. Demonstrate equivalency to Biofiltration by completing the BMP Design worksheet and Proprietary Biofiltration Criteria, which is found in Appendix 5, including all supporting documentation, and
2. Obtain Co-Permittee concurrence for the long term Operation and Maintenance Plan for the proprietary BMP. The Co-Permittee has the sole discretion to allow or reject Proprietary BMPs, especially if they will be maintained publically through a CFD, CSA, or L&LMD.

Add additional rows to Table D-4 to document approval criteria are met for each type of BMP proposed.

Table D-4 Proprietary BMP Approval Requirement Summary

Proposed Proprietary Biofiltration BMP	Approval Criteria	Notes/Comments
N/A	BMP Design worksheets and Proprietary Biofiltration Criteria are completed in Appendix 5	☐ Yes or ☐ No
	Proposed BMP has an active TAPE GULD Certification for the project pollutants of concern[4] or equivalent 3rd party demonstrated performance.	☐ Yes or ☐ No
	Is there any media or cartridge required to maintain the function of the BMP sole-sourced or proprietary in any way? If yes, obtain explicit approval by the Agency. Potentially full replacement costs to a non-proprietary BMP needs to be considered.	☐ Yes or ☐ No If yes, provide the date of concurrence from the Co-Permittee.
	☐ The BMP includes biological features including vegetation supported by engineered or other growing media.	

[4] Use Table F-1, F-2, and F-3 to identify and document the pollutants of concern and include these tables in Appendix 5.

D.3 Feasibility Assessment Summaries

From the Infiltration, Biofiltration with Partial Infiltration and Biofiltration with No Infiltration Sections above, complete Table D-5 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D-5 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy			No LID (Alternative Compliance)
	1. Infiltration	2. Biofiltration with Partial Infiltration*	3. Biofiltration with No Infiltration*	
All	☒	☐	☐	☐

*Includes Proprietary Biofiltration, if accepted by the Co-Permittee.

For those DMAs where LID BMPs are not feasible, provide a narrative in Table D-6 below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section F 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.

This is based on the clarification letter titled "San Diego Water Board's Expectations of Documentation to Support a Determination of Priority Development Project Infiltration Infeasibility" (April 28, 2017, Via email from San Diego Regional Water Quality Control Board to San Diego County Municipal Storm Water Copermittees[5]).

Table D-6 Summary of Infeasibility Documentation

Question	Narrative Summary (include reference to applicable appendix/attachment/report, as applicable)
a) When in the entitlement process did a geotechnical engineer analyze the site for infiltration feasibility?	N/A
b) When in the entitlement process were other investigations conducted (e.g., groundwater quality, water rights) to evaluate infiltration feasibility?	N/A
c) What was the scope and results of testing, if conducted, or rationale for why testing was not needed to reach findings?	N/A
d) What public health and safety requirements affected infiltration locations?	N/A
e) What were the conclusions and recommendations of the geotechnical engineer and/or other professional responsible for other investigations?	N/A
f) What was the history of design discussions between the permittee and applicant for the proposed project, resulting in the final design determination related locations feasible for infiltration?	N/A
g) What site design alternatives were considered to achieve infiltration or partial infiltration on site?	N/A
h) What physical impairments (i.e., fire road egress, public safety considerations, utilities) and public safety concerns influenced site layout and infiltration feasibility?	N/A
i) What LID Principles (site design BMPs) were included in the project site design?	N/A

[5] http://www.projectcleanwater.org/download/pdp-infiltration-infeasibility/

D.4 LID BMP Sizing

Each LID BMP must be designed to ensure that the DCV will be captured by the selected BMPs with no discharge to the storm drain or surface waters during the DCV size storm. Infiltration BMPs must at minimum be sized to capture the DCV to achieve pollutant control requirements.

Biofiltration BMPs must at a minimum be sized to:

- Treat 1.5 times the DCV not reliably retained on site using a volume-base or flow-based sizing method, or
- Include static storage volume, including pore spaces and pre-filter detention volume, at least 0.75 times the portion of the DCV not reliably retained on site.

First**,** calculate the DCV 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 the methods included in Section 3 of the LID BMP Design Handbook. Utilize the worksheets found in the LID BMP Design Handbook or consult with the Copermittee to assist you in correctly sizing your LID BMPs. Use Table D-7 below to document the DCV 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-7 DCV Calculations for LID BMPs

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA1 – IB1* *Infiltration Trench*		
	[A]		[B]	[C]	[A] x [C]	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA1/LS1	11585	LANDSCAPE	0.1	0.1105	1280			
DMA1/LS2	370	LANDSCAPE	0.1	0.1105	41			
DMA1/LS3	1570	LANDSCAPE	0.1	0.1105	173			
DMA1/LS4	3815	LANDSCAPE	0.1	0.1105	421			
DMA1/LS6	2934	LANDSCAPE	0.1	0.1105	324			
DMA1/LS7	279	LANDSCAPE	0.1	0.1105	31			
DMA1/IP1	23036	IMPERVIOUS	1.0	0.8920	20548			
DMA1/DG1	3384	D.G.	0.3	0.2252	762			
DMA1/IB1	6905	BMP	0.1	0.1105	763			
	53879				24343	0.57	1156	33145

[B], [C] is obtained as described in Section 2.6.1.b of the SMR WQMP
[E] is obtained from Exhibit A in the SMR WQMP
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6.

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA2 – IB2* *Infiltration Trench*		
	[A]		[B]	[C]	[A] x [C]			
DMA2/LS5	2250	LANDSCAPE	0.1	0.1105	249			
DMA2/LS8	3401	LANDSCAPE	0.1	0.1105	376			
DMA2/LS10	30054	LANDSCAPE	0.1	0.1105	3320			
DMA2/LS11	38050	LANDSCAPE	0.1	0.1105	4203			
DMA2/LS12	609	LANDSCAPE	0.1	0.1105	67			
DMA2/LS13	260	LANDSCAPE	0.1	0.1105	29			
DMA2/LS14	1103	LANDSCAPE	0.1	0.1105	122			
DMA2/LS15	3470	LANDSCAPE	0.1	0.1105	383			
DMA2/LS16	662	LANDSCAPE	0.1	0.1105	73			
DMA2/LS17	7190	LANDSCAPE	0.1	0.1105	794			
DMA2/R1	7340	ROOF	1.0	0.8920	6547			
DMA2/R9	1263	ROOF	1.0	0.8920	1126			
DMA2/IP2	2012	IMPERVIOUS	1.0	0.8920	1795			
DMA2/IP3	65676	IMPERVIOUS	1.0	0.8920	58583			
DMA2/PL	2234	POOL	0	0	0			
DMA2/DG2	10319	D.G.	0.3	0.2252	2323			
DMA2/IB2	10140	BMP	0.1	0.1105	1120	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	186034				81111	0.57	3853	72253

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA3 – IB3 Infiltration Trench*		
	[A]		[B]	[C]	[A] x [C]			
DMA3/LS18	1089	LANDSCAPE	0.1	0.1105	120			
DMA3/LS19	623	LANDSCAPE	0.1	0.1105	69			
DMA3/LS20	292	LANDSCAPE	0.1	0.1105	32			
DMA3/LS21	347	LANDSCAPE	0.1	0.1105	38			
DMA3/LS22	716	LANDSCAPE	0.1	0.1105	79			
DMA3/LS23	455	LANDSCAPE	0.1	0.1105	50			
DMA3/LS24	8771	LANDSCAPE	0.1	0.1105	969			
DMA3/LS25	1936	LANDSCAPE	0.1	0.1105	214			
DMA3/LS26	1832	LANDSCAPE	0.1	0.1105	202			
DMA3/LS27	2271	LANDSCAPE	0.1	0.1105	251			
DMA3/LS28	3449	LANDSCAPE	0.1	0.1105	381			
DMA3/LS29	2436	LANDSCAPE	0.1	0.1105	269			
DMA3/LS30	2934	LANDSCAPE	0.1	0.1105	324			
DMA3/R2	17732	ROOF	1.0	0.8920	15817			
DMA3/R3	5514	ROOF	1.0	0.8920	4919			
DMA3/R4	5358	ROOF	1.0	0.8920	4779			
DMA3/R5	3849	ROOF	1.0	0.8920	3434			
DMA3/IP4	9484	IMPERVIOUS	1.0	0.8920	8460			
DMA3/IP5	7247	IMPERVIOUS	1.0	0.8920	6464			
DMA3/IB3(V)	68030	BMP	0.1	0.1105	7514	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	144364				54386	0.57	2583	16393

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA4 – IB4* *Infiltration Trench*		
	[A]		[B]	[C]	[A] x [C]	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA4/LS31	11451	LANDSCAPE	0.1	0.1105	1265			
DMA4/LS32	11945	LANDSCAPE	0.1	0.1105	1319			
DMA4/LS33	3505	LANDSCAPE	0.1	0.1105	387			
DMA4/LS34	2009	LANDSCAPE	0.1	0.1105	222			
DMA4/LS35	381	LANDSCAPE	0.1	0.1105	42			
DMA4/LS36	1417	LANDSCAPE	0.1	0.1105	156			
DMA43/R6	21552	ROOF	1.0	0.8920	19225			
DMA4/IP6	84310	IMPERVIOUS	1.0	0.8920	75205			
DMA4/IB4A	2702	BMP	0.1	0.1105	298			
DMA4/IB4B	2714	BMP	0.1	0.1105	300			
DMA4/IB4C	2829	BMP	0.1	0.1105	312			
	144815				96148	0.57	4567	16393

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA5 – IB5* *Infiltration Trench*		
	[A]		[B]	[C]	[A] x [C]	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA5/LS37	17907	LANDSCAPE	0.1	0.1105	1978			
DMA5/LS38	5412	LANDSCAPE	0.1	0.1105	598			
DMA5/LS39	12822	LANDSCAPE	0.1	0.1105	1416			
DMA5/LS40	1572	LANDSCAPE	0.1	0.1105	174			
DMA5/R7	17741	LANDSCAPE	0.1	0.1105	15825			
DMA5/R8	5865	ROOF	1.0	0.8920	5232			
DMA5/IP7	24481	IMPERVIOUS	1.0	0.8920	21837			
DMA5/IB5	2608	BMP	0.1	0.1105	288			
	88407				47348	0.57	2249	12273

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA6 – IB6* *Infiltration Trench*		
	[A]		[B]	[C]	[A] x [C]			
DMA6/IP8	12594	IMPERVIOUS	1.0	0.8920	11234	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA6/IB6	350	BMP	0.1	0.1105	39			
	12944				11272	0.57	535	2793

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA7 – IB7* *Infiltration Trench*		
	[A]		[B]	[C]	[A] x [C]			
DMA7/LS41	869	LANDSCAPE	0.1	0.1105	96	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA7/LS42	1346	LANDSCAPE	0.1	0.1105	149			
DMA7/IP9	8817	IMPERVIOUS	1.0	0.8920	7865			
DMA7/IB7	750	BMP	0.1	0.1105	83			
	11782				8193	0.57	389	2359

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*DMA8 – IB8* *Infiltration Trench*		
	[A]		[B]	[C]	[A] x [C]			
DMA8/IP10	24989	IMPERVIOUS	1.0	0.8920	22290	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
DMA8/IB8	825	BMP	0.1	0.1105	91			
	25815				22381	0.57	1063	11735

Complete Table D-8 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. You can add rows to the table as needed. Alternatively, the Santa Margarita Hydrology Model (SMRHM) can be used to size LID BMPs to address the DCV and, if applicable, to size Hydrologic Control BMPs to meet the Hydrologic Performance Standard described in the SMR WQMP, as identified in Section E.

Table D-8 LID BMP Sizing

BMP Name / ID	DMA No.	BMP Type / Description	Design Capture Volume (ft^3)	Proposed Volume (ft^3)
IB1	DMA1	INFILTRATION TRENCH	1,156	18,196
IB2	DMA2	INFILTRATION TRENCH	3,853	33,145
IB3	DMA3	INFILTRATION TRENCH	2,583	72,253
IB4	DMA4	INFILTRATION TRENCH	4,567	16,393
IB5	DMA5	INFILTRATION TRENCH	2,249	,12,273
IB6	DMA6	INFILTRATION TRENCH	535	2,793
IB7	DMA7	INFILTRATION TRENCH	389	2,359
IB8	DMA8	INFILTRATION TRENCH	1,063	11,735

If bioretention will include a capped underdrain, then include sizing calculations demonstrating that the BMP will meet infiltration sizing requirements with the underdrain capped and also meet biofiltration sizing requirements if the underdrain is uncapped.

Section E: Implement Hydrologic Control BMPs and Sediment Supply BMPs

See Appendix 7 for additional required information.

If a completed Table 1.2 demonstrates that the project is exempt from Hydromodification Performance Standards, specify N/A and proceed to Section G.

☐ N/A Project is Exempt from Hydromodification Performance Standards.

If a PDP is not exempt from hydromodification requirements than the PDP must satisfy the requirements of the performance standards for hydrologic control BMPs and Sediment Supply BMPs. The PDP may choose to satisfy hydrologic control requirements using onsite or offsite BMPs (i.e. Alternative Compliance). Sediment supply requirements cannot be met via alternative compliance. If N/A is not selected above, select one of the two options below and complete the applicable sections.

☒ Project is Not Hydromodification Exempt and chooses to implement Hydrologic Control and Sediment Supply BMPs Onsite (complete Section E).

☐ Project is Not Hydromodification Exempt and chooses to implement Hydrologic Control Requirements using Alternative Compliance (complete Section F). Selection of this option must be approved by the Copermittee.

E.1 Hydrologic Control BMP Selection

Capture of the DCV and achievement of the Hydrologic Performance Standard may be met by combined and/or separate structural BMPs. The user should consider the full suite of Hydrologic Control BMPs to manage runoff from the post-development condition and meet the Hydrologic Performance Standard identified in this section.

For the Preliminary WQMP, in lieu of preparing detailed routing calculations, the basin size may be estimated as the difference in volume between the pre-development and post-development hydrograph for the 10-year 24-hour storm event plus the Vbmp. This does not relieve the engineer of the responsibility for meeting the full Hydrologic Control requirements during final design.

The Hydrologic Performance Standard consists of matching or reducing the flow duration curve of post-development conditions to that of pre-existing, naturally occurring conditions, for the range of geomorphically significant flows (the low flow threshold runoff event up to the 10-year runoff event). 10% of the 2-year runoff event can be used for the low flow threshold without any justification. Higher low flow thresholds can be used with site-specific analysis, see Section 2.6.2.b of the WQMP guidance document. Select each of the hydrologic control BMP types that are applied to meet the above performance standard on the site.

☒ LID principles as defined in Section 3.2 of the SMR WQMP.

☒ Structural LID BMPs that may be modified or enlarged, if necessary, beyond the DCV.

☐ Structural Hydrologic Control BMPs that are distinct from the LID BMPs above. The LID BMP Design Handbook provides information not only on Hydrologic Control BMP design, but also on BMP design to meet the combined LID requirement and Hydrologic Performance Standard. The Handbook specifies the type of BMPs that can be used to meet the Hydrologic Performance Standard.

E.2 Hydrologic Control BMP Sizing

Hydrologic Control BMPs must be designed to ensure that the flow duration curve of the post-development DMA will not exceed that of the pre-existing, naturally occurring, DMA for the range of geomorphically significant flows. Using SMRHM, (or another acceptable continuous simulation model if approved by the Copermittee) the applicant shall demonstrate that the performance of the Hydrologic Control BMPs complies with the Hydrologic Performance Standard. Complete Table E-1 below and identify, for each DMA, the type of Hydrologic Control BMP, if the SMRHM model confirmed the management (Identified as "passed" in SMRHM), the total volume capacity of the Hydrologic Control BMP, the Hydrologic Control BMP footprint at top floor elevation, and the drawdown time of the Hydrologic Control BMP. SMRHM summary reports should be documented in Appendix 7. Refer to the SMRHM Guidance Document for additional information on SMRHM. You can add rows to the table as needed.

Table E-1 Hydrologic Control BMP Sizing

Table E-1: Hydrologic Control BMP Sizing						
BMP Name / ID	DMA No.	BMP Type / Description	SMRHM Passed ***	BMP Volume (ac-ft)	BMP Footprint (ac)	Drawdown time (hr)
IB1	DMA1	INFILTRATION TRENCH	☒	0.4177	0.1585	4.14
IB2	DMA2	INFILTRATION TRENCH	☒	0.7609	0.2328	6.14
IB3	DMA3	INFILTRATION TRENCH	☒	1.6587	1.5618	2.01
IB4	DMA4	INFILTRATION TRENCH	☒	0.3763	0.0901	22.11
IB5	DMA5	INFILTRATION TRENCH	☒	0.2817	0.0599	16.58
IB6	DMA6	INFILTRATION TRENCH	☒	0.0641	0.0080	6.46
IB7	DMA7	INFILTRATION TRENCH	☒	0.0542	0.0172	13.67
IB8	DMA8	INFILTRATION TRENCH	☒	0.2694	0.0189	4.64
*** SMRHM was not used. The County of Riverside approved Santa Margarita Region – County HydroMod Iterative Spreadsheet Model (V.10) developed by Benjie Cho, P.E.						

If a bioretention BMP with capped underdrain is used and hydromodification requirements apply, then sizing calculations must demonstrate that the BMP meets flow duration control criteria with the underdrain capped and uncapped. Both calculations must be included.

E.3 Implement Sediment Supply BMPs

The sediment supply performance standard applies to PDPs for which hydromodification applied that have the potential to impact Potential Critical Coarse Sediment Yield Areas. Refer to Exhibit G-1 of the WQMP Guidance Document to determine if there are onsite Potential Critical Coarse Sediment Yield Areas (based on on-going WMAA analysis) or Potential Sediment Source Areas (sites added through the Regional Board review process). Select one of the two options below and include the Potential Critical Coarse Sediment Yield Area Exhibit showing your project location in Appendix 7.

☒ There are no mapped Potential Critical Coarse Sediment Yield Areas or Potential Sediment Source Areas on the site. The Sediment Supply Performance Standard is met with no further action is needed.

☐ There are mapped Potential Critical Coarse Sediment Yield Areas or Potential Sediment Source Areas on the site, the Sediment Supply Performance Standard will be met through Option 1 (E.3.1) or Option 2 (E.3.2) below.

☐ **E.3.1 Option 1: Avoid Potential Critical Coarse Sediment Yield Areas and Potential Sediment Source Areas**

The simplest approach for complying with the Sediment Supply Performance Standard is to avoid impacts to areas identified as Potential Critical Coarse Sediment Yield Areas or Potential Sediment Supply Areas. If a portion of PDP is identified as a Potential Critical Coarse Sediment Yield Area or a Potential Sediment Source Area, that PDP may still achieve compliance with the Sediment Supply Performance Standards if Potential Critical Coarse Sediment Yield Areas and Potential Sediment Supply Areas are avoided, i.e. areas are not developed and thereby delivery of Critical Coarse Sediment to the receiving waters is not impeded by site developments.

Provide a narrative describing how the PDP has avoided impacts to Potential Critical Coarse Sediment Yield Areas and/or Potential Sediment Source Areas below.

N/A

If it is not feasible to avoid these areas, proceed to Option 2 to complete a Site-Specific Critical Coarse Sediment Analysis.

☐ **E.3.2 Option 2: Site-Specific Critical Coarse Sediment Analysis**

Perform a stepwise assessment to ensure the pre-project source(s) of Critical Coarse Sediment (i.e., Bed Sediment Supply) is maintained:

Step 1: Identify if the site is an actual verified Critical Coarse Sediment Yield Area supplying Bed Sediment Supply to the receiving channel

☐ **Step 1.A** – Is the Bed Sediment of onsite streams similar to that of receiving streams?

Rate the similarity: ☐ High

☐ Medium

☐ Low

Results from the geotechnical and sieve analysis to be performed both onsite and in the receiving channel should be documented in Appendix 7. Of particular interest, the results of the sieve analysis, the soil erodibility factor, a description of the topographic relief of the project area, and the lithology of onsite soils should be reported in Appendix 7.

☐ **Step 1.B** – Are onsite streams capable of delivering Bed Sediment Supply from the site, if any, to the receiving channel?

Rate the potential: ☐ High
☐ Medium
☐ Low

Results from the analyses of the sediment delivery potential to the receiving channel should be documented in Appendix 7 and identify, at a minimum, the Sediment Source, the distance to the receiving channel, the onsite channel density, the project watershed area, the slope, length, land use, and rainfall intensity.

☐ **Step 1.C** – Will the receiving channel adversely respond to a change in Bed Sediment Load?

Rate the need for bed sediment supply:
☐ High
☐ Medium
☐ Low

Results from the in-stream analysis to be performed both onsite should be documented in Appendix 7. The analysis should, at a minimum, quantify the bank stability and the degree of incision, provide a gradation of the Bed Sediment within the receiving channel, and identify if the channel is sediment supply-limited.

☐ **Step 1.D** – Summary of Step 1

Summarize in Table E.3 the findings of Step 1 and associate a score (in parenthesis) to each step. The sum of the three individual scores determines if a stream is a significant contributor to the receiving stream.

- Sum is equal to or greater than eight - Site is a significant source of sediment bed material – all on-site streams must be preserved or by-passed within the site plan. The applicant shall proceed to Step 2 for all onsite streams.
- Sum is greater than five but lower than eight. Site is a source of sediment bed material – some of the on-site streams must be preserved (with identified streams noted). The applicant shall proceed to Step 2 for the identified streams only.
- Sum is equal to or lower than five. Site is not a significant source of sediment bed material. The applicant may advance to Section F.

Table E-2 Triad Assessment Summary

Step	Rating			Total Score
1.A	☐ High (3)	☐ Medium (2)	☐ Low (1)	
1.B	☐ High (3)	☐ Medium (2)	☐ Low (1)	
1.C	☐ High (3)	☐ Medium (2)	☐ Low (1)	
Significant Source Rating of Bed Sediment to the receiving channel(s)				**N/A**

Step 2: Avoid Development of Critical Coarse Sediment Yield Areas, Potential Sediment Sources Areas, and Preserve Pathways for Transport of Bed Sediment Supply to Receiving Waters

Onsite streams identified as a actual verified Critical Coarse Sediment Yield Areas should be avoided in the site design and transport pathways for Critical Coarse Sediment should be preserved

Check those that apply:

☐ The site design does avoid all onsite channels identified as actual verified Critical Coarse Sediment Yield Areas ***AND***

☐ The drainage design bypasses flow and sediment from onsite upstream drainages identified as actual verified Critical Coarse Sediment Yield Areas to maintain Critical Coarse Sediment supply to receiving waters

(If both are yes, the applicant may disregard subsequent steps of Section E.3 and directly advance directly to Section G)

Or **-**

Provide in Appendix 7 a site map that identifies all onsite channels and highlights those onsite channels that were identified as a Significant Source of Bed Sediment. The site map shall demonstrate, if feasible, that the site design avoids those onsite channels identified as a Significant Source of Bed Sediment. In addition, the applicant shall describe the characteristics of each onsite channel identified as a Significant Source of Bed Sediment. If the design plan cannot avoid the onsite channels, please provide a rationale for each channel individually.

The site map shall demonstrate that the drainage design bypasses those onsite channels that supply Critical Coarse Sediment to the receiving channel(s). In addition, the applicant shall describe the characteristics of each onsite channel identified as an actual verified Critical Coarse Sediment Yield Area.

N/A

☐ The site design **does NOT avoid** all onsite channels identified as actual verified Critical Coarse Sediment Yield Areas

OR

☐ The project blocks the potential for Critical Coarse Sediment from migrating to receiving waters.

(If either of these are the case, the applicant shall continue completing this section).

E.3.3 Sediment Supply BMPs to Result in No Net Impact to Downstream Receiving Waters

If impacts to Critical Coarse Sediment Yield Areas cannot be avoided, sediment supply BMPs must be implemented such there is no net impact to receiving waters. Sediment supply BMPs may consist of approaches that permit flux of bed sediment supply from Critical Coarse Sediment Yield Areas within the project boundary. This approach is subject to acceptance by the County of Riverside. It may require extensive documentation and analysis by qualified professionals to support this demonstration.

Appendix H of the San Diego Model BMP Design Manual provides additional information on site-specific investigation of Critical Coarse Sediment Supply areas.

http://www.projectcleanwater.org/download/2018-model-bmp-design-manual/

N/A

Documentation of sediment supply BMPs should be detailed in Appendix 7.

Section F: Alternative Compliance

Alternative Compliance may be used to achieve compliance with pollutant control and/or hydromodification requirements for a given PDP. Alternative Compliance may be used under two scenarios, check the applicable box if the PDP is proposing to use Alternative Compliance to satisfy all or a portion of the Pollutant Control and/or Hydrologic Control requirements (but not sediment supply requirements)

☐ If it is not feasible to fully implement Infiltration or Biofiltration BMPs at a PDP site, Flow-Through Treatment Control BMPs may be used to treat pollutants contained in the portion of DCV not reliably retained on site and Alternative Compliance measures must also be implemented to mitigate for those pollutants in the DCV that are not retained or removed on site prior to discharging to a receiving water.

☐ Alternative Compliance is selected to comply with either pollutant control or hydromodification flow control requirements even if complying with these requirements is potentially feasible on-site. If such voluntary Alternative Compliance is implemented, Flow-Through Treatment Control BMPs must still be used to treat those pollutants in the portion of the DCV not reliably retained on site prior to discharging to a receiving water.

Refer to Section 2.7 of the SMR WQMP and consult the Local Jurisdiction for currently available Alternative Compliance pathways. Coordinate with the Copermittee if electing to participate in Alternative Compliance and complete the sections below to document implementation of the Flow-Through BMP component of the program.

F.1 Identify Pollutants of Concern

The purpose of this section is to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs and to document compliance and.

Utilize Table A-1 from Section A, which noted your project's Receiving Waters, to identify impairments for Receiving Waters (including downstream receiving waters) by completing Table F-1. Table F-1 includes the watersheds identified as impaired in the Approved 2010 303(d) list; check box corresponding with the PDP's receiving water. The most recent 303(d) lists are available from the State Water Resources Control Board website:
https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml).https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml.

Table F-1 Summary of Approved 2010 303(d) listed waterbodies and associated pollutants of concern for the Riverside County SMR Region and downstream waterbodies.

Water Body		Nutrients[1]	Metals[2]	Toxicity	Bacteria and Pathogens	Pesticides and Herbicides	Sulfate	Total Dissolved Solids
☐	De Luz Creek	X	X				X	
☐	Long Canyon Creek		X		X	X		
☐	Murrieta Creek	X	X	X		X		
☐	Redhawk Channel	X	X		X	X		X
☐	Santa Gertudis Creek	X	X		X	X		
☐	Santa Margarita Estuary	X						
☐	Santa Margarita River (Lower)	X			X			
☐	Santa Margarita River (Upper)	X		X				
☐	Temecula Creek	X	X	X		X		X
☐	Warm Springs Creek	X	X		X	X		

[1] Nutrients include nitrogen, phosphorus and eutrophic conditions caused by excess nutrients.

[2] Metals includes copper, iron, and manganese.

Use Table F-2 to identify the pollutants identified with the project site. Indicate the applicable PDP Categories and/or Project Features by checking the boxes that apply. If the identified General Pollutant Categories are the same as those listed for your Receiving Waters, then these will be your Pollutants of Concern; check the appropriate box or boxes in the last row.

Table F-2 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	Total Dissolved Solids	Sulfate
☐	Detached Residential Development	P	N	P	P	N	P	P	P	N	N
☐	Attached Residential Development	P	N	P	P	N	P	P	P(2)	N	N
☐	Commercial/Industrial Development	P(3)	P(7)	P(1)	P(1)	P	P(1)	P	P	N	N
☐	Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P	N	N
☐	Restaurants (>5,000 ft^2)	P	N	N	P(1)	N	N	P	P	N	N
☐	Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P	N	N
☐	Parking Lots (>5,000 ft^2)	P(6)	P(7)	P(1)	P(1)	P(4)	P	P	P	N	N
☐	Streets, Highways, and Freeways	P(6)	P(7)	P(1)	P(1)	P(4)	P	P	P	N	N
☐	Retail Gasoline Outlets	N	P(7)	N	N	P(4)	N	P	P	N	N
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 products; otherwise not expected

(4) Including petroleum hydrocarbons

(5) Including solvents

(6) Bacterial indicators are routinely detected in pavement runoff

(7) A potential source of metals, primarily copper and zinc. Iron, magnesium, and aluminum are commonly found in the environment and are commonly associated with soils, but are not primarily of anthropogenic stormwater origin in the municipal environment.

F.2 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 be selected to address the Project Priority Pollutants of Concern (identified above) and meet the acceptance criteria described in Section 2.3.7 of the SMR WQMP. Documentation of acceptance criteria 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 F-3 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 Copermittee Approved Study and provided in Appendix 6.

F.3 Sizing Criteria

Utilize Table F-4 below to appropriately size flow-through BMPs to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.1 of the SMR WQMP for further information.

Table F-4 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here*	
	[A]		[B]	[C]	[A] x [C]		
						Design Storm (in)	*Design Flow Rate (cfs)*
	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D]x[E]}{[\ \ ]}$

[B], [C] is obtained as described in Section 2.6.1.b from the SMR WQMP
[E] either 0.2 inches or 2 times the 85th percentile hourly rainfall intensity
[G] = 43,560,.

F.4 Hydrologic Performance Standard – Alternative Compliance Approach

Alternative compliance options are only available if the governing Copermittee has acknowledged the infeasibility of onsite Hydrologic Control BMPs and approved an alternative compliance approach. See Section 3.5 and 3.6 of the SMR WQMP.

Select the pursued alternative and describe the specifics of the alternative:

☐ Offsite Hydrologic Control Management within the same channel system

N/A

☐ In-Stream Restoration Project

N/A

<u>For Offsite Hydrologic Control BMP Option</u>

Each Hydrologic Control BMP must be designed to ensure that the flow duration curve of the post-development DMA will not exceed that of the pre-existing, naturally occurring, DMA by more than ten percent over a one-year period. Using SMRHM, the applicant shall demonstrate that the performance of each designed Hydrologic Control BMP is equivalent with the Hydrologic Performance Standard for onsite conditions. Complete Table F-5 below and identify, for each Hydrologic Control BMP, the equivalent DMA the Hydrologic Control BMP mitigates, that the SMRHM model passed, the total volume capacity of the BMP, the BMP footprint at top floor elevation, and the drawdown time of the BMP. SMRHM summary reports for the alternative approach should be documented in Appendix 7. Refer to the SMRHM Guidance Document for additional information on SMRHM. You can add rows to the table as needed.

Table F-5 Offsite Hydrologic Control BMP Sizing

BMP Name / Type	Equivalent DMA (ac)	SMRHM Passed	BMP Volume (ac-ft)	BMP Footprint (ac)	Drawdown time (hr)
Not Applicable		☐			

<u>For Instream Restoration Option</u>

Attach to Appendix 7 the technical report detailing the condition of the receiving channel subject to the proposed hydrologic and sediment regimes. Provide the full design plans for the in-stream restoration project that have been approved by the Copermittee. Utilize the San Diego Regional Water Quality Equivalency Guidance Document.

Section G: Implement Trash Capture BMPs

The Local Jurisdiction may require full trash capture BMPs to be installed as part of the project. Consult with the Local Jurisdiction to determine applicability. Riverside County Maintenance is generally supportive of United Storm Water – Connector Pipe Screens or equivalent. Equivalent systems or alternative designs shall be on the State of California Approved Trash Capture Device List and requires approval by the Transportation Department for maintenance. Riverside County is developing Trash Capture Device Standards, which are expected to be added to the Transportation Plan Check Policies and Guidelines when available. Design calculations are not expected to be required if the project uses standard sizes per the County’s Trash Capture Device Standards. Until the Trash Capture Device Standards are available and the project uses standard sizes, the project shall complete the following tables.

Trash Capture BMPs may be applicable to Type 'D' DMAs, as defined in Section 2.3.4 of the SMR WQMP. Trash Capture BMPs are designed to treat Q_{TRASH}, the runoff flow rate generated during the 1-year 1-hour precipitation depth. Utilize Table G-1 to size Trash Capture BMP. Refer to Table G-2 to determine the Trash Capture Design Storm Intensity (E).

Table G-1 Sizing Trash Capture BMPs

<table>
<tr><th>DMA Type/ID</th><th>DMA Area (square feet)</th><th>Post-Project Surface Type</th><th>Effective Impervious Fraction, I_f</th><th>DMA Runoff Factor</th><th>DMA Areas x Runoff Factor</th><th colspan="2" rowspan="2">Enter BMP Name / Identifier Here</th></tr>
<tr><td></td><td>[A]</td><td></td><td>[B]</td><td>[C]</td><td>[A] x [C]</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td rowspan="6">Trash Capture Design Storm Intensity (in)</td><td rowspan="6">Trash Capture Design Flow Rate (cubic feet or cfs)</td></tr>
<tr><td colspan="5" rowspan="4">PER THE REGIONAL WATER QUALITY CONTROL BOARD, PROPERLY DESIGNED INFILTRATION TRENCHES DO NOT NEED FURTHER TRASH BMPS. REFERENCES PROVIDED IN APPENDIX 6.</td><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>$A_T = \Sigma[A]$</td><td colspan="3"></td><td>$\Sigma = [D]$</td><td>[E]</td><td>$[F] = \frac{[D]x[E]}{[\ ]}$</td></tr>
</table>

[B], [C] is obtained as described in Section 2.6.1.b from the SMR WQMP
[G] = 43,560

Table G-2 Approximate precipitation depth/intensity values for calculation of the Trash Capture Design Storm

City	1-year 1-hour Precipitation Depth/Intensity (inches/hr)
Murrieta	0.47
Temecula	0.50
Wildomar	0.37

Use Table G-3 to summarize and document the selection and sizing of Trash Capture BMPs.

Table G-3 Trash Capture BMPs

BMP Name / ID	DMA No(s)	BMP Type / Description	Required Trash Capture Flowrate (cfs)	Provided Trash Capture Flowrate (cfs)[1]
N/A				

[1] For connector pipe screens, the Trash Capture Flowrate shall be based on a fully clogged condition for the screen, where the water level is at the top of the screen. Then determined the Flowrate based on weir equation (Qweir = C x L x H^(2/3), where C = 3.4). The height used to calculate the weir flow rate shall maintain a 6" freeboard to the invert of the catch basin opening at the road. This analysis is meant to replicate the hydraulic analysis used in the County's Full Trash Capture Device Standards.

Section H: Source Control BMPs

Section H need only be completed at the Preliminary WQMP phase if source control is critical to the project successfully handling the anticipated pollutants.

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 Maximum Extent Practicable (MEP) standard typically requires both types of BMPs. In general, Operational Source Control BMPs cannot be substituted for a feasible and effective Structural Source Control BMP. Complete checklist below to determine applicable Source Control BMPs for your site.

Project-Specific WQMP Source Control BMP Checklist

All development projects must implement Source Control BMPs. Source Control BMPs are used to minimize pollutants that may discharge to the MS4. Refer to Chapter 3 (Section 3.8) of the SMR WQMP for additional information. Complete Steps 1 and 2 below to identify Source Control BMPs for the project site.

STEP 1: IDENTIFY POLLUTANT SOURCES

Review project site plans and identify the applicable pollutant sources. "Yes" indicates that the pollutant source is applicable to project site. "No" indicates that the pollutant source is not applicable to project site.

☒ Yes ☐ No	Storm Drain Inlets	☒ Yes ☐ No	Outdoor storage areas
☐ Yes ☒ No	Floor Drains	☐ Yes ☒ No	Material storage areas
☐ Yes ☒ No	Sump Pumps	☐ Yes ☒ No	Fueling areas
☒ Yes ☐ No	Pets Control/Herbicide Application	☒ Yes ☐ No	Loading Docks
☒ Yes ☐ No	Food Service Areas	☒ Yes ☐ No	Fire Sprinkler Test/Maintenance water
☒ Yes ☐ No	Trash Storage Areas	☒ Yes ☐ No	Plazas, Sidewalks and Parking Lots
☒ Yes ☐ No	Industrial Processes	☒ Yes ☐ No	Pools, Spas, Fountains and other water features
☐ Yes ☒ No	Vehicle and Equipment Cleaning and Maintenance/Repair Areas		

Step 2: Required Source Control BMPs

List each Pollutant source identified above in column 1 and fill in the corresponding Structural Source Control BMPs and Operational Control BMPs by referring to the Stormwater Pollutant Sources/Source Control Checklist included in Appendix 8. The resulting list of structural and operational source control BMPs must be implemented as long as the associated sources are present on the project site. Add additional rows as needed.

Pollutant Source	Structural Source Control BMP	Operational Source Control BMP
A. On-site storm drain inlets	Mark all inlets with the words "No Dumping! Flows to Bay" or similar	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.
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	State that final landscape plans will accomplish all of the following: Preserve existing native trees, shrubs, and ground cover to the maximum extent possible.	Maintain landscaping using minimum or no pesticides
	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.	See applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
	Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions.	Provide Integrated Pest Management information to new owners, lessees and operators
	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.	
E. Pools, spas, ponds, decorative fountains, and other water features	If the local municipality 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 Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

F. Food Services	If the local municipality 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.	n/a
	Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	
G. Refuse areas	State how site refuse will be handled and provide supporting detail to what is shown on plans.	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 onsite. See Fact Sheet SC-34, “Waste Handling and Disposal” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
	State that signs will be posted on or near dumpsters with the words “Do not dump hazardous materials here” or similar.	
H. Industrial processes.	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
I. Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	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 local 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	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
K. Vehicle/Equipment Repair and Maintenance	State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.	In the SUSMP report, 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.
	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.	

M. Loading Docks	n/a	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
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: 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.	n/a
O. Miscellaneous Drain or Wash Water: Rooftop Equipment	Rooftop mounted equipment with potential to produce pollutants shall be roofed and/or have secondary containment.	n/a
O. Miscellaneous Drain or Wash Water: Roofing, gutters, and trim	Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	n/a
P. Plazas, sidewalks, and parking lots	n/a	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 I: Coordinate Submittal with Other Site Plans

For Final WQMPs, populate Table I-1 below to assist the plan checker in an expeditious review of your project. During construction and at completion, County of Riverside inspectors will verify the installation of BMPs against the approved plans. 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 I-1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
	To Be Completed with Final WQMP	

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. The Copermittee with jurisdiction over the Project site can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Use Table I-2 to identify other applicable permits that may impact design of the site. If yes is answered to any of the items below, the Copermittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Table I-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 Section 401 Water Quality Certification	☐ Y	☒ N
US Army Corps of Engineers, Clean Water Act Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage	☒ Y	☐ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)*		
- County of Riverside Building Permit	☒ Y	☐ N
- County of Riverside Grading Permit	☒ Y	☐ N
- State General Construction Permit (WDID#)	☒ Y	☐ N

Section J: Operation, Maintenance and Funding

Applicant is required to state the intended responsible party for BMP Operation, Maintenance and Funding at the Preliminary WQMP phase. The remaining requirements as outlined above are required for Final WQMP only.

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

1. A means to finance and implement maintenance of BMPs 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 Operations and Maintenance or inspections but will require typical landscape maintenance as noted in Chapter 5, in the SMR WQMP. Include a brief description of typical landscape maintenance for these areas.

The Copermittee with jurisdiction over the Project site will also require that you prepare and submit a detailed BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the 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 BMP Operation and Maintenance Plan are in Chapter 5 of the SMR WQMP.

Maintenance Mechanism: Property Owner executed County Maintenance Agreement

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

☐ Y ☒ N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9, **see Appendix 9 for additional instructions.** 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.

Section K: Acronyms, Abbreviations and Definitions

Regional MS4 Permit	Order No. R9-2013-0001 as amended by Order No. R9-2015-0001 and Order No. R9-2015-0100 an NPDES Permit issued by the San Diego Regional Water Quality Control Board.
Applicant	Public or private entity seeking the discretionary approval of new or replaced improvements from the Copermittee with jurisdiction over the project site. The Applicant has overall responsibility for the implementation and the approval of a Priority Development Project. The WQMP uses consistently the term "user" to refer to the applicant such as developer or project proponent. The WQMP employs also the designation "user" to identify the Registered Professional Civil Engineer responsible for submitting the Project-Specific WQMP, and designing the required BMPs.
Best Management Practice (BMP)	Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.
BMP Fact Sheets	BMP Fact Sheets are available in the LID BMP Design Handbook. Individual BMP Fact Sheets include sitting considerations, and design and sizing guidelines for seven types of structural BMPs (infiltration basin, infiltration trench, permeable pavement, harvest-and-use, bioretention, extended detention basin, and sand filter).
California Stormwater Quality Association (CASQA)	Publisher of the California Stormwater Best Management Practices Handbooks, available at www.cabmphandbooks.com.
Conventional Treatment Control BMP	A type of BMP that provides treatment of stormwater runoff. Conventional treatment control BMPs, while designed to treat particular Pollutants, typically do not provide the same level of volume reduction as LID BMPs, and commonly require more specialized maintenance than LID BMPs. As such, the Regional MS4 Permit and this WQMP require the use of LID BMPs wherever feasible, before Conventional Treatment BMPs can be considered or implemented.
Copermittees	The Regional MS4 Permit identifies the Cities of Murrieta, Temecula, and Wildomar, the County, and the District, as Copermittees for the SMR.

County	The abbreviation refers to the County of Riverside in this document.
CEQA	California Environmental Quality Act - a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.
CIMIS	California Irrigation Management Information System - an integrated network of 118 automated active weather stations all over California managed by the California Department of Water Resources.
CWA	Clean Water Act - is the primary federal law governing water pollution. Passed in 1972, the CWA established the goals of eliminating releases of high amounts of toxic substances into water, eliminating additional water pollution by 1985, and ensuring that surface waters would meet standards necessary for human sports and recreation by 1983. CWA Section 402(p) is the federal statute requiring NPDES permits for discharges from MS4s.
CWA Section 303(d) Waterbody	Impaired water in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of urban runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.
Design Storm	The Regional MS4 Permit has established the 85th percentile, 24-hour storm event as the "Design Storm". The applicant may refer to Exhibit A to identify the applicable Design Storm Depth (D85) to the project.
DCV	Design Capture Volume (DCV) is the volume of runoff produced from the Design Storm to be mitigated through LID Retention BMPs, Other LID BMPs and Volume Based Conventional Treatment BMPs, as appropriate.
Design Flow Rate	The design flow rate represents the minimum flow rate capacity that flow-based conventional treatment control BMPs should treat to the MEP, when considered.
DCIA	Directly Connected Impervious Areas - those impervious areas that are hydraulically connected to the MS4 (i.e. street curbs, catch basins, storm drains, etc.) and thence to the structural BMP without flowing over pervious areas.
Discretionary Approval	A decision in which a Copermittee uses its judgment in deciding whether and how to carry out or approve a project.
District	Riverside County Flood Control and Water Conservation District.

DMA	A Drainage Management Area - a delineated portion of a project site that is hydraulically connected to a common structural BMP or conveyance point. The Applicant may refer to Section 3.3 for further guidelines on how to delineate DMAs.
Drawdown Time	Refers to the amount of time the design volume takes to pass through the BMP. The specified or incorporated drawdown times are to ensure that adequate contact or detention time has occurred for treatment, while not creating vector or other nuisance issues. It is important to abide by the drawdown time requirements stated in the fact sheet for each specific BMP.
Effective Area	Area which 1) is suitable for a BMP (for example, if infiltration is potentially feasible for the site based on infeasibility criteria, infiltration must be allowed over this area) and 2) receives runoff from impervious areas.
ESA	An Environmental Sensitive Area (ESA) designates an area "in which plants or animals life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments". (Reference: California Public Resources Code § 30107.5).
ET	Evapotranspiration (ET) is the loss of water to the atmosphere by the combined processes of evaporation (from soil and plant surfaces) and transpiration (from plant tissues). It is also an indicator of how much water crops, lawn, garden, and trees need for healthy growth and productivity
FAR	The Floor Area Ratio (FAR) is the total square feet of a building divided by the total square feet of the lot the building is located on.
Flow-Based BMP	Flow-based BMPs are conventional treatment control BMPs that are sized to treat the design flow rate.
FPPP	Facility Pollution Prevention Plan
HCOC	Hydrologic Condition of Concern - Exists when the alteration of a site's hydrologic regime caused by development would cause significant impacts on downstream channels and aquatic habitats, alone or in conjunction with impacts of other projects.
HMP	Hydromodification Management Plan – Plan defining Performance Standards for PDPs to manage increases in runoff discharge rates and durations.
Hydrologic Control BMP	BMP to mitigate the increases in runoff discharge rates and durations and meet the Performance Standards set forth in the HMP.
HSG	Hydrologic Soil Groups – soil classification to indicate the minimum rate of infiltration obtained for bare soil after prolonged wetting. The HSGs are A (very low runoff potential/high infiltration rate), B, C, and D (high runoff potential/very low infiltration rate)

Hydromodification	The Regional MS4 Permit identifies that increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses.
JRMP	A separate Jurisdictional Runoff Management Plan (JRMP) has been developed by each Copermittee and identifies the local programs and activities that the Copermittee is implementing to meet the Regional MS4 Permit requirements.
LID	Low Impact Development (LID) is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff.
LID BMP	A type of stormwater BMP that is based upon Low Impact Development concepts. LID BMPs not only provide highly effective treatment of stormwater runoff, but also yield potentially significant reductions in runoff volume – helping to mimic the pre-project hydrologic regime, and also require less ongoing maintenance than Treatment Control BMPs. The applicant may refer to Chapter 2.
LID BMP Design Handbook	The LID BMP Design Handbook was developed by the Copermittees to provide guidance for the planning, design and maintenance of LID BMPs which may be used to mitigate the water quality impacts of PDPs within the County.
LID Bioretention BMP	LID Bioretention BMPs are bioretention areas are vegetated (i.e., landscaped) shallow depressions that provide storage, infiltration, and evapotranspiration, and provide for pollutant removal (e.g., filtration, adsorption, nutrient uptake) by filtering stormwater through the vegetation and soils. In bioretention areas, pore spaces and organic material in the soils help to retain water in the form of soil moisture and to promote the adsorption of pollutants (e.g., dissolved metals and petroleum hydrocarbons) into the soil matrix. Plants use soil moisture and promote the drying of the soil through transpiration. The Regional MS4 Permit defines "retain" as to keep or hold in a particular place, condition, or position without discharge to surface waters.
LID Biofiltration BMP	BMPs that reduce stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration, and other biological and chemical processes. As stormwater passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded, and sequestered by the soil and plants, and collected through an underdrain.

LID Harvest and Reuse BMP	BMPs used to facilitate capturing Stormwater Runoff for later use without negatively impacting downstream water rights or other Beneficial Uses.
LID Infiltration BMP	BMPs to reduce stormwater runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Typical LID Infiltration BMPs include infiltration basins, infiltration trenches and pervious pavements.
LID Retention BMP	BMPs to ensure full onsite retention without runoff of the DCV such as infiltration basins, bioretention, chambers, trenches, permeable pavement and pavers, harvest and reuse.
LID Principles	Site design concepts that prevent or minimize the causes (or drivers) of post-construction impacts, and help mimic the pre-development hydrologic regime.
MEP	Maximum Extent Practicable - standard established by the 1987 amendments to the CWA for the reduction of Pollutant discharges from MS4s. Refer to Attachment C of the Regional MS4 Permit for a complete definition of MEP.
MF	Multi-family – zoning classification for parcels having 2 or more living residential units.
MS4	Municipal Separate Storm Sewer System (MS4) is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.
New Development Project	Defined by the Regional MS4 Permit as 'Priority Development Projects' if the project, or a component of the project meets the categories and thresholds described in Section 1.1.1.
NPDES	National Pollution Discharge Elimination System - Federal program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.
NRCS	Natural Resources Conservation Service

PDP	Priority Development Project - Includes New Development and Redevelopment project categories listed in Provision E.3.b of the Regional MS4 Permit.
Priority Pollutants of Concern	Pollutants expected to be present on the project site and for which a downstream water body is also listed as Impaired under the CWA Section 303(d) list or by a TMDL.
Project-Specific WQMP	A plan specifying and documenting permanent LID Principles and Stormwater BMPs to control post-construction Pollutants and stormwater runoff for the life of the PDP, and the plans for operation and maintenance of those BMPs for the life of the project.
Receiving Waters	Waters of the United States.
Redevelopment Project	The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing existing roadways; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair. Project that meets the criteria described in Section 1.
Runoff Fund	Runoff Funds have not been established by the Copermittees and are not available to the Applicant. If established, a Runoff Fund will develop regional mitigation projects where PDPs will be able to buy mitigation credits if it is determined that implementing onsite controls is infeasible.
San Diego Regional Board	San Diego Regional Water Quality Control Board - The term "Regional Board", as defined in Water Code section 13050(b), is intended to refer to the California Regional Water Quality Control Board for the San Diego Region as specified in Water Code Section 13200. State agency responsible for managing and regulating water quality in the SMR.
SCCWRP	Southern California Coastal Water Research Project
Site Design BMP	Site design BMPs prevent or minimize the causes (or drivers) of post-construction impacts, and help mimic the pre-development hydrologic regime.
SF	Parcels with a zoning classification for a single residential unit.
SMC	Southern California Stormwater Monitoring Coalition
SMR	The Santa Margarita Region (SMR) represents the portion of the Santa Margarita Watershed that is included within the County of Riverside.

Source Control BMP	Source Control BMPs land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between Pollutants and runoff.
Structural BMP	Structures designed to remove pollutants from stormwater runoff and mitigate hydromodification impacts.
SWPPP	Storm Water Pollution Prevention Plan
Tentative Tract Map	Tentative Tract Maps are required for all subdivision creating five (5) or more parcels, five (5) or more condominiums as defined in Section 783 of the California Civil Code, a community apartment project containing five (5) or more parcels, or for the conversion of a dwelling to a stock cooperative containing five (5) or more dwelling units.
TMDL	Total Maximum Daily Load - the maximum amount of a Pollutant that can be discharged into a waterbody from all sources (point and non-point) and still maintain Water Quality Standards. Under CWA Section 303(d), TMDLs must be developed for all waterbodies that do not meet Water Quality Standards after application of technology-based controls.
USEPA	United States Environmental Protection Agency
Volume-Based BMP	Volume-Based BMPs applies to BMPs where the primary mode of pollutant removal depends upon the volumetric capacity such as detention, retention, and infiltration systems.
WQMP	Water Quality Management Plan
Wet Season	The Regional MS4 Permit defines the wet season from October 1 through April 30.

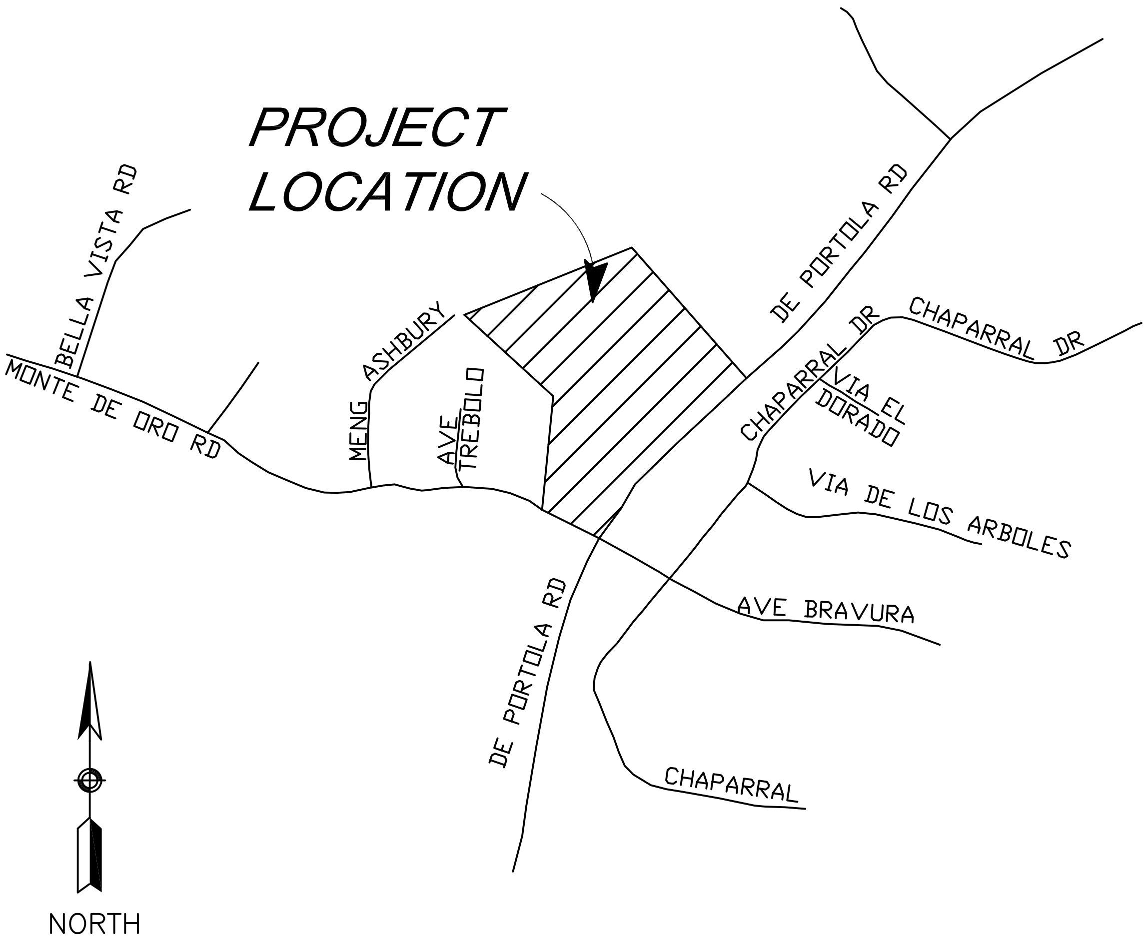
Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

Complete the checklist below to verify all exhibits and components are included in the Project-Specific WQMP. Refer Section 4 of the SMR WQMP and Section D of this Template.

Map and Site Plan Checklist
Indicate all Maps and Site Plans are included in your Project-Specific WQMP by checking the boxes below.
☒ Vicinity and Location Map
☐ Existing Site Map (unless exiting conditions are included in WQMP Site Plan)
☒ WQMP Site Plan
☒ Parcel Boundary and Project Footprint
☒ Existing and Proposed Topography
☒ Drainage Management Areas (DMAs)
☒ Proposed Structural Best Management Practices (BMPs)
☒ Drainage Paths
☒ Drainage infrastructure, inlets, overflows
☐ Source Control BMPs
☐ Site Design BMPs
☒ Buildings, Roof Lines, Downspouts
☒ Impervious Surfaces
☒ Pervious Surfaces (i.e. Landscaping)
☒ Standard Labeling
☐ Use Riverside County Flood Control CB-110 for outlet structure with block outs for a trash screen out the outside, and an orifice/weir plate(s) on the inside of the structure or other design that is as easy to maintain. The screen should be as large as possible to minimize clogging.
☐ If BMPs are in the road R/W (only with CFD/CSA maintenance or LID Principals) add “BMP” paddle markers at the start and end of each BMPs and LID principals
☐ For Tracts, the Regional Board requires <u>fully functioning</u> WQMP BMPs for opening model home complexes, sales offices, or use of roads (i.e. prior to occupancy or intended use of any portion of the project). The County encourages phasing post-construction BMPs, small structural BMPs (e.g. specifically for sales offices), or self-retaining areas. This phasing can be shown on the WQMP site map and sequencing shall be included on the Grading plans, so that a fully functioning WQMP BMP is addressing any portion of the project that has been granted occupancy or granted the intended use.

VICINITY MAP



T7S R1W SEC 29
T7S R1W SEC 30

VICINITY MAP

NOT TO SCALE

DMA4-IB4 NOTE:

DMA4-IB4 IS SPLIT INTO THREE SECTIONS BUT WILL FUNCTION AS ONE INFILTRATION BASIN

Table C.1 DMA Classifications - DMA1				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA1/LS1	LANDSCAPE	11585	TYPE D – DRAINS TO BMP	58
DMA1/LS2	LANDSCAPE	370	TYPE D – DRAINS TO BMP	2
DMA1/LS3	LANDSCAPE	1570	TYPE D – DRAINS TO BMP	8
DMA1/LS4	LANDSCAPE	3815	TYPE D – DRAINS TO BMP	19
DMA1/LS6	LANDSCAPE	2934	TYPE D – DRAINS TO BMP	15
DMA1/LS7	LANDSCAPE	279	TYPE D – DRAINS TO BMP	1
DMA1/IP1	IMPERVIOUS PAVING	23036	TYPE D – DRAINS TO BMP	979
DMA1/DG1	DG SURFACE	3384	TYPE D – DRAINS TO BMP	37
DMA1/IB1	INFILTRATION AREA	6905	TYPE D – DRAINS TO BMP	35
		53879		1154

Table C.1 DMA Classifications - DMA2				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA2/LS5	LANDSCAPE	3350	TYPE D – DRAINS TO BMP	11
DMA2/LS8	LANDSCAPE	3401	TYPE D – DRAINS TO BMP	17
DMA2/LS10	LANDSCAPE	30054	TYPE D – DRAINS TO BMP	150
DMA2/LS11	LANDSCAPE	38050	TYPE D – DRAINS TO BMP	190
DMA2/LS12	LANDSCAPE	609	TYPE D – DRAINS TO BMP	3
DMA2/LS13	LANDSCAPE	260	TYPE D – DRAINS TO BMP	1
DMA2/LS14	LANDSCAPE	1103	TYPE D – DRAINS TO BMP	5
DMA2/LS15	LANDSCAPE	3470	TYPE D – DRAINS TO BMP	17
DMA2/LS16	LANDSCAPE	662	TYPE D – DRAINS TO BMP	3
DMA2/LS17	LANDSCAPE	7190	TYPE D – DRAINS TO BMP	36
DMA2/R1	ROOF	7340	TYPE D – DRAINS TO BMP	311
DMA2/R9	ROOF	1263	TYPE D – DRAINS TO BMP	54
DMA2/IP2	IMPERVIOUS PAVING	2012	TYPE D – DRAINS TO BMP	85
DMA2/IP3	IMPERVIOUS PAVING	65676	TYPE D – DRAINS TO BMP	2792
DMA2/PL	POOL	2234	TYPE D – DRAINS TO BMP	0
DMA2/DG2	DG SURFACE	10319	TYPE D – DRAINS TO BMP	112
DMA2/IB2	INFILTRATION AREA	10140	TYPE D – DRAINS TO BMP	51
		186034		3838

Table C.1 DMA Classifications - DMA3				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA3/LS18	LANDSCAPE	1089	TYPE D – DRAINS TO BMP	5
DMA3/LS19	LANDSCAPE	623	TYPE D – DRAINS TO BMP	3
DMA3/LS20	LANDSCAPE	292	TYPE D – DRAINS TO BMP	2
DMA3/LS21	LANDSCAPE	347	TYPE D – DRAINS TO BMP	2
DMA3/LS22	LANDSCAPE	716	TYPE D – DRAINS TO BMP	3
DMA3/LS23	LANDSCAPE	455	TYPE D – DRAINS TO BMP	2
DMA3/LS24	LANDSCAPE	8771	TYPE D – DRAINS TO BMP	44
DMA3/LS25	LANDSCAPE	1936	TYPE D – DRAINS TO BMP	10
DMA3/LS26	LANDSCAPE	1832	TYPE D – DRAINS TO BMP	9
DMA3/LS27	LANDSCAPE	2271	TYPE D – DRAINS TO BMP	11
DMA3/LS28	LANDSCAPE	3449	TYPE D – DRAINS TO BMP	17
DMA3/LS29	LANDSCAPE	2436	TYPE D – DRAINS TO BMP	12
DMA3/LS30	LANDSCAPE	2934	TYPE D – DRAINS TO BMP	15
DMA3/R2	ROOF	17732	TYPE D – DRAINS TO BMP	753
DMA3/R3	ROOF	5514	TYPE D – DRAINS TO BMP	235
DMA3/R4	ROOF	5358	TYPE D – DRAINS TO BMP	228
DMA3/R5	ROOF	3849	TYPE D – DRAINS TO BMP	163
DMA3/IP4	IMPERVIOUS PAVING	9484	TYPE D – DRAINS TO BMP	404
DMA3/IP5	IMPERVIOUS PAVING	7247	TYPE D – DRAINS TO BMP	307
DMA3/IB3(V)	INFILTRATION	68030	TYPE D – DRAINS TO BMP	340
		144364		2565

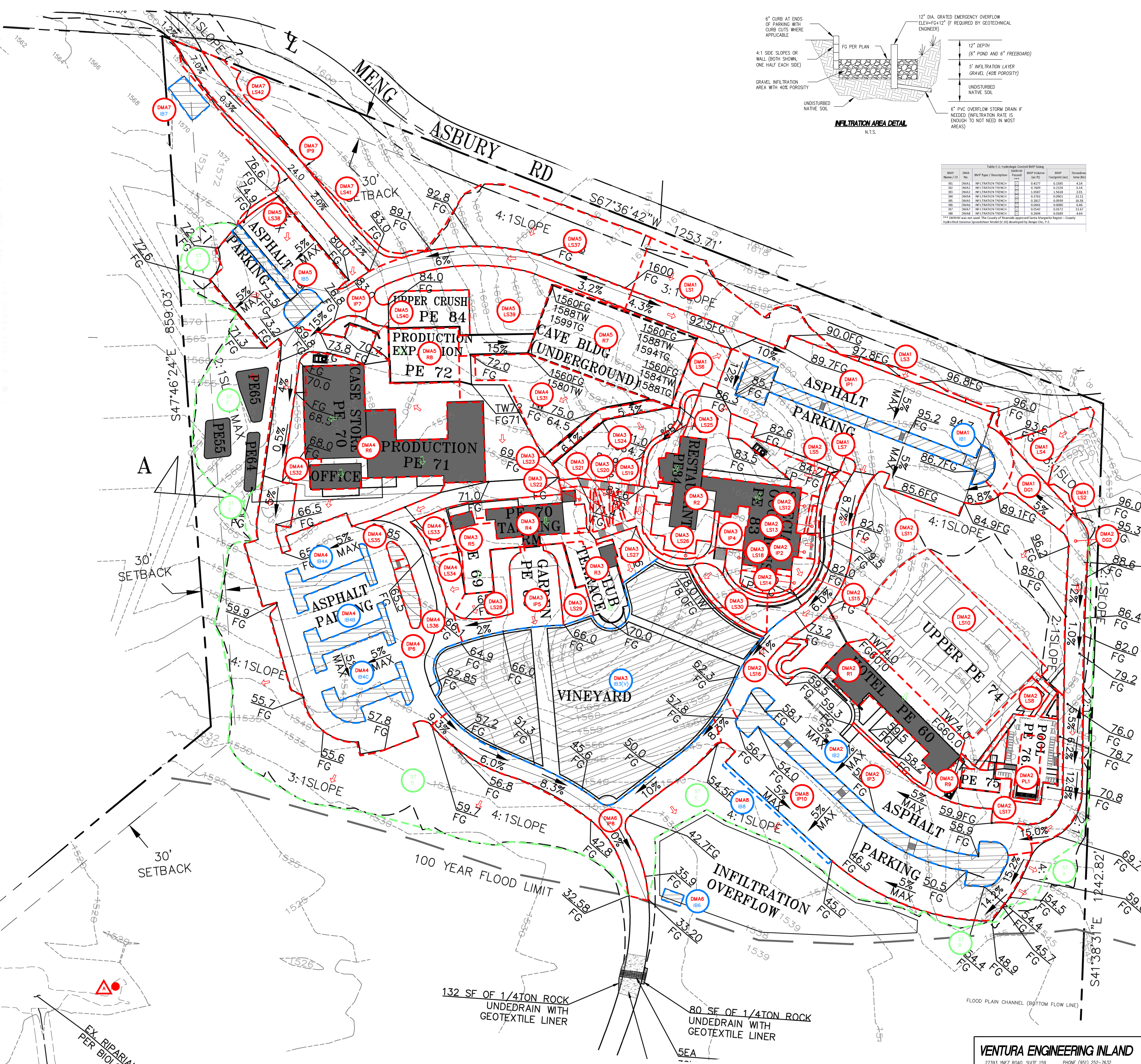
Table C.1 DMA Classifications - DMA4				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA4/LS31	LANDSCAPE	11451	TYPE D – DRAINS TO BMP	57
DMA4/LS32	LANDSCAPE	11945	TYPE D – DRAINS TO BMP	60
DMA4/LS33	LANDSCAPE	3505	TYPE D – DRAINS TO BMP	17
DMA4/LS34	LANDSCAPE	2009	TYPE D – DRAINS TO BMP	10
DMA4/LS35	LANDSCAPE	381	TYPE D – DRAINS TO BMP	2
DMA4/LS36	LANDSCAPE	1417	TYPE D – DRAINS TO BMP	7
DMA4/R6	ROOF	21552	TYPE D – DRAINS TO BMP	916
DMA4/IP6	IMPERVIOUS PAVING	84310	TYPE D – DRAINS TO BMP	3582
DMA4/IB4A	INFILTRATION	2702	TYPE D – DRAINS TO BMP	
DMA4/IB4B	INFILTRATION	2714	TYPE D – DRAINS TO BMP	41
DMA4/IB4C	INFILTRATION	2829	TYPE D – DRAINS TO BMP	
		144815		4692

Table C.1 DMA Classifications - DMA5				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA5/LS37	LANDSCAPE	17907	TYPE D – DRAINS TO BMP	90
DMA5/LS38	LANDSCAPE	5412	TYPE D – DRAINS TO BMP	27
DMA5/LS9	LANDSCAPE	12822	TYPE D – DRAINS TO BMP	64
DMA5/LS40	LANDSCAPE	1572	TYPE D – DRAINS TO BMP	8
DMA5/R7	ROOF	17741	TYPE D – DRAINS TO BMP	753
DMA5/R8	ROOF	5865	TYPE D – DRAINS TO BMP	250
DMA5/IP7	IMPERVIOUS PAVING	24481	TYPE D – DRAINS TO BMP	1040
DMA5/IB5	INFILTRATION	2608	TYPE D – DRAINS TO BMP	13
		88407		2245

Table C.1 DMA Classifications - DMA6				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA6/IP8	IMPERVIOUS PAVING	12594	TYPE D – DRAINS TO BMP	535
DMA6/IB6	INFILTRATION	350	TYPE D – DRAINS TO BMP	2
		12944		537

Table C.1 DMA Classifications - DMA7				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA7/LS41	LANDSCAPE	869	TYPE D – DRAINS TO BMP	4
DMA7/LS42	LANDSCAPE	1346	TYPE D – DRAINS TO BMP	7
DMA7/IP9	IMPERVIOUS PAVING	8817	TYPE D – DRAINS TO BMP	374
DMA7/IB7	INFILTRATION	750	TYPE D – DRAINS TO BMP	4
		11782		389

Table C.1 DMA Classifications - DMA8				
DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type	VBMP (PER APP 6)
DMA8/IP10	IMPERVIOUS PAVING	24989	TYPE D – DRAINS TO BMP	1063
DMA8/IB8	INFILTRATION	825	TYPE D – DRAINS TO BMP	4
		25815		1067



INFILTRATION AREA DETAIL

N.T.S.

Table E-1: Hydrologic Control BMP Sizing						
BMP Name / ID	DMA No.	BMP Type / Description	SMRHM Passed ***	BMP Volume (ac-ft)	BMP Footprint (ac)	Drawdown time (hr)
IB1	DMA1	INFILTRATION TRENCH	☒	0.4177	0.1585	4.14
IB2	DMA2	INFILTRATION TRENCH	☒	0.7609	0.2328	6.14
IB3	DMA3	INFILTRATION TRENCH	☒	1.6587	1.5618	2.01
IB4	DMA4	INFILTRATION TRENCH	☒	0.3763	0.0901	22.11
IB5	DMA5	INFILTRATION TRENCH	☒	0.2817	0.0599	16.58
IB6	DMA6	INFILTRATION TRENCH	☒	0.0641	0.0080	6.46
IB7	DMA7	INFILTRATION TRENCH	☒	0.0542	0.0172	13.67
IB8	DMA8	INFILTRATION TRENCH	☒	0.2694	0.0189	4.64

*** SMRHM was not used. The County of Riverside approved Santa Margarita Region – County HydroMod Iterative Spreadsheet Model (V.10) developed by Benjie Cho, P.E.

LEGEND

- DMA AREA BOUNDARY
- BMP BOUNDARY
- SELF TREATING DMA BOUNDARY
- DEMINIMUS DMA BOUNDARY
- DMA # / ## — DMA ID / DMA SUB-AREA ID
- DMA # / ## — DMA ID / BMP ID
- N/A / ## — SELF TREATING DMA ID
- DRAINAGE FLOW DIRECTION
- DRAINAGE FLOW DIRECTION (ROOF)
- XX — POINT OF COMPLIANCE

LANDSCAPING NOTE:

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

IP DMA NOTE:

DMA SUB-AREAS DESIGNATED AS IP ARE IMPERVIOUS AREAS AND CAN BE WINDING AREAS THAT WEAVE IN AND AROUND OTHER AREAS SO ONLY 1 DESIGNATION IS USED.

0 40 80 160

(IN FEET)
1 inch = 40 ft.
(ORIGINAL EXHIBIT SIZE IS 36X48)

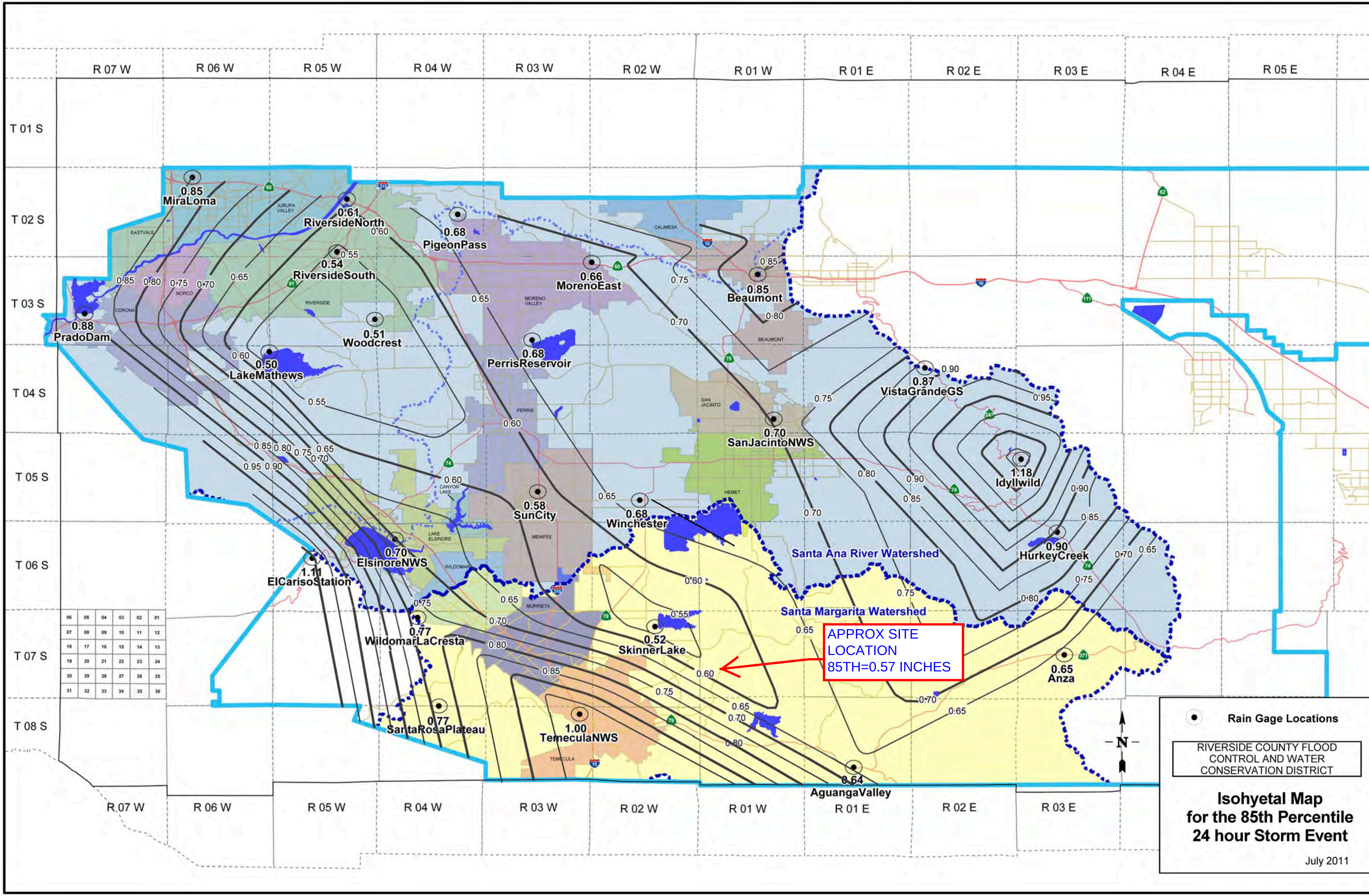
PPT180003, PAR01536

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

COUNTY OF RIVERSIDE

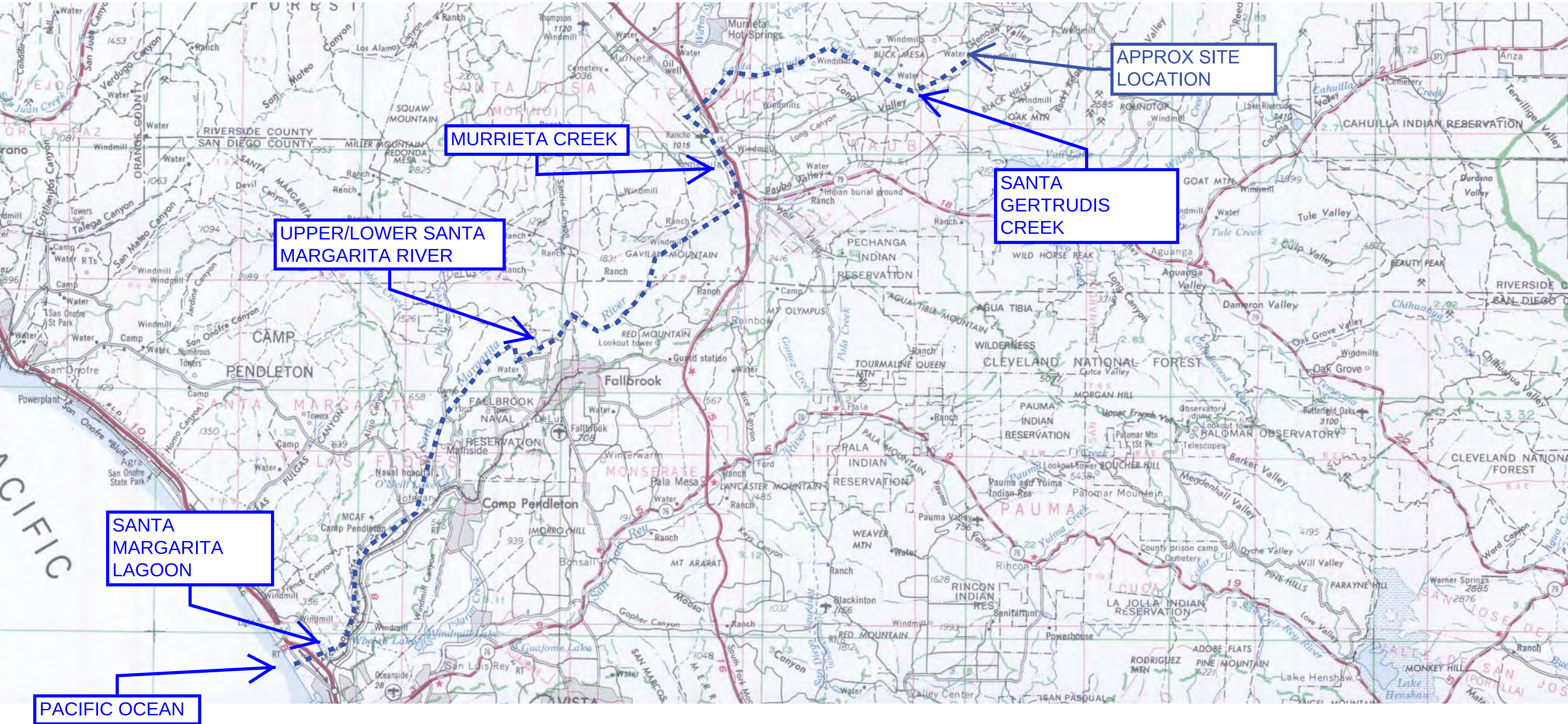
MONARCH WINERY
TEMECULA, CALIFORNIA
LOT K14 PER RECORD OF SURVEY 50/68
APN: 941-180-032

APPENDIX 1: DMA EXHIBIT



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
0.68 PerrisReservoir
0.50 LakeMathews
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.90 HurkeyCreek
Santa Ana River Watershed
Santa Margarita Watershed
0.77 WildomarLaCresta
0.52 SkinnerLake
APPROX SITE LOCATION
85TH=0.57 INCHES
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
N
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011

WATERSHED MAP AND PATH TO OCEAN



WATERSHED INFROMATION:	SANTA MARGARITA HU
902.42	AULD HU
	GERTRUDIS HSA

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC 1	REC 2	BIOL	WARM	COLD	WILD	RARE	SPWN
San Onofre Creek Watershed – continued																
Las Flores Creek	1.52	+	●						●	●		●	●	●	●	
Piedra de Lumbre Canyon	1.52	+	●						●	●		●	●	●	●	
unnamed intermittent coastal streams	1.52	+	●						●	●		●		●		
Aliso Canyon	1.53	+	●						●	●		●	●	●	●	
French Canyon	1.53	+	●						●	●		●		●	●	
Cockleburr Canyon	1.53	+	●						●	●		●		●		
Santa Margarita River Watershed																
Santa Margarita River	2.22	●	●	●					●	●		●	●	●	●	
Murrieta Creek	2.31	●	●	●	●				○	●		●		●		
Bundy Canyon	2.31	●	●	●	●				○	●		●		●		
Slaughterhouse Canyon	2.31	●	●	●	●				○	●		●		●		
Murrieta Creek	2.32	●	●	●	●				○	●		●		●		
Murrieta Creek	2.52	●	●	●	●	●			○	●		●		●		
Cole Canyon	2.32	●	●	●	●				○	●	●	●		●		
Miller Canyon	2.32	●	●	●	●				○	●		●		●		
Warm Springs Creek	2.36	●	●	●	●				○	●		●		●		
Diamond Valley	2.36	●	●	●	●				○	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

\+ Excepted from MUN (See Text)

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Santa Margarita River Watershed - continued																
Goodhart Canyon	2.36	●	●	●	●				○	●		●		●		
Pixley Canyon	2.36	●	●	●	●				○	●		●		●		
Warm Springs Creek	2.35	●	●	●	●				○	●		●		●		
Domenigoni Valley	2.35	●	●	●	●				○	●		●		●		
Warm Springs Creek	2.34	●	●	●	●				○	●		●		●		
Warm Springs Creek	2.33	●	●	●	●				○	●		●		●		
French Valley	2.33	●	●	●	●				○	●		●		●		
Santa Gertrudis Creek	2.42	●	●	●	●	○			●	●		●		●		
Long Valley	2.42	●	●	●	●	○			●	●		●		●		
Glenoak Valley	2.42	●	●	●	●	○			●	●		●	●	●		
Tucalota Creek	2.43	●	●	●	●	○			●	●		●	●	●		
Willow Canyon	2.44	●	●	●	●	○			●	●		●	●	●		
Lake Skinner	2.41	See Reservoirs & Lakes – Table 2-4														
Tucalota Creek	2.41	●	●	●	●	○			●	●		●		●		
Crown Valley	2.41	●	●	●	●	○			●	●		●	●	●		
Rawson Canyon	2.41	●	●	●	●	○			●	●		●	●	●		
Tucalota Creek	2.42	●	●	●	●	○			●	●		●		●		

● Existing Beneficial Use

○ Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE														
		MUN	AGR	IND	PROC	GWR	FRSH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Santa Margarita River Watershed - continued																
Temecula Creek	2.51	●	●	●	●	●			○	●		●		●		
Temecula Creek	2.52	●	●	●	●	●			○	●		●		●		
Pechanga Creek	2.52	●	●	●	●	●			○	●		●		●		
Rainbow Creek[3]	2.23	●	●	●					●	●		●	●	●		●
Rainbow Creek[3]	2.22	●	●	●					●	●		●	●	●		●
Sandia Canyon	2.22	●	●	●					●	●		●	●	●		●
Walker Basin	2.22	●	●	●					●	●		●	●	●		
Santa Margarita River	2.21	●	●	●					●	●		●	●	●	●	
DeLuz Creek	2.21	●	●	●					●	●		●	●	●	●	●
Cottonwood Creek	2.21	●	●	●					●	●		●	●	●		
Camps Creek	2.21	●	●	●					●	●		●	●	●		●
Fern Creek	2.21	●	●	●					●	●		●	●	●		●
Roblar Creek	2.21	●	●	●					●	●		●	●	●		
O'Neill Lake	2.13	See Reservoirs & Lakes – Table 2-4														
Santa Margarita River	2.13	●	●	●	●				●	●		●	●	●	●	
Wood Canyon	2.13	●	●	●	●				●	●		●		●		
Santa Margarita River	2.12	●	●	●	●				●	●		●	●	●	●	

● Existing Beneficial Use

○ Potential Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

[3] Rainbow Creek is designated as an impaired water body for total nitrogen and total phosphorus pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads (TMDLs) have been adopted to address these impairments. See Chapter 3, Water Quality Objectives for Biostimulatory Substances and Chapter 7, Total Maximum Daily Loads.

Table 2-2. BENEFICIAL USES OF INLAND SURFACE WATERS

Inland Surface Waters [1, 2]	Hydrologic Unit Basin Number	BENEFICIAL USE MUN	AGR	IND	PROC	GWR	FRSH	POW	REC 1	REC 2	BIOL	WARM	COLD	WILD	RARE	SPWN
Santa Margarita River Watershed - continued																
Santa Margarita River	2.11	●	●	●	●				●	●		●	●	●	●	
Pueblitos Canyon	2.11	●	●	●	●				●	●		●		●	●	
Newton Canyon	2.11	●	●	●	●				●	●		●		●		
Santa Margarita Lagoon	2.11	See Coastal Waters – Table 2-3														
San Luis Rey River Watershed																
San Luis Rey River	3.32	●	●	●			●	●	●	●		●	●	●		
Johnson Canyon	3.32	●	●	●			●	●	●	●		●	●	●		
San Luis Rey River	3.31	●	●	●			●	●	●	●		●	●	●		
Canada Aguanga	3.31	●	●	●			●	●	●	●		●	●	●		
Dark Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Bear Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Cow Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Blue Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Rock Canyon	3.31	●	●	●			●	●	●	●		●	●	●		
Agua Caliente Creek	3.31	●	●	●			●	●	●	●		●	●	●		
unnamed Tributary	3.31	●	●	●			●	●	●	●		●	●	●		●
Canada Agua Caliente	3.31	●	●	●			●	●	●	●		●	●	●		

● Existing Beneficial Use

[1] Waterbodies are listed multiple times if they cross hydrologic area or sub area boundaries.

[2] Beneficial use designations apply to all tributaries to the indicated waterbody, if not listed separately.

Table 2-3. BENEFICIAL USES OF COASTAL WATERS

Coastal Waters	Hydrologic Unit Basin Number	BENEFICIAL USE														
		IND	NAV	REC1	REC2	COMM	BIOL	EST	WILD	RARE	MAR	AQUA	MIGR	SPWN	WARM	SHELL
Coastal Lagoons – continued																
Buena Vista Lagoon[8]	4.21			●	●		●	○	●	●	●				●	
Loma Alta Slough	4.10			●	●			●	●	●	●					
Mouth of San Luis Rey River[9]	3.11			●	●				●	●	●		●			
Santa Margarita Lagoon	2.11			●	●			●	●	●	●		●	●		

[8] Fishing from shore or boat permitted, but other water contact recreational (REC-1) uses are prohibited.

[9] The mouth of San Luis Rey River is designated as a water quality limited segment for indicator bacteria pursuant to Clean Water Act section 303(d). Total Maximum Daily Loads have been adopted to address these impairments. See Chapter 3, *Water Quality Objectives*, Bacteria - Total Coliform, Fecal Coliform, *E. Coli*, and Enterococci, and Chapter 7, *Revised Total Maximum Daily Loads for Indicator Bacteria, Project I – Twenty Beaches and Creeks in the San Diego Region (Including Tecolote Creek).*

● Existing Beneficial Use

○ Potential Beneficial Use

Table 2-5. BENEFICIAL USES OF GROUND WATERS

Ground Water		Hydrologic Unit Basin Number	BENEFICIAL USE					
			MUN	AGR	IND	PROC	FRSH	GWR
SANTA MARGARITA HYDROLOGIC UNIT		2.00						
Ysidora	HA [2]	2.10	●	●	●	●		
DeLuz	HA	2.20	●	●	●			
Murrieta	HA	2.30	●	●	●	●		
Auld	HA	2.40	●	●	●			
Pechanga	HA	2.50	●	●	●			
Wilson	HA	2.60	●	●	○			
Cave Rocks	HA	2.70	●	●				
Aguanga	HA	2.80	●	●	●			
Oakgrove	HA	2.90	●	●				

2 These beneficial uses do not apply westerly of the right-of-way of Interstate 5 and this area is excepted from the sources of drinking water policy. The beneficial uses for the remainder of the hydrologic area are as shown.

● Existing Beneficial Use

○ Potential Beneficial Use

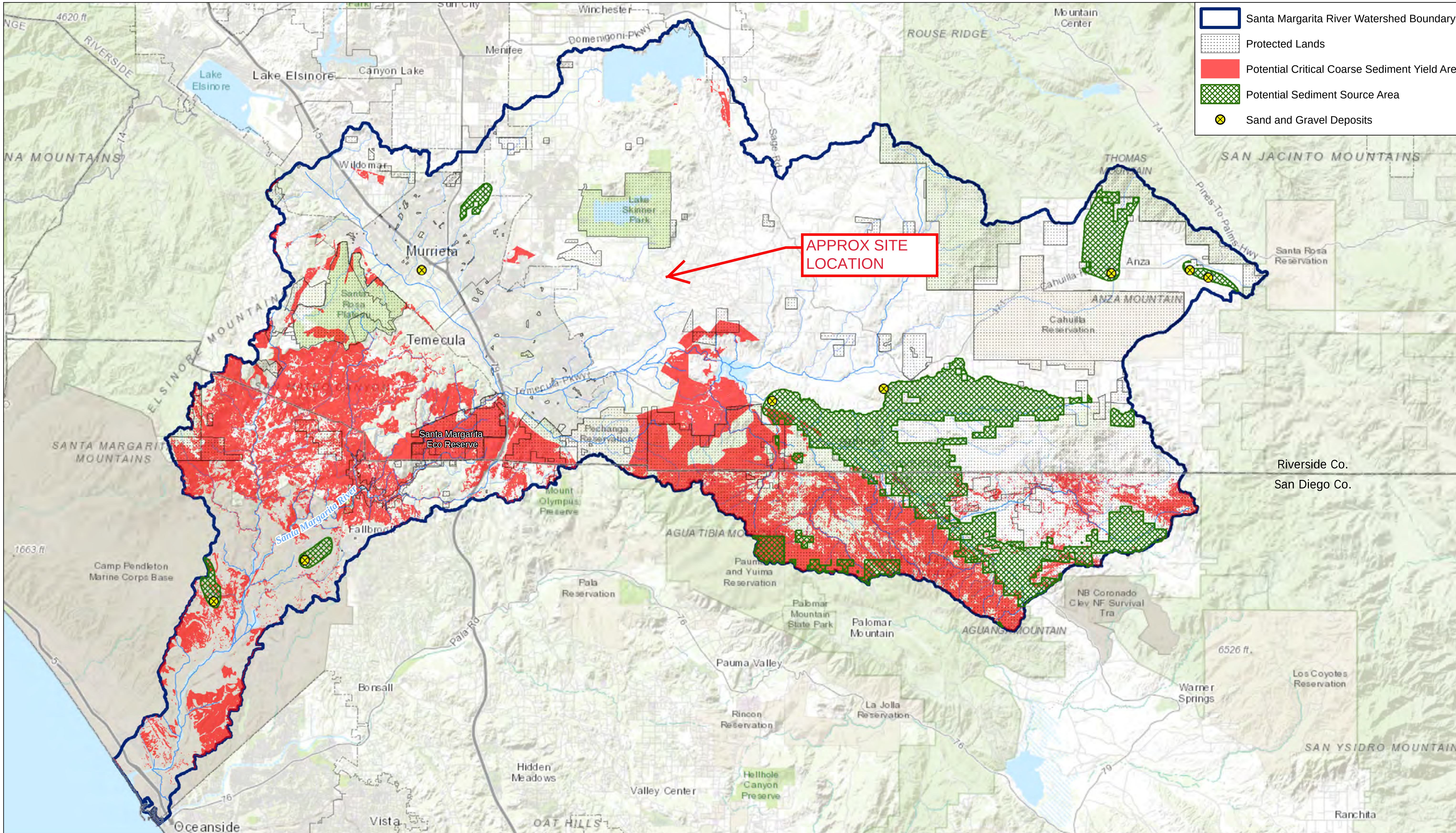


Exhibit G-1

SANTA MARGARITA RIVER WATERSHED

POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREAS AND POTENTIAL SEDIMENT SOURCE AREAS

wsp

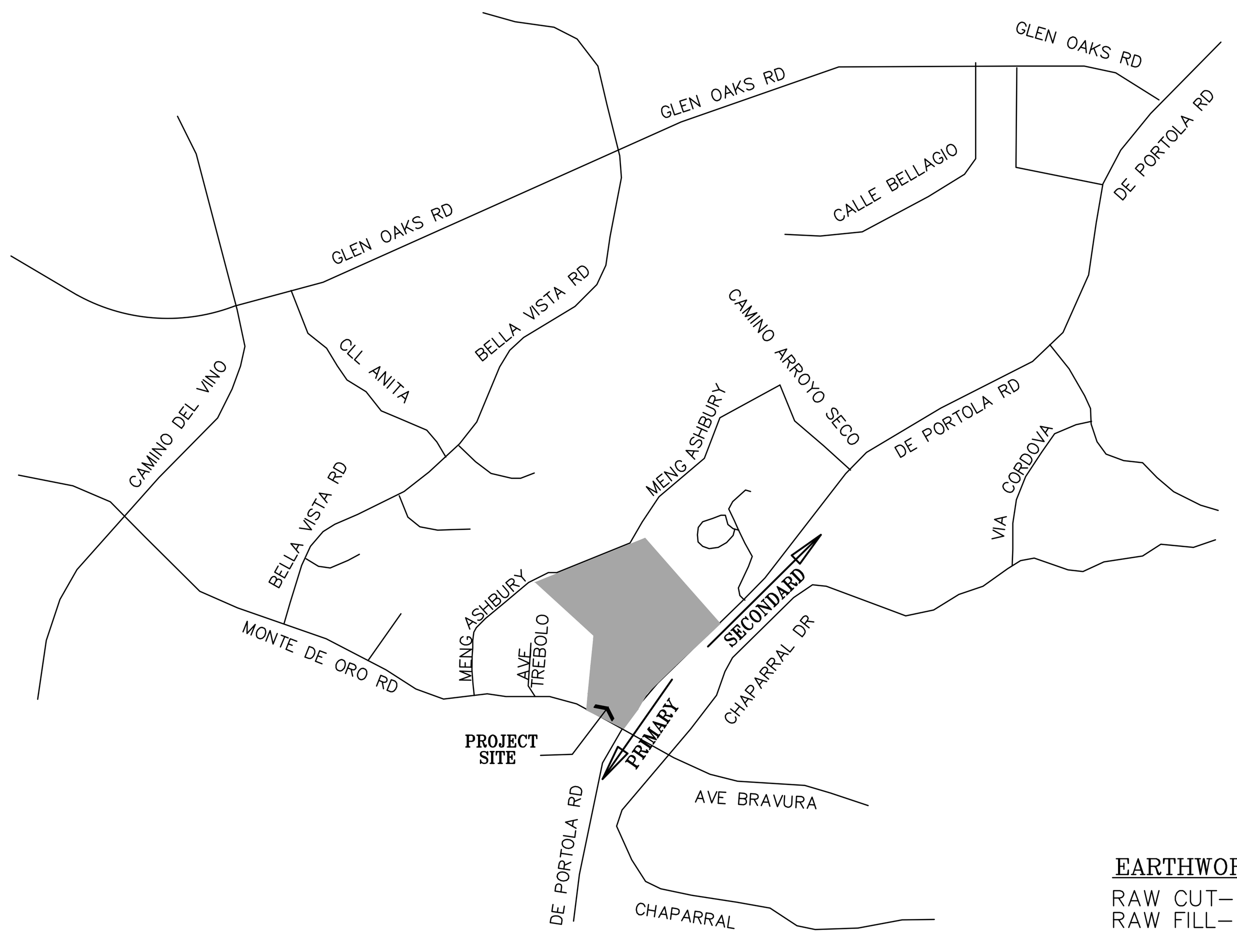
Appendix 2: Construction Plans

*The latest set of Grading, Drainage Plans, and Street Improvement plans **shall be included***

PPT 180003 /SCHEMATIC GRADING PLAN

FOR PROPOSED WINERY

LOT K14, RS 50/68
IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA



VICINITY MAP

NOT TO SCALE

OWNER/APPLICANT:

LONG JIANG
FERTILE SOIL,LLC

79 DUNMORE
IRVINE, CA 92620
949 981 9026

SITE ADDRESS:

DE PORTOLA ROAD
TEMECULA, CA 92592

REPRESENTATIVE:

CONTACT PERSON: GREG KOLL
Koll Custom Homes, Inc.
P.O. Box 1658
Temecula, CA 92593
951.225.1065, x501

ENGINEER:

CONTACT PERSON: WILFREDO VENTURA
VENTURA ENGINEERING INLAND, INC.
26811 HOBIE CIRCLE, STE 12
MURRIETA, CA 92562
(951)252–7632

SOURCE OF TOPOGRAPHY

DELTA SURVEY AND MAPPING
39305 SALINAS DRIVE
MURRIETA, CA 92563
(951)764–0158
DATE OF SURVEY: MARCH 2017

ASSSESSORS PARCELS:

941–180–032

AREA

42.63 ACRES (GROSS)

THOMAS GUIDE

RIVERSIDE COUNTY
PAGE: 930 GRID: F7
PAGE: 960 GRID: F1

LEGAL DESCRIPTION

LOT K14 OF RS 50/68 IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA.
T7S R1W SEC 29 & 30

UTILITY PURVEYORS & SCHOOL DISTRICT

WATER:	EASTERN MUNICIPAL WATER DISTRICT
SEWER:	SEPTIC
GAS:	PROPANE
ELECTRIC:	SOUTHERN CALIFORNIA EDISON
TELEPHONE:	VERIZON
CABLE:	NO CABLE
SCHOOL DISTRICT:	TEMECULA VALLEY UNIFIED

ZONING/USE:

EXISTING ZONING:	C/V–10
EXISTING LAND USE:	VACANT
PROPOSED ZONING:	WC–W
PROPOSED LAND USE:	WINERY

EARTHWORK QUANTITIES

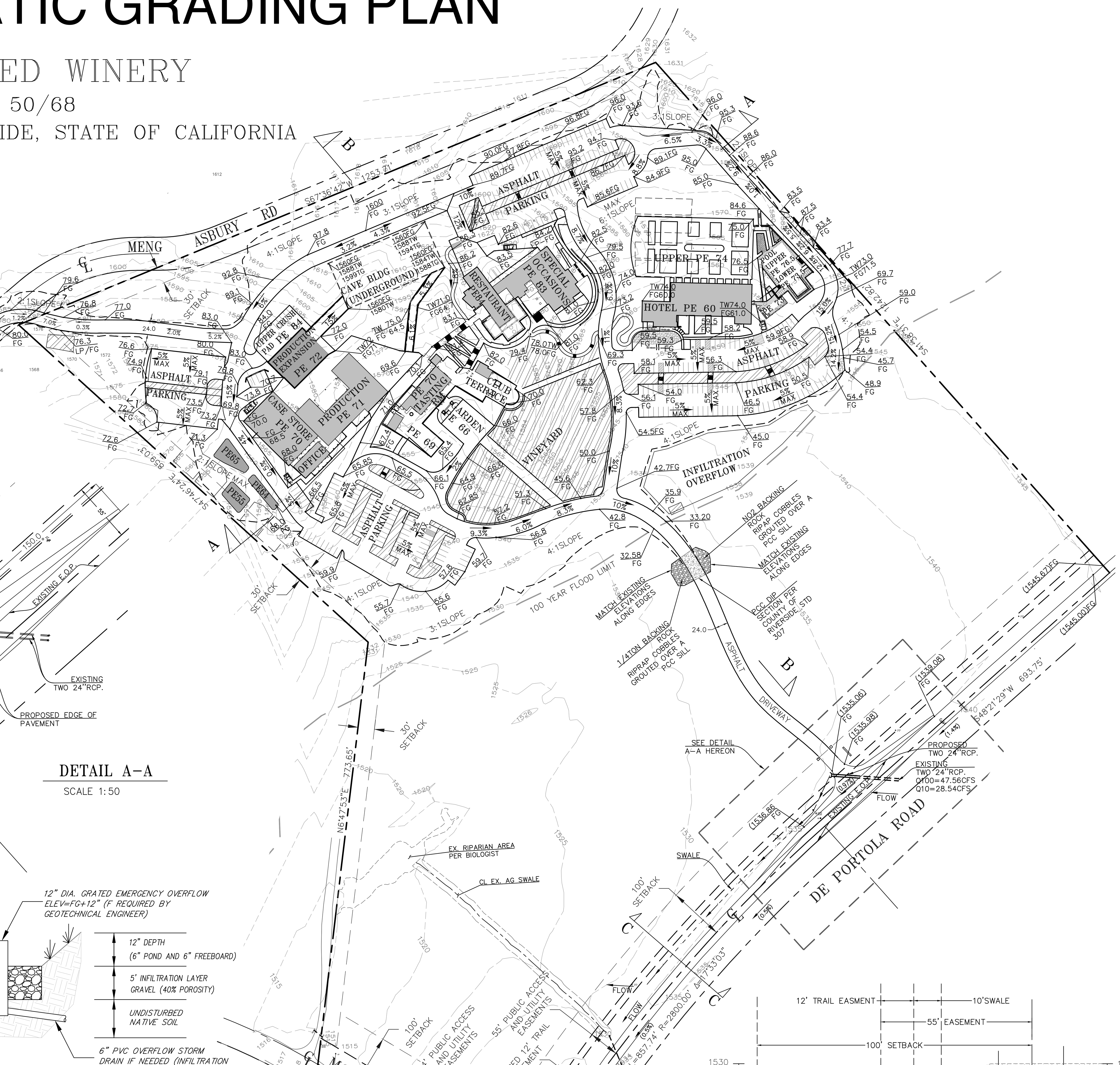
RAW CUT– 132,816 C.Y.
RAW FILL– 132,816 C.Y.

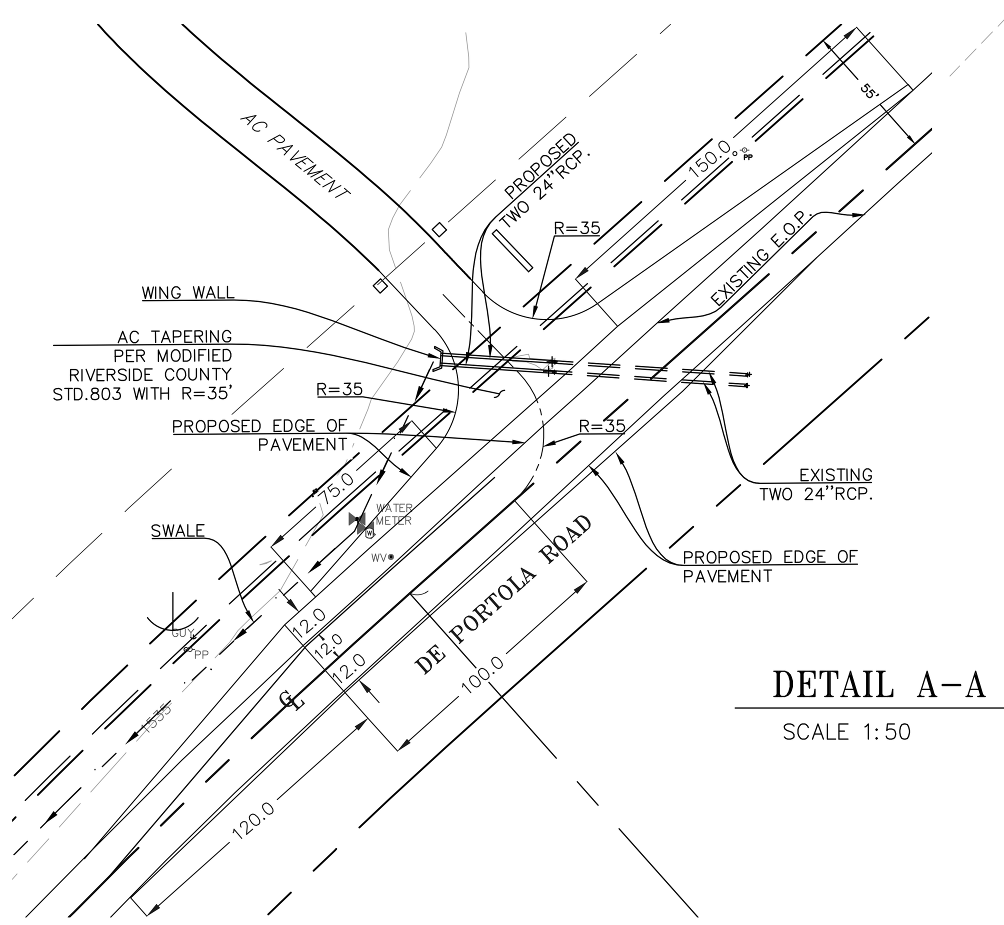
QUANTITIES ARE ESTIMATES ONLY AND CONTRACTOR IS TO VERIFY QUANTITIES PRIOR TO CONSTRUCTION

LEGEND:

℄ =	CENTERLINE
℘ =	EXIST. PROPERTY LINE
=	PROJECT BOUNDARY
(1300) =	EXISTING CONTOUR
	PROPOSED BUILDING
	INFILTRATION AREA
	RETAINING WALL
1940	EXISTING CONTOUR
	DRAINAGE FLOW
FLOW LINE	F.L.
HIGH POINT	H.P.
FINISHED GRADE	F.G.
PAD ELEVATION	P.E.
EDGE OF PAVEMENT	E.O.P
TOP OF WALL	T.W.

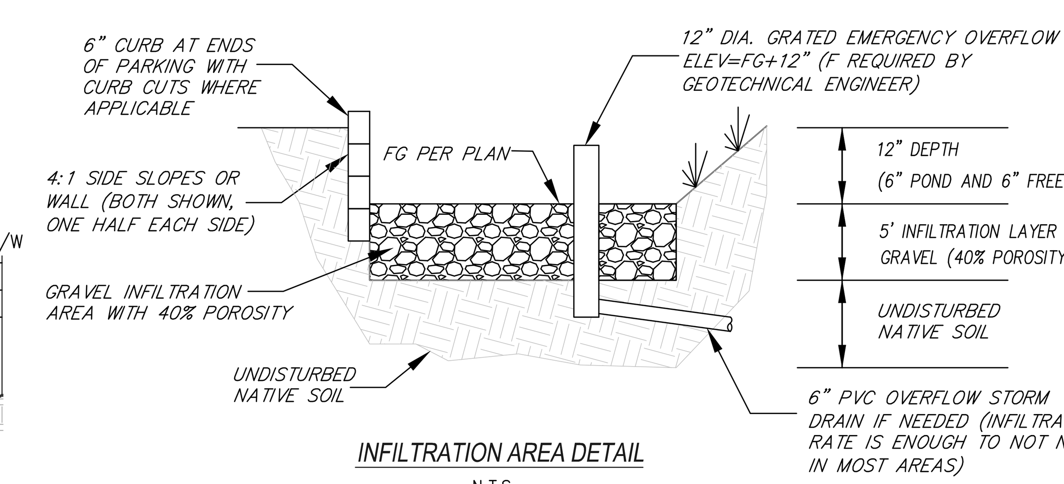
THERE IS NO EASEMENT ON PROPERTY.





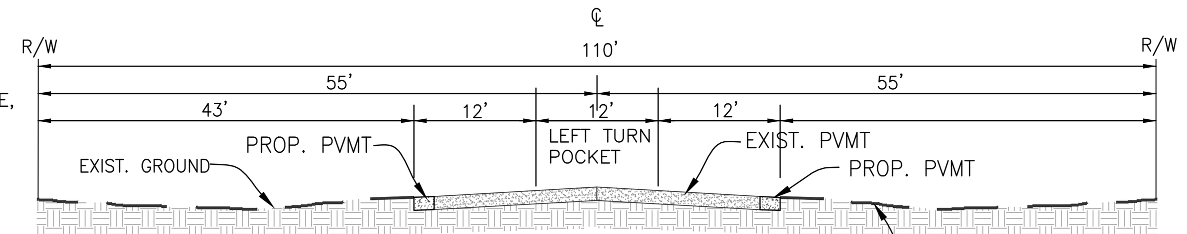
DETAIL A–A

SCALE 1:50



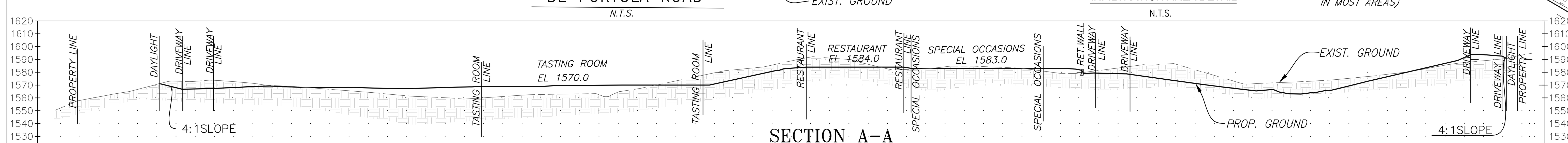
INFILTRATION AREA DETAIL

N.T.S.



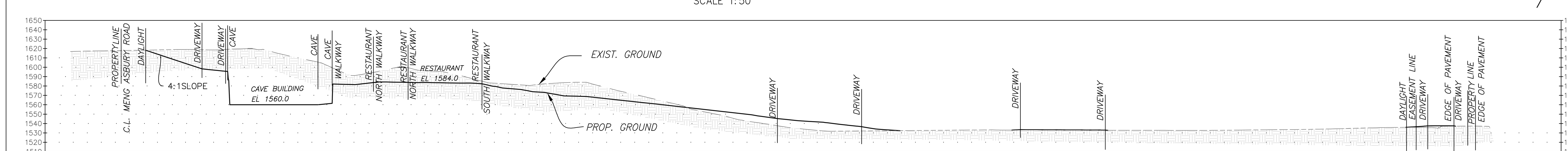
DE PORTOLA ROAD

N.T.S.



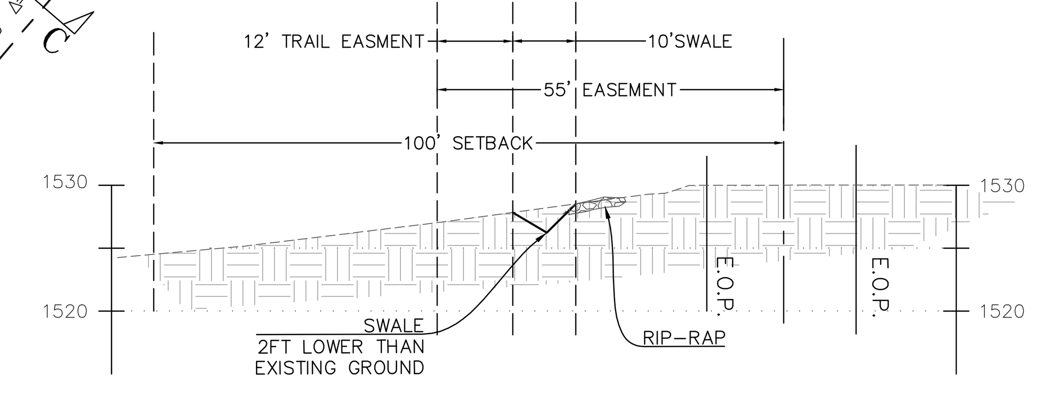
SECTION A–A

SCALE 1:50



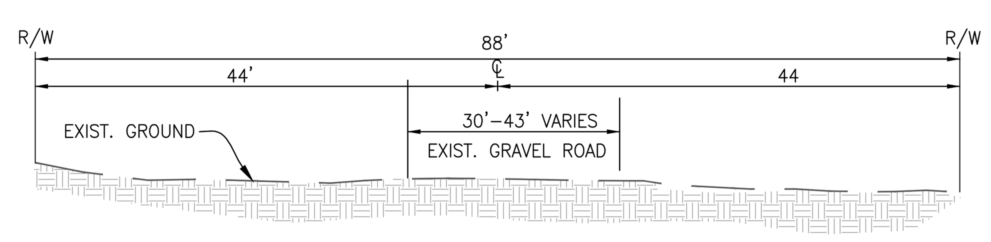
SECTION B–B

SCALE 1:60



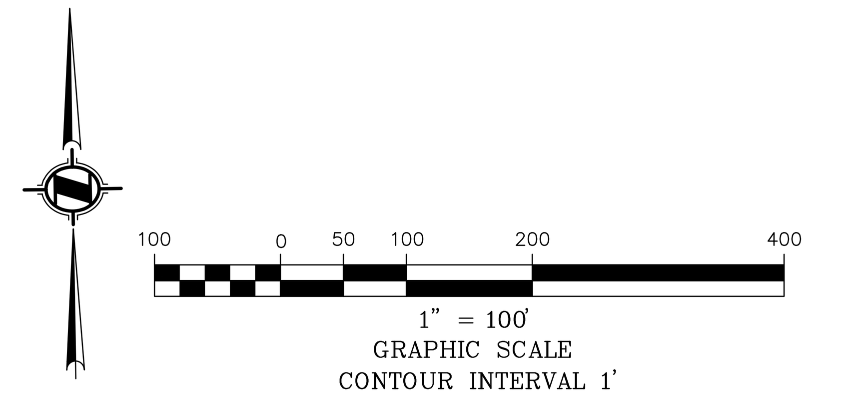
SECTION C–C

SCALE H 1:20 V 1:10



MONTE DE ORO ROAD

N.T.S.



REGISTERED PROFESSIONAL ENGINEER, WILFREDO S.D. VENTURA, No. 66532, Exp. 6–30–20, CIVIL, STATE OF CALIFORNIA	**VENTURA ENGINEERING INLAND, INC.** 27393 Ynez Rd, Suite 159, Temecula, CA. 92591 PHONE (951) 252-7632 WILFREDO S.D. VENTURA RCE 66532, EXP. 06/30/20 DATE: 10/11/19	REVISIONS:	PPT 180003 FOR FOR PROPOSED WINERY LOT K14, RS 50/68 A.P.N. 941–180–032 — SHEET NO. 1 OF 1

Appendix 3: Soils Information

Geotechnical Study, Other Infiltration Testing Data, and/or Other Documentation

Examples of material to provide in Appendix 3 may include but are not limited to the following:

- Geotechnical Study/Report prepared for the project,
- Additional soils testing data (if not included in the Geotechnical Study),
- Exhibits/Maps/Other Documentation of the Hydrologic Soils Groups (HSG)s at the project site.

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 2.3 of the SMR WQMP and Sections A and D of this Template.

The County will accept explicit recommendations from the Geotechnical Engineer, such as specifying a design infiltration rate (unfactored) when infiltration rates vary, recommendations for impermeable liners due to concerns about seepage in fill areas/near gas tanks, or other site specific recommendations based on physical conditions.

Project No. 171857-12A

October 10, 2017

Mr. Greg Koll
KOLL CUSTOM HOMES
P.O. Box 1658
Temecula, CA CA

Subject: **Infiltration Testing for Water Quality Treatment Areas, Assessor Parcel Numbers 941-180-032, Located at the Northeast Corner of De Portola Road and Monte de Oro Road, Temecula Area, Riverside County, California**

Earth Strata Geotechnical Services is pleased to present this infiltration feasibility report for the proposed residential tract homes, located at the northeast corner of De Portola Road and Monte de Oro Road, Assessor Parcel Numbers 941-180-032, in the Temecula area, Riverside County, California. The purpose of our study was to determine the infiltration rates and physical characteristics of the subsurface earth materials at the approximate depth of the proposed WQMP area within the proposed development. This feasibility report provides the infiltration rates to be used for the design and the development of the water quality management plan, where applicable.

PROPERTY DESCRIPTION

The subject property is located at the northeast corner of De Portola Road and Monte de Oro Road in the Temecula area, Riverside County, California (see Figure 1). The subject property consists of approximately 42.63 acres of undeveloped land. The site has relatively flat terrain in the southern portion of the site and hilly in the northern portion. The property is currently bounded by residential development, as well as vacant property to the south and an orchard to the north. The subject property is underlain by colluvium deposits (Qc) and Pauba Formation (Qpfs).

PROPOSED CONSTRUCTION

Based on plans provided by Ventura Engineering, the proposed development as illustrated on the conceptual grading plans will consist of a winery complete with roads, utilities, driveways, parking, vineyards, and onsite water quality treatment areas.

SUBSURFACE EXPLORATION AND INFILTRATION TESTING

SUBSURFACE EXPLORATION

Subsurface exploration of the subject site consisted of one exploratory boring within each of the proposed basins to depths of 15 feet, conducted on September 18, 2017. Additional borings and test pits associated with the geotechnical investigation were excavated on October 6, October 7, and October 13, 2017. The approximate locations of the exploratory excavations are shown on the attached Infiltration Location Map, Plate 1.

EARTH MATERIALS

The earth materials on the site are primarily comprised of topsoil, colluvium deposits, and sandstone formation deposits. A general description of the dominant earth materials observed on the site is provided below:

- Topsoil: Topsoil / residual soils blanketed most of the proposed basin areas to a depth of approximately 2 feet below existing grade.

- Quaternary Colluvium Deposits (map symbol Qc): Quaternary Colluvium Deposits; fine to coarse silty sand, with different amounts of silt and clay. The alluvium color varied from light brown to dark brown, slightly moist to moist, loose to medium dense.

- Quaternary Pauba Formation (Qpfs): The sandstone member of the Pauba Formation was encountered below the loose colluvium deposits. These materials consisted of silty sand with fine to coarse sand.

GROUNDWATER

Groundwater was not observed within the exploratory borings excavated to a depth of 15.5 feet.

INFILTRATION TESTING

The double ring infiltrometer test method was utilized to perform a total of two (2) infiltration tests on October 10, 2017 to evaluate near surface infiltration rates in order to estimate the amount of storm water runoff that can infiltrate into the onsite water quality treatment plan areas. The infiltration tests were performed in general accordance with the requirements of double ring infiltration testing, ASTM D3385 and Appendix A of the Riverside County Flood Control and Water Conservation District.

The infiltration tests were performed using double ring infiltrometer and Mariotte tubes at a depth of 5 feet below existing grades. The locations of the infiltration tests are indicated on the attached Infiltration Location Map, Plate 1. The double ring infiltrometer tests were located by property boundary measurement on the site plan and by using geographic features. Infiltration test data recorded in the field are summarized in the following table and is included within Appendix B including the graph of Infiltration Rate versus Elapsed Time.

INFILTRATION TEST SUMMARY

TEST NUMBER	INFILTRATION HOLE DEPTH (ft.)	INFILTRATION RATE (in/hr)	DESCRIPTION
DR-1	5	4.54	Silty SAND
DR-2	5	1.84	Silty SAND

The infiltration test rates ranged from 1.84 to 4.54 inches per hour (in/hr).

CONCLUSIONS AND RECOMMENDATIONS

Based on the data presented in this report and the recommendations set forth herein, it is the opinion of Earth Strata Geotechnical Services that the water quality treatment areas can be designed for an insitu infiltration rate of 1.8 inches per hour.

GRADING PLAN REVIEW AND CONSTRUCTION SERVICES

This report has been prepared for the exclusive use of **Mr. Greg Koll** and their authorized representative. It likely does not contain sufficient information for other parties or other uses. Earth Strata Geotechnical Services should be engaged to review the final design plans and specifications prior to construction. This is to verify that the recommendations contained in this report have been properly incorporated into the project plans and specifications. Should Earth Strata Geotechnical Services not be accorded the opportunity to review the project plans and specifications, we are not responsibility for misinterpretation of our recommendations.

Earth Strata Geotechnical Services should be retained to provide observations during construction to validate this report. In order to allow for design changes in the event that the subsurface conditions differ from those anticipated prior to construction.

Earth Strata Geotechnical Services should review any changes in the project and modify and approve in writing the conclusions and recommendations of this report. This report and the drawings contained within are intended for design input purposes only and are not intended to act as construction drawings or specifications. In the event that conditions encountered during grading or construction operations appear to be different than those indicated in this report, this office should be notified immediately, as revisions may be required.

REPORT LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists, practicing at the time and location this report was prepared. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

Earth materials vary in type, strength, and other geotechnical properties between points of observation and exploration. Groundwater and moisture conditions can also vary due to natural processes or the works of man on this or adjacent properties. As a result, we do not and cannot have complete knowledge of the subsurface conditions beneath the subject property. No practical study can completely eliminate uncertainty with regard to the anticipated geotechnical conditions in connection with a subject property.

The conclusions and recommendations within this report are based upon the findings at the points of observation and are subject to confirmation by Earth Strata Geotechnical Services during construction. This report is considered valid for a period of one year from the time the report was issued.

This report was prepared with the understanding that it is the responsibility of the owner or their representative, to ensure that the conclusions and recommendations contained herein are brought to the attention of the other project consultants and are incorporated into the plans and specifications. The owners' contractor should properly implement the conclusions and recommendations during grading and construction, and notify the owner if they consider any of the recommendations presented herein to be unsafe or unsuitable.

Respectfully submitted,

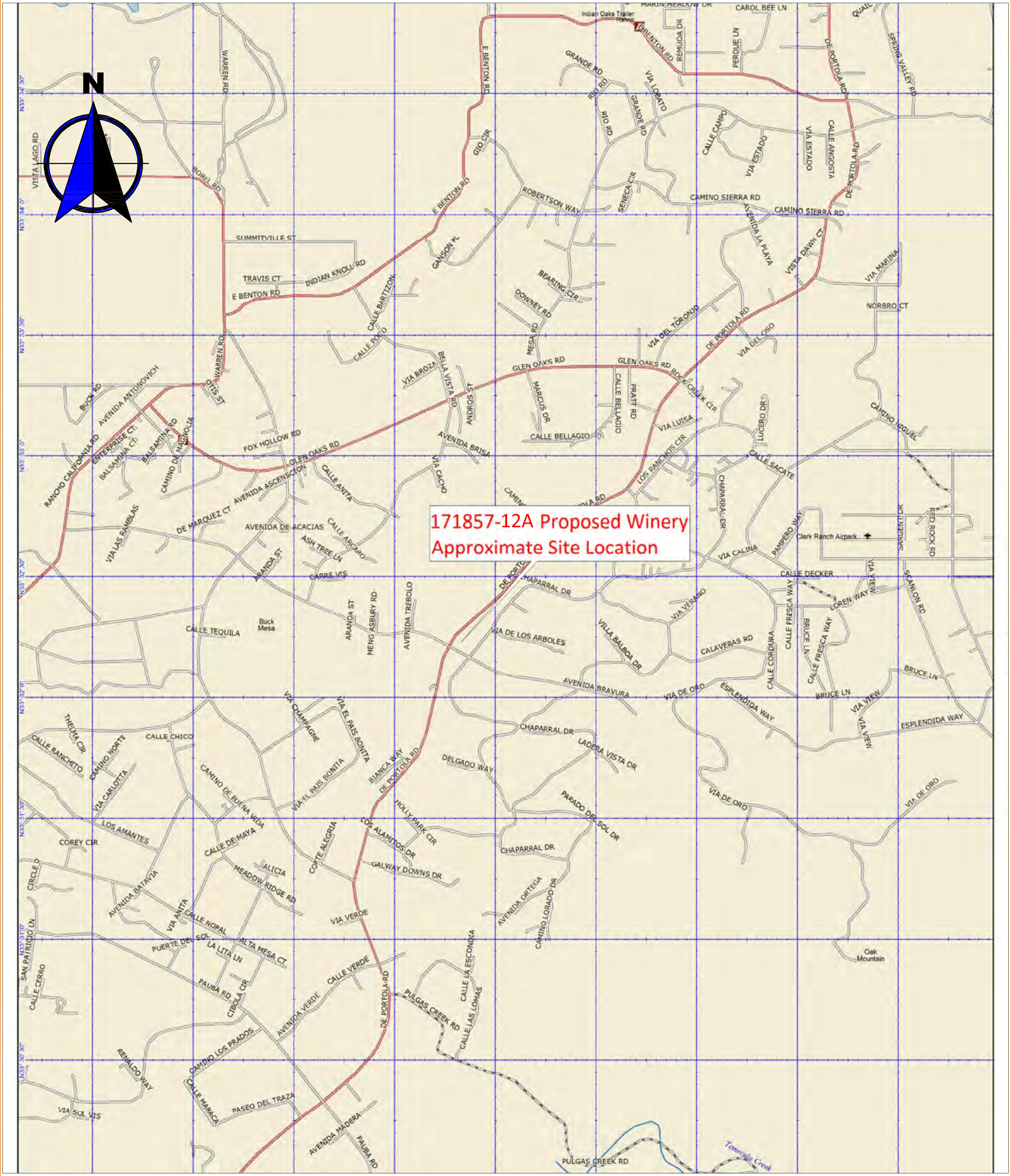
EARTH STRATA GEOTECHNICAL SERVICES

Stephen M. Poole, PE 40219
President
Principal Engineer

SMP/jf

Distribution: (1) Addressee

Attachments: Figure 1 – Vicinity Map *(Rear of Text)*
Appendix A – Exploratory Logs *(Rear of Text)*
Appendix B – Infiltration Test Sheets *(Rear of Text)*
Plate 1 – Infiltration Location Map *(Rear of Text)*



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Geotechnical, Environmental and Materials Testing Consultants
www.ESGSINC.com (951) 397-8315

PROPOSED WINERY		171857-12A
VICINITY MAP	SCALE 1:40,625	
	OCT. 2017	FIGURE 1

APPENDIX A

EXPLORATORY LOGS

Geotechnical Test Pit Log TP-1

Date: October 5, 2017	**Project Name: Monte de Oro and De Portola Winery** **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: Backhoe**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0		0-5]				**Topsoil**
					SM	Silty SAND; dark brown, dry to slightly moist, medium dense, fine to coarse
						sand with clay
						Quaternary Pauba Formation (Qps)
						Silty SANDSTONE; yellowish brown, slightly moist, dense, fine to coarse sand with
5						trace clay
						Practical Refusal at 5 feet
						Total Depth: 5 feet
						No Groundwater
10						
15						
20						
25						
30						

Geotechnical Test Pit Log TP-2

Date: October 5, 2017	**Project Name: Monte de Oro and De Portola Winery** **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: Backhoe**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil**
					SC	Clayey SAND; dark brown, slightly moist, dense, fine to coarse sand
						Quaternary Pauba Formatin (Qps)
					SC	Clayey SAND; dark brown, slgihtly moist, dense, fien to coarse sand
						Practical Refusal at 4 feet
5						Total Depth: 4 feet
						No Groundwater
10						
15						
20						
25						
30						

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Geotechnical Test Pit Log TP-3

Date: October 5, 2017	**Project Name: Monte de Oro and De Portola Winery** **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: Backhoe**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil**
					SC	Clayey SAND; dark brown, slightly moist, dense, fine to coarse sand
						Quaternary Pauba Formatin (Qps)
					SC	Clayey SAND; dark brown, slgihtly moist, dense, fine to coarse sand
						Practical Refusal at 4.5 feet
5						Total Depth: 4.5 feet
						No Groundwater
10						
15						
20						
25						
30						

Geotechnical Boring Log B-1

Date: October 6, 2017	**Project Name: Monte de Oro and De Portola Winery** **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil**
					SC	Clayey SAND; dark brown, slightly moist, medium dense, fine to coarse sand
	27	2.5'	93.1	5.8		**Quaternary Pauba Formation (Qps)**
						Silty SANDSTONE; dark yellowish brown, dry, very dense, fine to coarse sand
						with trace clay
5	57	5'	113.9	10.0		
	59	7.5'	111.3	5.5		
10	78/10.5"	10'	107.4	9..3		Dark yellowish brown below 10 feet
						Total Depth: 12.5 feet
						No Groundwater
15						
20						
25						
30						

Geotechnical Boring Log B-2

Date: October 7, 2017	**Project Name: Monte de Oro and De Portola Winery** — **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** — **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil**
					SM	Silty SAND; light brown, loose, dry, fine to coarse sand
	23	2.5'	104.6	3.3		**Quaternary Pauba Formation (Qps)**
					SM	Silty SAND; dark orange brown, slightly moist, medium dense, fine to coarse sand
5	18	5'	97.1	4.6		
	25	7.5'	108.8	7.9	SP-SC	Poorly-Graded SAND with Clay; dark orange brown, slightly moist, medium dense, fine to coarse sand
10	34	10'	105.9	8.2		Dense below 10 feet
15	51	15'	116.9	7.4		Very dense below 15 feet
20	61	20'	113.2	8.2		
						Total Depth: 21.5 feet
						No Groundwater
25						
30						

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Geotechnical Boring Log B-3

Date: October 7, 2017	Project Name: Monte de Oro and De Portola Winery Page: 1 of 1
Project Number: 171857-10A	Logged By: JF
Drilling Company: Drilling It	Type of Rig: B-61
Drive Weight (lbs): 140	Drop (in): 30 Hole Diameter (in): 8
Top of Hole Elevation (ft): See Map	Hole Location: See Geotechnical Map

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil**
					SM	Silty SAND; light brown, dry, loose, fine to coarse sand
	36	2.5'	106.3	3.2		**Quaternary Pauba Formation (Qps)**
					SM	Silty SAND; light brown, dry, dense, fine to coarse sand with trace clay
5	62	5'	109.4	3.4		Very dense below 5 feet
	38	7.5'	106.8	4.7		Dark orange brown, slightly moist, dense below 7.5 feet
10	35	10'	99.9	5.4		
15	69	15'	105.7	6.5		Very dense below 15 feet
						Total Depth: 16.5 feet
						No Groundwater
20						
25						
30						

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Geotechnical Boring Log B-4

Date: October 13, 2017	**Project Name: Monte de Oro and De Portola Winery** — **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** — **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**<u>Topsoil</u>**
					SM	Silty SAND; light brown, dry, loose, fine to coarse sand with trace clay
	23	2.5'	100.8	2.5		**<u>Quaternary Pauba Formation (Qps)</u>**
						Silty SAND; light brown, dry, medium dense, fine to coarse sand with trace clay
5	41	5'	114.3	4.7		Silty SANDSTONE; medium brown, dry, dense, fine to coarse sand with clay
	40	7.5'	107.0	4.5		
10	52	10'	103.4	7.2		
	97/11"	12.5'	107.0	4.1	SP-SM	Poorly-Graded SAND with Silt; medium brown, dry, very dense, fine with coarse sand with trace gravel
15						Total Depth: 14 feet
						No Groundwater
20						
25						
30						

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Geotechnical Boring Log B-5

Date: October 13, 2017	**Project Name: Monte de Oro and De Portola Winery** **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil**
					SM	Silty SAND; light brown, dry, loose, fine to coarse sand with trace clay
	34	2.5'	105.1	2.5		**Quaternary Pauba Formation (Qps)**
						Silty SAND; light brown, dry, dense, fine to coarse sand with trace clay
5	33	5'	108.8	3.6		
	13	7.5'	102.4	4.6		Medium dense below 7 feet
10	23	10'	93.5	2.1		
	27	12.5'	99.8	4.1	SP-SM	Poorly-Graded SAND with Silt; medium brown, dry, very dense, fine with coarse sand with trace gravel
15						Total Depth: 14 feet
						No Groundwater
20						
25						
30						

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Earth Strata Geotechnical Services, Inc.

Geotechnical, Environmental and Materials Testing Consultants

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Geotechnical Boring Log MW-1

Date: September 18, 2017	**Project Name: De Portola Winery** **Page: 1 of 1**
Project Number: 171857-11A	**Logged By: TJ**
Drilling Company: Drilling It	**Type of Rig: Simco 2800**
Drive Weight (lbs): -	**Drop (in): -** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil:**
						Silty SAND; light brown, loose, dry, fine to medium sand
						Quaternary Colluvium Deposits (Qc):
					SM	Silty SAND; strong brown, slightly moist, medium dense, fine to medium sand
5						**Quaternary Pauba Formation (Qpfs):**
						Silty SANDSTONE; brown, medium dense, slightly moist, fine to coarse sand
10						
15						
						Total Depth: 15.5 feet
						No Groundwater
20						
25						
30						

APPENDIX B

INFILTRATION TEST SHEETS

Test No.	DR-1	Location	See Map

Turf-Tec International - Record Chart for IN10-W - (12 & 24 Inch Infiltration Rings)

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Project Identification:	171857-12A	Constants	Area cm2	Depth of Liquid (cm)	Liquid Container Number	Marriotte Tube Volume
Test Location:	DR-1	Inner Ring	729	10.0	1	3000
Liquid Used:	TAP WATE pH: 8.0	Annular Ring	2189	10.0	2	10000
Tested By:	JM	Date	Liquid level maintained (X) Flow Valve ( ) Float Valve ( ) Mariotte Tubes			
Depth to water table:	> 30 Feet	Depth of Test: 5 feet	Penetration Depth of Outer Ring: 9 cm			Other

						Flow Readings					Infiltration Rates				Ground Temperature		Remarks
Trial #	Start / End	Date MM/DD/YY	Time HR:MIN	Time Increment /(Total)	Elapsed Time (Min)	Inner Ring Reading cm	Inner Maroitte Tube Flow (ml)	Annular Space Reading cm	Annular Space Marriotte Tube Flow (ml)	Liquid Temp ºF	Inner Infiltration Rate cm/h	Inner Infiltration Rate In/h	Annular Infiltration Rate cm/h	Annular Infiltration Rate in/h	Ground Temp Depth (cm)	Temp at Depth (c)	Weather conditions Etc...
	Start Test	10/7/2017	9:55	0:15	15												
1	End Test	10/7/2017	10:10	0:15		6.00	3500	6.00	10500		19.20	7.56	19.19	7.55			
	Start Test	10/7/2017	10:10	0:15	30												
2	End Test	10/7/2017	10:25	0:30		6.00	3000	6.00	9000		16.46	6.48	16.45	6.47			
	Start Test	10/7/2017	10:25	0:15	45												
3	End Test	10/7/2017	10:40	0:45		6.00	2000	6.00	6000		10.97	4.32	10.96	4.32			
	Start Test	10/7/2017	10:40	0:15	60												
4	End Test	10/7/2017	10:55	1:00		6.00	2250	6.00	6500		12.35	4.86	11.88	4.68			
	Start Test	10/7/2017	10:55	0:15	75												
5	End Test	10/7/2017	11:10	1:15		6.00	2350	6.00	7000		12.89	5.08	12.79	5.04			
	Start Test	10/7/2017	11:10	0:15	90												
6	End Test	10/7/2017	11:25	1:30		6.00	1750	6.00	5000		9.60	3.78	9.14	3.60			
	Start Test	10/7/2017	11:25	0:15	105												
7	End Test	10/7/2017	11:40	1:45		6.00	2100	6.00	7000		11.52	4.54	12.79	5.04			
	Start Test	10/7/2017	11:40	0:15	120												
8	End Test	10/7/2017	11:55	2:00		6.00	2100	6.00	7000		11.52	4.54	12.79	5.04			
	Start Test	10/7/2017	11:55	0:15	135												
9	End Test	10/7/2017	12:10	2:15		6.00	2100	6.00	6500		11.52	4.54	11.88	4.68			
	Start Test	10/7/2017	12:10	0:15	150												
10	End Test	10/7/2017	12:25	2:30		6.00	2100	6.00	6500		11.52	4.54	11.88	4.68			
	Start Test	10/7/2017	12:25	0:15	165												
11	End Test	10/7/2017	12:40	2:45		6.00	2100	6.00	6500		11.52	4.54	11.88	4.68			
	Start Test	10/7/2017	12:40	0:15	180												
12	End Test	10/7/2017	12:55	3:00		6.00	2100	6.00	6500		11.52	4.54	11.88	4.68			

Turf-Tec International

Project Identification:	171857-12A		
Test Location:	DR-1		
Liquid Used:	TAP WATE	**pH:**	8.0
Tested By:	JM		
Depth to water table:	> 30 Feet		

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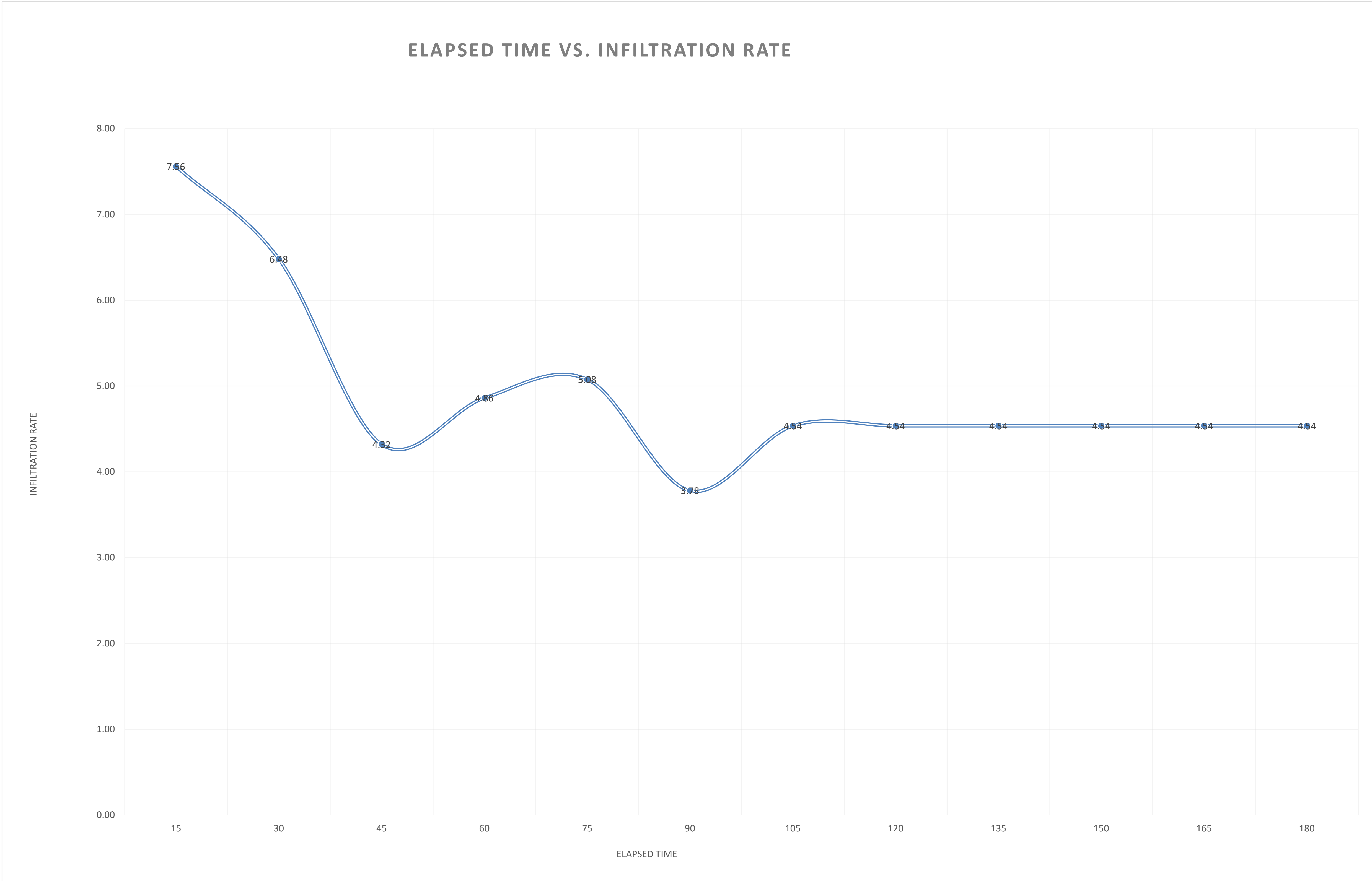

Turf-Tec International - Record Chart for IN10-W - (12 & 24 Inch Infiltration Rings)

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Test No.	DR-2	Location	See Map				
Project Identification:	171857-12A	Constants	Area cm2	Depth of Liquid (cm)	Liquid Container Number	Marriotte Tube Volume	
Test Location:	DR-2	Inner Ring	729	10.0	1	3000	
Liquid Used:	TAP WATE	pH:	8.0	Annular Ring	2189	10.0	2	10000
Tested By:	JM	Date		Liquid level maintained	(X) Flow Valve ( ) Float Valve ( ) Mariotte Tubes		
Depth to water table:	> 30 Feet	Depth of Test	5 feet	Penetration Depth of Outer Ring:	9 cm	Other	

Trial #	Start / End	Date MM/DD/YY	Time HR:MIN	Time Increment /(Total)	Elapsed Time (Min)	Flow Readings: Inner Ring Reading cm	Inner Maroitte Tube Flow (ml)	Annular Space Reading cm	Annular Space Marriotte Tube Flow (ml)	Liquid Temp °F	Infiltration Rates: Inner Infiltration Rate cm/h	Inner Infiltration Rate In/h	Annular Infiltration Rate cm/h	Annular Infiltration Rate in/h	Ground Temperature: Ground Temp Depth (cm)	Temp at Depth (c)	Remarks: Weather conditions Etc...
	Start Test	10/9/2017	8:15	0:15	15	5.00		5.00									
1	End Test	10/9/2017	8:30	0:15		5.00	1750	5.00	5500		9.60	3.78	10.05	3.96			
	Start Test	10/9/2017	8:30	0:15	30	5.00		5.00									
2	End Test	10/9/2017	8:45	0:30		6.00	2000	5.00	6000		10.97	4.32	10.96	4.32			
	Start Test	10/9/2017	8:45	0:15	45	5.00		5.00									
3	End Test	10/9/2017	9:00	0:45		5.00	1750	5.00	6000		9.60	3.78	10.96	4.32			
	Start Test	10/9/2017	9:00	0:15	60	5.00		5.00									
4	End Test	10/9/2017	9:15	1:00		5.00	1750	5.00	5500		9.60	3.78	10.05	3.96			
	Start Test	10/9/2017	9:15	0:15	75	5.00		5.00									
5	End Test	10/9/2017	9:30	1:15		5.00	1750	5.00	5500		9.60	3.78	10.05	3.96			
	Start Test	10/9/2017	9:30	0:15	90	5.00		5.00									
6	End Test	10/9/2017	9:45	1:30		5.00	1000	5.00	3000		5.49	2.16	5.48	2.16			
	Start Test	10/9/2017	9:45	0:15	105	5.00		5.00									
7	End Test	10/9/2017	10:00	1:45		5.00	850	5.00	2500		4.66	1.84	4.57	1.80			
	Start Test	10/9/2017	10:00	0:15	120	5.00		5.00									
8	End Test	10/9/2017	10:15	2:00		5.00	850	5.00	2500		4.66	1.84	4.57	1.80			
	Start Test	10/9/2017	10:15	0:15	135	5.00		5.00									
9	End Test	10/9/2017	10:30	2:15		5.00	850	5.00	2500		4.66	1.84	4.57	1.80			
	Start Test	10/9/2017	10:30	0:15	150	5.00		5.00									
10	End Test	10/9/2017	10:45	2:30		5.00	850	5.00	2500		4.66	1.84	4.57	1.80			
	Start Test	10/9/2017	10:45	0:15	165	5.00		5.00									
11	End Test	10/9/2017	11:00	2:45		5.00	850	5.00	2500		4.66	1.84	4.57	1.80			
	Start Test	10/9/2017	11:00	0:15	180	5.00		5.00									
12	End Test	10/9/2017	11:15	3:00		5.00	850	5.00	2500		4.66	1.84	4.57	1.80			
	Start Test	10/9/2017	11:15	0:15	195	5.00		5.00									
13	End Test	10/9/2017	11:30	3:15		5.00	850	5.00	2500		4.66	1.84	4.57	1.80			
	Start Test	10/9/2017	11:30	0:15	210	5.00		5.00									
14	End Test	10/9/2017	11:45	3:30		5.00	850	5.00	2500		4.66	1.84	4.57	1.80			
	Start Test	10/9/2017	11:45	0:15	225	5.00		5.00									
15	End Test	10/9/2017	12:00	3:45		5.00	850	5.00	2500		4.66	1.84	4.57	1.80			
	Start Test	10/9/2017	12:00	0:15	240	5.00		5.00									
16	End Test	10/9/2017	12:15	4:00		5.00	850	5.00	2500		4.66	1.84	4.57	1.80			

Turf-Tec International

Project Identification:	171857-12A		
Test Location:	DR-2		
Liquid Used:	TAP WATE	**pH:**	8.0
Tested By:	JM		
Depth to water table:	> 30 Feet		

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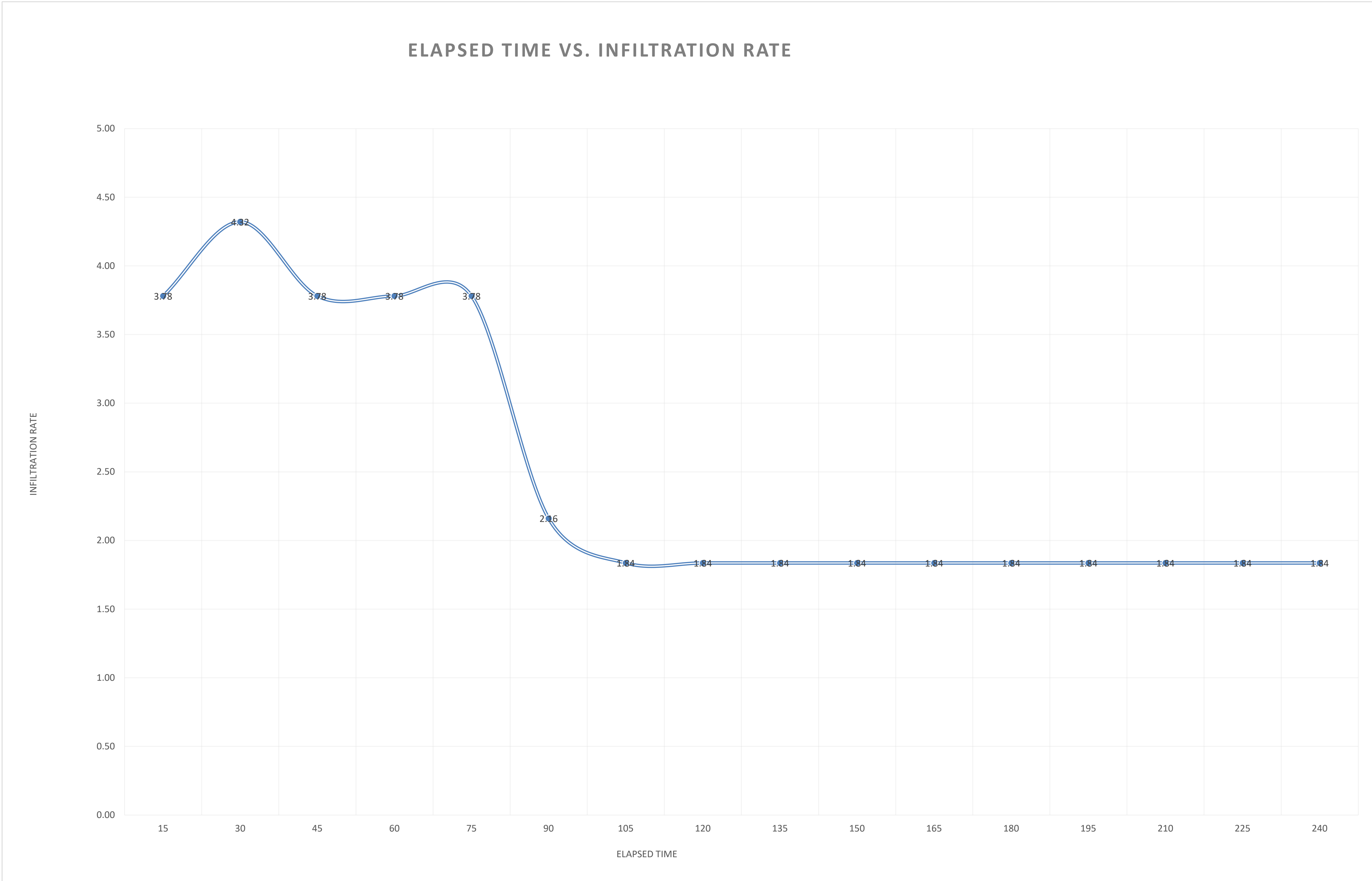

October 24, 2017 Project No. 171857-10A

Mr. Greg Koll
KOLL CUSTOM HOMES
P.O. Box 1658
Temecula, CA

Subject: **Preliminary Geotechnical Interpretive Report, Proposed Winery, Assessor's Parcel Number 941-180-032, Located at the Northeast Corner of De Portola Road and Monte de Oro Road, Temecula Area, Riverside County, California**

Earth Strata Geotechnical Services is pleased to present our preliminary geotechnical interpretive report for the proposed winery, Assessor's Parcel Number 941-180-032, located at the northeast corner of De Portola Road and Monte de Oro Road in the Temecula Area of Riverside County, California. This work was performed in accordance with the scope of work described in our proposal, dated July 19, 2017. The purpose of this study is to evaluate the nature, distribution, engineering properties, and geologic strata underlying the site with respect to the proposed development.

Earth Strata Geotechnical Services appreciates the opportunity to offer our consultation and advice on this project. In the event that you have any questions, please do not hesitate to contact the undersigned at your earliest convenience.

Respectfully submitted,

EARTH STRATA GEOTECHNICAL SERVICES

Stephen M. Poole

REGISTERED PROFESSIONAL ENGINEER STEPHEN MICHAEL POOLE No. 692 Exp. GEOTECHNICAL STATE OF CALIFORNIA

Stephen M. Poole, PE, GE
Principal Engineer

CERTIFIED ENGINEERING GEOLOGIST AARON G. WOOD No. 2550 Exp. 6/30/19 STATE OF CALIFORNIA

Aaron G. Wood, PG, CEG
Principal Geologist

SMP/snj

Distribution: (2) Addressee

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Attachments:

INTRODUCTION

Earth Strata Geotechnical Services is pleased to present our preliminary geotechnical interpretive report for the proposed development. The purpose of this study was to evaluate the nature, distribution, engineering properties, and geologic strata underlying the site with respect to the proposed development, and then provide preliminary grading and foundation design recommendations based on the plans you provided. The general location of the subject property is indicated on the Vicinity Map, Figure 1. The plans you provided were used as the base map to show geologic conditions within the subject site, see Geotechnical Map, Plate 1.

SITE DESCRIPTION

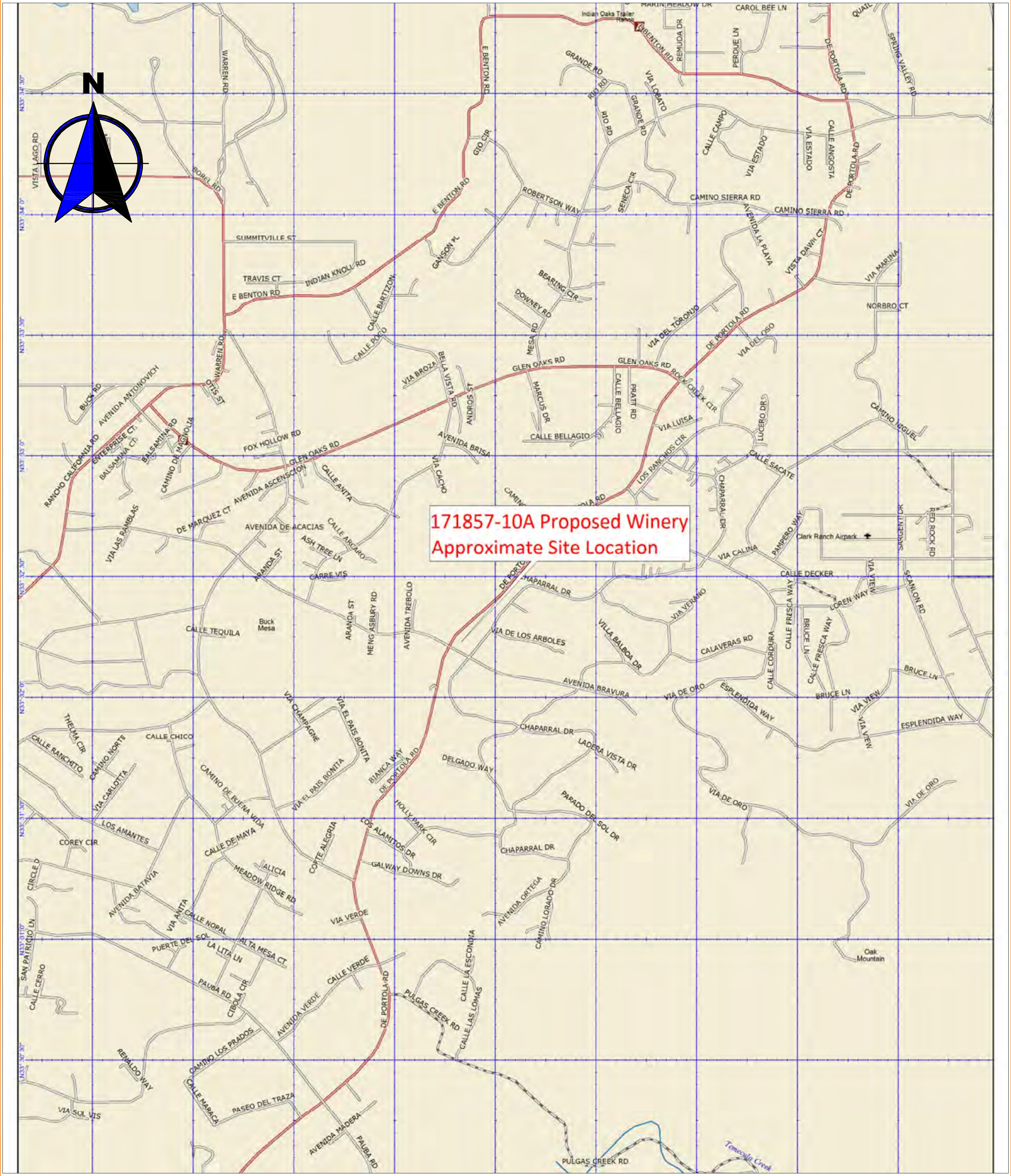
The subject property is located on the northeast corner of De Portola Road and Monte de Oro in the Temecula area of Riverside County, California. The approximate location of the site is shown on the Vicinity Map, Figure 1.

The subject property is comprised of approximately 42.63 acres of undeveloped land. Topographic relief at the subject property is relatively moderate with the terrain being generally flat in the southern portion of the site and hilly in the northern portion of the site. Elevations at the site range from approximately 1,520 to 1,630 feet above mean sea level (msl), for a difference of about 110± feet across the entire site. Drainage within the subject property generally flows to the southwest.

The site is currently bordered by residential development, as well as vacant property to the south and a orchard to the north. Most of the vegetation on the site consists of dense amounts of annual weeds/grasses and brush, along with small to large trees scattered across the subject site.

PROPOSED DEVELOPMENT AND GRADING

The proposed residential development is expected to consist of concrete, wood or steel framed one- and/or two-story structures utilizing slab on grade construction with associated streets, landscape areas, and utilities. The current development plans include six (6) building pads positioned throughout the site, as well as, an underground facility. The plans provided by you were utilized in our exploration and form the base for our Geotechnical Map, Plate 1.



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PROPOSED WINERY		171857-10A
VICINITY MAP	SCALE 1:40,625	
	OCT. 2017	FIGURE 1

FIELD EXPLORATION AND LABORATORY TESTING

Field Exploration

Subsurface exploration within the subject site was performed on October 6, October 7, and October 13, 2017 for the exploratory excavations. A truck mounted hollow-stem-auger drill rig was utilized to drill six (6) borings throughout the site to a maximum depth of 21.5 feet. A backhoe was utilized to excavate three (3) test pits to a maximum depth of 5 feet. An underground utilities clearance was obtained from Underground Service Alert of Southern California, prior to the subsurface exploration.

Earth materials encountered during exploration were classified and logged in general accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) of ASTM D 2488. Upon completion of laboratory testing, exploratory logs and sample descriptions may have been reconciled to reflect laboratory test results with regard to ASTM D 2487.

Associated with the subsurface exploration was the collection of bulk (disturbed) samples and relatively undisturbed samples of earth materials for laboratory testing and analysis. The relatively undisturbed samples were obtained with a 3 inch outside diameter modified California split-spoon sampler lined with 1-inch-high brass rings. Samples obtained using a hollow stem auger drill rig, were mechanically driven with successive 30 inch drops of a 140-pound automatic trip safety hammer. The blow count per one-foot increment was recorded in the boring logs. The central portions of the driven samples were placed in sealed containers and transported to our laboratory for testing and analysis. The approximate exploratory locations are shown on Plate 1 and descriptive logs are presented in Appendix B.

Laboratory Testing

Maximum dry density/optimum moisture content, expansion potential, pH, resistivity, sulfate content, chloride content, and in-situ density/moisture content were determined for selected undisturbed and bulk samples of earth materials, considered representative of those encountered. An evaluation of the test data is reflected throughout the Conclusions and Recommendations section of this report. A brief description of laboratory test criteria and summaries of test data are presented in Appendix C.

FINDINGS

Regional Geology

Regionally, the site is located in the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are characterized by northwest trending steep mountain ranges separated by sediment filled elongated valleys. The dominant structural geologic features reflect the northwest trend of the province. Associated with and subparallel to the San Andreas Fault are the San Jacinto Fault, Newport-Inglewood, and the Whittier-Elsinore Fault. The Santa Ana Mountains abut the west side of the Elsinore Fault while the Perris Block forms the other side of the fault zone to the east. The Perris Block is bounded to the east by the San Jacinto Fault. The northern perimeter of the Los Angeles basin forms part of a northerly dipping blind thrust fault at the boundary between the Peninsular Ranges Province and the Transverse Range Province.

The mountainous regions within the Peninsular Ranges Province are comprised of Pre-Cretaceous, metasedimentary, and metavolcanic rocks along with Cretaceous plutonic rocks of the Southern California

Batholith. The low lying areas are primarily comprised of Tertiary and Quaternary non-marine alluvial sediments consisting of alluvial deposits, sandstones, claystones, siltstones, conglomerates, and occasional volcanic units. A map illustrating the regional geology is presented on the Regional Geologic Map, Figure 2.

Local Geology

The earth materials on the site are primarily comprised of topsoil and bedrock. A general description of the dominant earth materials observed on the site is provided below:

- Topsoil (no map symbol): Residual topsoil, encountered in the upper 1 to 2 feet, blankets the site and underlying bedrock. These materials were noted to be generally light brown to dark brown, silty sand and clayey sand which were very porous, dry to slightly moist and in a loose to medium dense state.

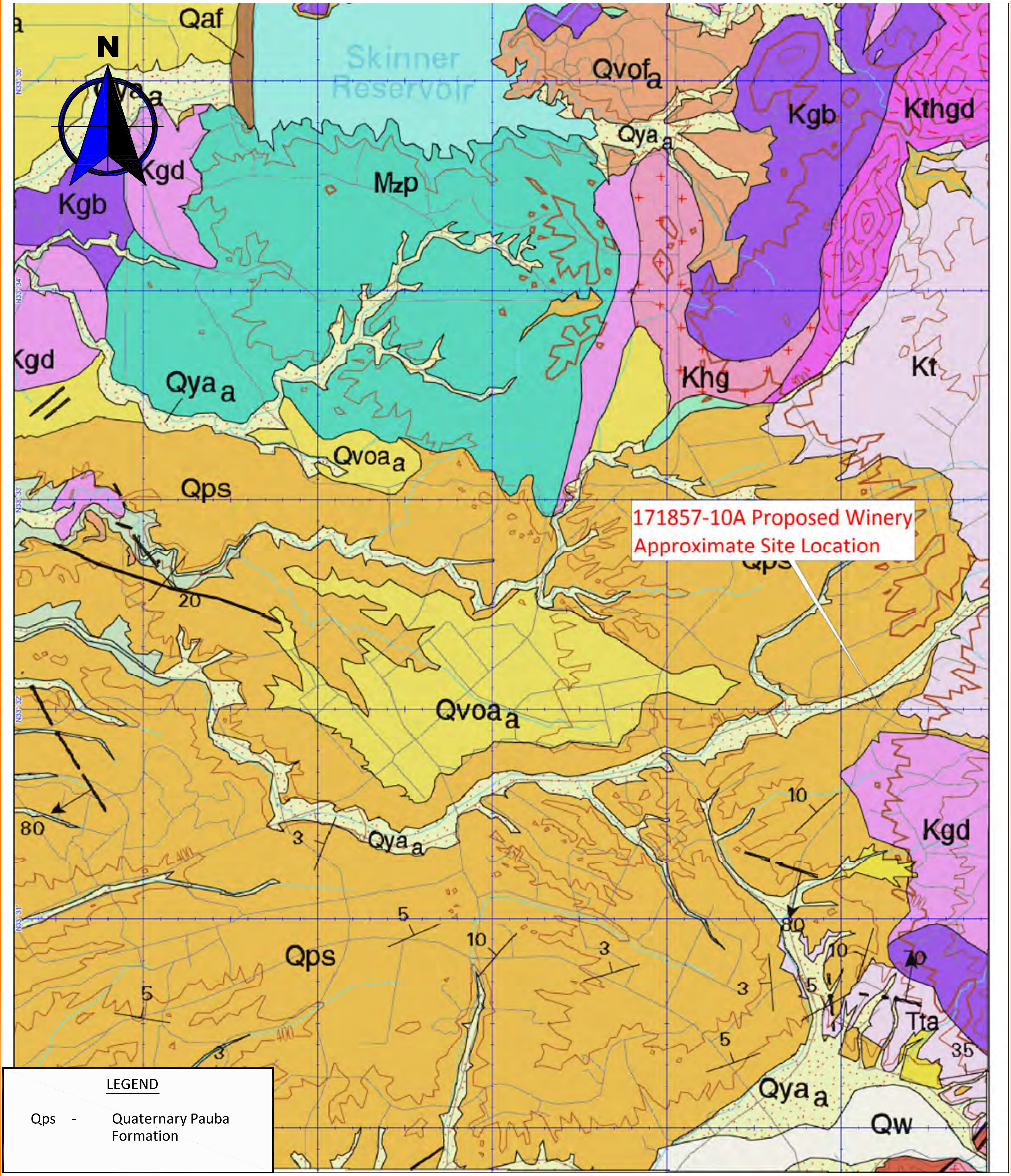
- Quaternary Pauba Formation (map symbol Qps): Pauba Formation bedrock was generally encountered below the topsoil to the full depth of our exploration. These materials primarily consisted of light brown to dark yellowish brown, fine to coarse grained sandstone with varying amounts of silt and clay. These materials were generally noted to be dry to slightly moist, medium dense to very dense.

Faulting

The project is located in a seismically active region and as a result, significant ground shaking will likely impact the site within the design life of the proposed project. The geologic structure of the entire southern California area is dominated by northwest-trending faults associated with the San Andreas Fault system, which accommodates for most of the right lateral movement associated with the relative motion between the Pacific and North American tectonic plates. Known active faults within this system include the Newport-Inglewood, Whittier-Elsinore, San Jacinto and San Andreas Faults.

No active faults are known to project through the site and the site is not located within an Alquist-Priolo Earthquake Fault Zone, established by the State of California to restrict the construction of new habitable structures across identifiable traces of known active faults. An active fault is defined by the State of California as having surface displacement within the past 11,000 years or during the Holocene geologic time period. Based on our mapping of the subject site, review of current and historical aerial imagery, lack of lineaments indicative of active faulting, and the data compiled during the preparation of this report, it is our interpretation that the potential for surface rupture to adversely impact the proposed structures is very low to remote.

Based on our review of regional geologic maps and applicable computer programs (USGS 2008 Interactive Deaggregation, Caltrans ARS online, and USGS Earthquake Hazard Programs), the San Felipe Fault with an approximate source to site distance of 2.5 kilometers is the closest known active fault anticipated to produce the highest ground accelerations for shorter periods (<1.25 seconds), with an anticipated maximum modal magnitude of 6.3; the Elsinore Fault (Temecula section) with an approximate source to



REFERNCES: Morton, D.M., Hauser, Rachel M., and Ruppert, Kelly R., 2004, Preliminary Digital Geologic Map of the San Bernardino and Santa Ana 30' x 60' Quadrangle, Southern California, Version 2.0: U.S. Geological Survey Open-File Report 99-0172.

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Earth Strata Geotechnical Services, Inc. *Geotechnical, Environmental and Materials Testing Consultants* www.ESGSINC.com (951) 397-8315	PROPOSED WINERY		171857-10A
	REGIONAL GEOLOGIC MAP	SCALE 1:40,625	
		OCT. 2017	FIGURE 2

site distance of 11.93 kilometers is the closest known active fault anticipated to produce the highest ground accelerations for longer periods (<1.25 seconds), with an anticipated maximum modal magnitude of 7.7. A list of faults as well as a list of significant historical seismic events within a 100km radius of the subject site are included in Appendix D.

Landslides

Landslide debris was not observed during our subsurface exploration and no ancient landslides are known to exist on the site. No landslides are known to exist, or have been mapped, in the vicinity of the site. Geologic mapping of the site conducted during our investigation, and review of aerial imagery of the site, reveal no geomorphic expressions indicative of landsliding. The materials encountered in the pad area were found to be very hard and no oversteepened slopes exist on the site or are proposed.

CONCLUSIONS AND RECOMMENDATIONS

General

From geotechnical and engineering geologic points of view, the subject property is considered suitable for the proposed development, provided the following conclusions and recommendations are incorporated into the plans and are implemented during construction.

Earthwork

Earthwork and Grading

The provisions of the 2016 California Building Code (CBC), including the General Earthwork and Grading Specifications in the last Appendix of this report, should be applied to all earthwork and grading operations, as well as in accordance with all applicable grading codes and requirements of the appropriate reviewing agency. Unless specifically revised or amended herein, grading operations should also be performed in accordance with applicable provisions of our General Earthwork and Grading Specifications within the last appendix of this report.

Clearing and Grubbing

Vegetation including trees, grasses, weeds, brush, shrubs, or any other debris should be stripped from the areas to be graded and properly disposed of offsite. In addition, laborers should be utilized to remove any roots, branches, or other deleterious materials during grading operations.

Earth Strata Geotechnical Services should be notified at the appropriate times to provide observation and testing services during Clearing and Grubbing operations. Any buried structures or unanticipated conditions should be brought to our immediate attention.

Excavation Characteristics

Based on the results of our exploration and experience with similar projects in similar settings, the near surface earth materials, will be readily excavated with conventional earth moving equipment.

Groundwater

Groundwater was not observed during our subsurface exploration. Local well water data indicates regional groundwater highs approximately 437 feet below ground surface. It should be noted that localized groundwater could be encountered during grading due to the limited number of exploratory locations or other factors.

Ground Preparation for Fill Areas

For each area to receive compacted fill, the removal of low density, compressible earth materials, such as topsoil, upper alluvial materials, and undocumented artificial fill, should continue until firm competent bedrock is encountered. Removal excavations are subject to verification by the project engineer, geologist or their representative. Prior to placing compacted fills, the exposed bottom in each removal area should be scarified to a depth of 6 inches or more, watered or air dried as necessary to achieve near optimum moisture conditions and then compacted to a minimum of 90 percent of the maximum dry density determined by ASTM D 1557.

The intent of remedial grading is to diminish the potential for hydro-consolidation, slope instability, and/or settlement. Remedial grading should extend beyond the perimeter of the proposed structures a horizontal distance equal to the depth of excavation or a minimum of 5 feet, whichever is greater. For cursory purposes the anticipated removal depths are shown on the enclosed Geotechnical Map, Plate 1. In general, the anticipated removal depths should vary from 4 to 6 feet below existing grade.

Wet Removals

Wet alluvial materials will probably not be encountered within the low lying areas of the site. If removals of wet alluvial materials are required, special grading equipment and procedures can greatly reduce overall costs. Careful planning by an experienced grading contractor can reduce the need for special equipment, such as swamp cats, draglines, excavators, pumps, and top loading earthmovers. Possible solutions may include the placement of imported angular rock and/or geotextile ground reinforcement. More specific recommendations can be provided based on the actual conditions encountered. Drying or mixing of wet materials with dry materials will be needed to bring the wet materials to near optimum moisture prior to placing wet materials into compacted fills.

Oversize Rock

Oversize rock is not expected to be encountered during grading. Oversize rock that is encountered (i.e., rock exceeding a maximum dimension of 12 inches) should be disposed of offsite or stockpiled onsite and crushed for future use. The disposal of oversize rock is discussed in greater detail in General Earthwork and Grading Specifications within the last appendix of this report.

Compacted Fill Placement

Compacted fill materials should be placed in 6 to 8 inch maximum (uncompacted) lifts, watered or air dried as necessary to achieve uniform near optimum moisture content and then compacted to a minimum of 90 percent of the maximum dry density determined by ASTM D 1557.

Import Earth Materials

Should import earth materials be needed to achieve final design grades, all potential import materials should be free of deleterious/oversize materials, non-expansive, and approved by the project geotechnical consultant prior to delivery onsite.

Fill Slopes

When properly constructed, fill slopes up to 10 feet high with inclinations of 2:1 (h:v) or flatter are considered to be grossly stable. Keyways are required at the toe of all fill slopes higher than 5 feet and steeper than 5:1 (h:v). Keyways should be a minimum of 10 feet wide and 2 feet into bedrock, as measured on the downhill side. In order to establish keyway removals, backcuts should be cut no steeper than 1:1 or as recommended by the geotechnical engineer or engineering geologist. Compacted fill should be benched into bedrock.

Cut Slopes

When properly constructed, cut slopes into bedrock up to 10 feet high with inclinations of 2:1 (h:v) or flatter are considered grossly stable. Cut slopes should be observed by the engineering geologist or his representative during grading, but are anticipated to be stable.

Stabilization Fills

Currently, stabilization fills will not be required for cut slopes in the bedrock. Our engineering geologist or his representative should be called to evaluate all slopes during grading. In the event that unfavorable geologic conditions are encountered, recommendations for stabilization fills or flatter slopes will be provided.

Fill Over Cut Slopes

The fill portion of fill over cut slopes should not be constructed until the cut portion of the slope has been cut to finish grade. The earth materials and geologic structure exposed along the cut slope should be evaluated with regard to suitability for compacted fills or foundations and for stability. If the cut materials are determined to be competent, then the construction of the keyway and subdrain system may commence or additional remedial recommendations will be provided.

Temporary Backcuts

It is the responsibility of the grading contractor to follow all Cal-OSHA requirements with regard to excavation safety. Where existing developments are upslope, adequate slope stability to protect those developments must be maintained. Temporary backcuts will be required to accomplish removals of unsuitable materials and possibly, to perform canyon removals, stabilization fills, and/or keyways. Backcuts should be excavated at a gradient of 1:1 (h:v) or flatter. Flatter backcuts may be required where geologic structure or earth materials are unfavorable. It is imperative that grading schedules minimize the exposure time of the unsupported excavations. All excavations should be stabilized within 30 days of initial excavation.

Cut/Fill Transitions

Cut/fill transitions should be eliminated from all building areas where the depth of fill placed within the "fill" portion exceeds proposed footing depths. This is to diminish distress to structures resulting from excessive differential settlement. The entire foundation of each structure should be founded on a uniform bearing material. This should be accomplished by overexcavating the "cut" portion and replacing the excavated materials as properly compacted fill. Refer to the following table for recommended depths of overexcavation.

DEPTH OF FILL ("fill" portion)	DEPTH OF OVEREXCAVATION ("cut" portion)
Up to 5 feet	Equal Depth
5 to 10 feet	5 feet
Greater than 10 feet	One-half the thickness of fill placed on the "fill" portion (10 feet maximum)

Overexcavation of the "cut" portion should extend beyond the building perimeter a horizontal distance equal to the depth of overexcavation or a minimum of 5 feet, whichever is greater.

Cut Areas

In cut areas, an area a minimum of 5 feet beyond the footprint of the proposed structures should overexcavated until; competent bottoms are achieved; to a minimum 3 feet below the proposed foundations; or per the Overexcavation Table above; (whichever is greater) and replaced with compacted fill. Final determination of areas that require overexcavation should be determined in the field by a representative of Earth Strata Geotechnical Services.

Shrinkage, Bulking and Subsidence

Volumetric changes in earth material quantities will occur when poorly consolidated earth materials are replaced with properly compacted fill. Estimates of the percent shrinkage/bulking factors for the various geologic units observed on the subject property are based on in-place densities and on the estimated average percent of relative compaction achieved during grading.

GEOLOGIC UNIT	SHRINKAGE (%)
Topsoil	10 to 15
Pauba Formation	0 to 5

Subsidence from scarification and recompaction of exposed bottom surfaces is expected to be negligible to approximately 0.01 foot.

The estimates of shrinkage/bulking and subsidence are intended as an aid for project engineers in determining earthwork quantities. Since many variables can affect the accuracy of these estimates, they should be used with caution and contingency plans should be in place for balancing the project.

Geotechnical Observations

Clearing operations, removal of unsuitable materials, and general grading procedures should be observed by the project geotechnical consultant or his representative. No compacted fill should be placed without observations by the geotechnical consultant or his representative to verify the adequacy of the removals.

The project geotechnical consultant or his representative should be present to observe grading operations and to check that minimum compaction requirements and proper lift thicknesses are being met, as well as to verify compliance with the other recommendations presented herein.

Post Grading Considerations

Slope Landscaping and Maintenance

Adequate slope and building pad drainage is essential for the long term performance of the subject site. The gross stability of graded slopes should not be adversely affected, provided all drainage provisions are properly constructed and maintained. Engineered slopes should be landscaped with deep rooted, drought tolerant maintenance free plant species, as recommended by the project landscape architect.

Site Drainage

Control of site drainage is important for the performance of the proposed project. Roof gutters are recommended for the proposed structures. Pad and roof drainage should be collected and transferred to driveways, adjacent streets, storm-drain facilities, or other locations approved by the building official in non-erosive drainage devices. Drainage should not be allowed to pond on the pad or against any foundation or retaining wall. Drainage should not be allowed to flow uncontrolled over any descending slope. Planters located within retaining wall backfill should be sealed to prevent moisture intrusion into the backfill. Planters located next to structures should be sealed to the depth of the footings. Drainage control devices require periodic cleaning, testing and maintenance to remain effective.

At a minimum, pad drainage should be designed at the minimum gradients required by the CBC. To divert water away from foundations, the ground surface adjacent to foundations should also be graded at the minimum gradients required per the CBC.

Utility Trenches

All utility trench backfill should be compacted at near optimum moisture to a minimum of 90 percent of the maximum dry density determined by ASTM test method D 1557. For utility trench backfill within pavement areas the upper 6 inches of subgrade materials should be compacted to 95 percent of the maximum dry density determined by ASTM D 1557. This includes within the street right-of-ways, utility easements, under footings, sidewalks, driveways and building floor slabs, as well as within or adjacent to any slopes. Backfill should be placed in approximately 6 to 8 inch maximum loose lifts and then mechanically compacted with a hydro-hammer, rolling with a sheepsfoot, pneumatic tampers, or similar equipment. The utility trenches should be tested by the project geotechnical engineer or their representative to verify minimum compaction requirements are obtained.

In order to minimize the penetration of moisture below building slabs, all utility trenches should be backfilled with compacted fill, lean concrete or concrete slurry where they undercut the perimeter foundation. Utility trenches that are proposed parallel to any building footings (interior and/or exterior trenches), should not be located within a 1:1 (h:v) plane projected downward from the outside bottom edge of the footing.

SEISMIC DESIGN CONSIDERATIONS

Ground Motions

Structures are required to be designed and constructed to resist the effects of seismic ground motions as provided in the 2016 California Building Code Section 1613. The design is dependent on the site class, occupancy category I, II, III, or IV, mapped spectral accelerations for short periods (S_S), and mapped spectral acceleration for a 1-second period (S_1).

In order for structural design to comply with the 2016 CBC, the USGS "US Seismic Design Maps" online tool was used to compile spectral accelerations for the subject property based on data and maps jointly compiled by the United States Geological Survey (USGS) and the California Geological Survey (CGS). The data found in the following table is based on the Maximum Considered Earthquake (MCE) with 5% damped ground motions having a 2% probability of being exceeded in 50 years (2,475 year return period).

The seismic design coefficients were determined by a combination of the site class, mapped spectral accelerations, and occupancy category. The following seismic design coefficients should be implemented during design of the proposed structures. Summaries of the Seismic Hazard Deaggregation graphs and test data are presented in Appendix D.

2016 CBC	FACTOR
Site Location	Latitude: 33.540045˚ (North) Longitude: -117.011894˚(West)
Site Class	D
Mapped Spectral Accelerations for short periods, S_S	1.500
Mapped Spectral Accelerations for 1-Second Period, S_1	0.600
Maximum Considered Earthquake Spectral Response Acceleration for Short Periods, S_{MS}	1.500
Maximum Considered Earthquake Spectral Response Acceleration for 1-Second Period, S_{M1}	0.900
Design Spectral Response Acceleration for Short Periods, S_{DS}	1.000
Design Spectral Response Acceleration for 1-Second Period, S_{D1}	0.600
Seismic Design Category	D
Importance Factor Based on Occupancy Category	II

We performed the probabilistic seismic hazard assessment for the site in accordance with the 2016 CBC, Section 1803.5.11 and 1803.5.12. The probabilistic seismic hazard maps and data files were jointly prepared by the United States Geological Survey (USGS) and the California Geological Survey (CGS) and can be found at the CGS Probabilistic Seismic Hazards Mapping Ground Motion Page. Actual ground shaking intensities at the site may be substantially higher or lower based on complex variables such as the near source directivity effects, depth and consistency of earth materials, topography, geologic structure, direction of fault rupture, and seismic wave reflection, refraction, and attenuation rates. The mean peak ground acceleration was calculated to be 0.505g.

Secondary Seismic Hazards

Secondary effects of seismic shaking considered as potential hazards include several types of ground failure as well as induced flooding. Different types of ground failure, which could occur as a consequence of severe ground shaking at the site, include landslides, ground lurching, shallow ground rupture, and liquefaction/lateral spreading. The probability of occurrence of each type of ground failure depends on the severity of the earthquake, distance from faults, topography, the state of subsurface earth materials, groundwater conditions, and other factors. Based on our experience, subsurface exploration, and laboratory testing, all of the above secondary effects of seismic activity are considered unlikely.

Seismically induced flooding is normally a consequence of a tsunami (seismic sea wave), a seiche (i.e., a wave-like oscillation of surface water in an enclosed basin that may be initiated by a strong earthquake) or failure of a major reservoir or retention system up gradient of the site. Since the site is at an elevation of more than 1,500 feet above mean sea level and is located more than 30 miles inland from the nearest coastline of the Pacific Ocean, the potential for seismically induced flooding due to a tsunami is considered nonexistent. Since no enclosed bodies of water lie adjacent to or up gradient of the site, the likelihood for induced flooding due to a dam failure or a seiche overcoming the dam's freeboard is considered nonexistent.

Liquefaction and Lateral Spreading

Liquefaction occurs as a result of a substantial loss of shear strength or shearing resistance in loose, saturated, cohesionless earth materials subjected to earthquake induced ground shaking. Potential impacts from liquefaction include loss of bearing capacity, liquefaction related settlement, lateral movements, and surface manifestation such as sand boils. Seismically induced settlement occurs when loose sandy soils become denser when subjected to shaking during an earthquake. The three factors determining whether a site is likely to be subject to liquefaction include seismic shaking, type and consistency of earth materials, and groundwater level. The proposed structures will be supported by compacted fill and competent bedrock, with groundwater at a depth of approximately 437 feet. As such, the potential for earthquake induced liquefaction and lateral spreading beneath the proposed structures is considered very low to remote due to the recommended compacted fill, relatively low groundwater level, and the dense nature of the deeper onsite earth materials.

TENTATIVE FOUNDATION DESIGN RECOMMENDATIONS

General

Provided grading is performed in accordance with the recommendations of this report, shallow foundations are considered feasible for support of the proposed structures. Tentative foundation recommendations are provided herein and graphic presentations of relevant recommendations may also be included on the enclosed map.

Allowable Bearing Values

An allowable bearing value of 2,000 pounds per square foot (psf) is recommended for design of 24-inch square pad footings and 12-inch-wide continuous footings founded at a minimum depth of 12 inches below the lowest adjacent final grade. This value may be increased by 20 percent for each additional 1-foot of width and/or depth to a maximum value of 2,500 psf. Recommended allowable bearing values include both dead and frequently applied live loads and may be increased by one third when designing for short duration wind or seismic forces.

Settlement

Based on the settlement characteristics of the earth materials that underlie the building sites and the anticipated loading, we estimate that the maximum total settlement of the footings will be less than approximately ¾ inch. Differential settlement is expected to be about ½ inch over a horizontal distance of approximately 20 feet, for an angular distortion ratio of 1:480. It is anticipated that the majority of the settlement will occur during construction or shortly after the initial application of loading.

The above settlement estimates are based on the assumption that the grading and construction are performed in accordance with the recommendations presented in this report and that the project geotechnical consultant will observe or test the earth material conditions in the footing excavations.

Lateral Resistance

Passive earth pressure of 250 psf per foot of depth to a maximum value of 2,500 psf may be used to establish lateral bearing resistance for footings. For areas coved with hardscape, passive earth pressure may be taken from the surface. For areas without hardscape, the first 3 feet of the soil profile must be neglected when calculating passive earth pressure. A coefficient of friction of 0.36 times the dead load forces may be used between concrete and the supporting earth materials to determine lateral sliding resistance. The above values may be increased by one-third when designing for short duration wind or seismic forces. When combining passive and friction for lateral resistance, the passive component should be reduced by one third. In no case shall the lateral sliding resistance exceed one-half the dead load for clay, sandy clay, sandy silty clay, silty clay, and clayey silt.

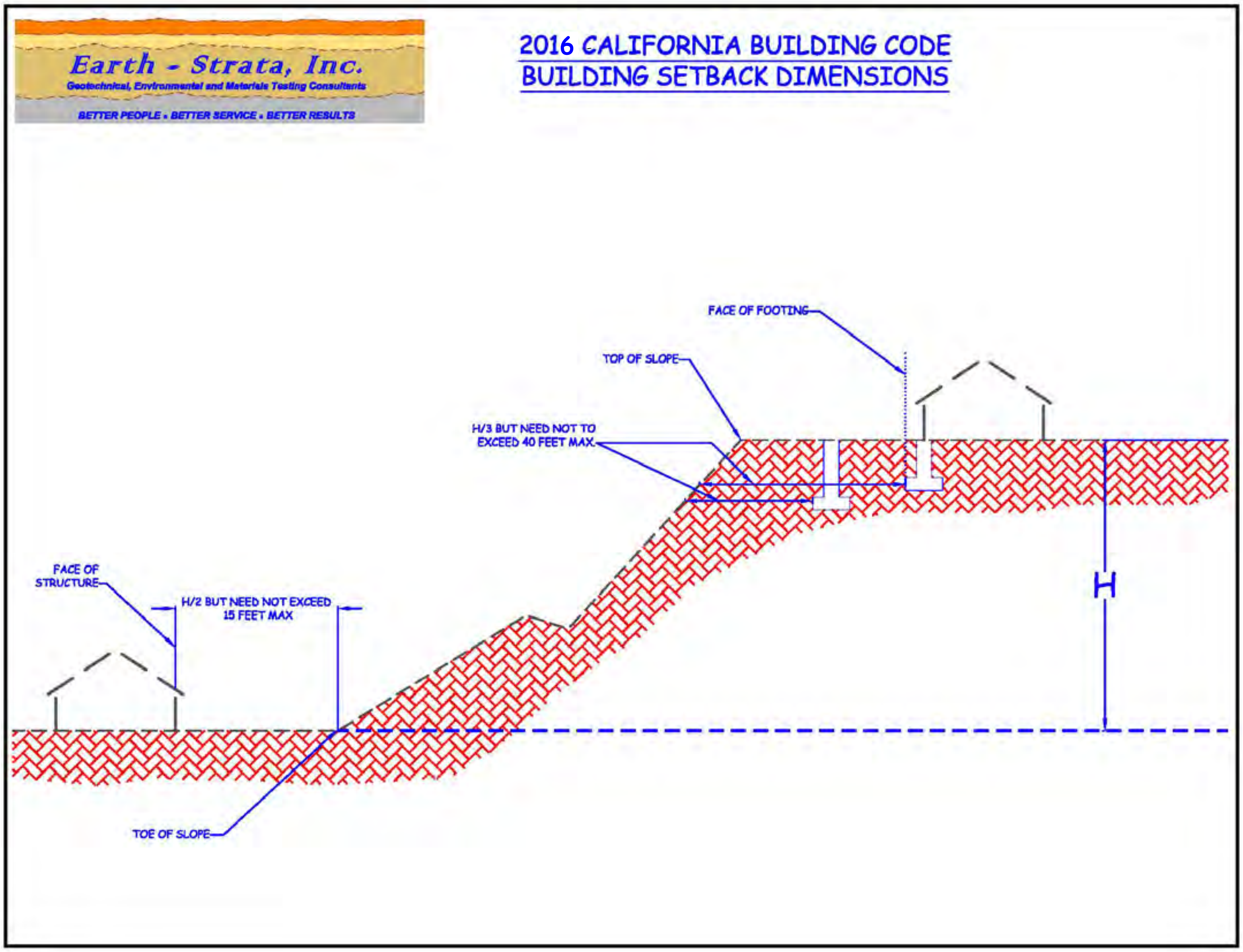
The above lateral resistance values are based on footings for an entire structure being placed directly against either compacted fill or competent bedrock.

Structural Setbacks and Building Clearance

Structural setbacks are required per the 2016 California Building Code (CBC). Additional structural setbacks are not required due to geologic or geotechnical conditions within the site. Improvements constructed in close proximity to natural or properly engineered and compacted slopes can, over time, be affected by natural processes including gravity forces, weathering, and long term secondary settlement. As a result, the CBC requires that buildings and structures be setback or footings deepened to resist the influence of these processes.

For structures that are planned near ascending and descending slopes, the footings should be embedded to satisfy the requirements presented in the CBC, Section 1808.7 as illustrated in the following Foundation Clearances from Slopes diagram.

FOUNDATION CLEARANCES FROM SLOPES



When determining the required clearance from ascending slopes with a retaining wall at the toe, the height of the slope shall be measured from the top of the wall to the top of the slope.

Foundation Observations

In accordance with the 2016 CBC and prior to the placement of forms, concrete, or steel, all foundation excavations should be observed by the geologist, engineer, or his representative to verify that they have been excavated into competent bearing materials. The excavations should be per the approved plans, moistened, cleaned of all loose materials, trimmed neat, level, and square. Any moisture softened earth materials should be removed prior to steel or concrete placement.

Earth materials from foundation excavations should not be placed in slab on grade areas unless the materials are tested for expansion potential and compacted to a minimum of 90 percent of the maximum dry density.

Expansive Soil Considerations

Preliminary laboratory test results indicate onsite earth materials exhibit an expansion potential of **VERY LOW** as classified in accordance with 2016 CBC Section 1803.5.3 and ASTM D4829-03. Additional, testing for expansive soil conditions should be conducted upon completion of rough grading. The following recommendations should be considered the very minimum requirements, for the earth materials tested. It is common practice for the project architect or structural engineer to require additional slab thickness, footing sizes, and/or reinforcement.

Very Low Expansion Potential (Expansion Index of 20 or Less)

Our laboratory test results indicate that the earth materials onsite exhibit a **VERY LOW** expansion potential as classified in accordance with 2016 CBC Section 1803.5.3 and ASTM D4829-03. Since the onsite earth materials exhibit expansion indices of 20 or less, the design of slab on ground foundations is exempt from the procedures outlined in Section 1808.6.1 or 1808.6.2.

Footings

- Exterior continuous footings may be founded at the minimum depths below the lowest adjacent final grade (i.e. 12-inch minimum depth for one-story, 18-inch minimum depth for two-story, and 24-inch minimum depth for three-story construction). Interior continuous footings for one-, two-, and three-story construction may be founded at a minimum depth of 12 inches below the lowest adjacent final grade. All continuous footings should have a minimum width of 12, 15, and 18 inches, for one-, two-, and three-story structures, respectively per Table 1809.7 of the 2016 CBC, and should be reinforced with a minimum of two (2) No. 4 bars, one (1) top and one (1) bottom.

- Exterior pad footings intended to support roof overhangs, such as second story decks, patio covers and similar construction should be a minimum of 24 inches square and founded at a minimum depth of 18 inches below the lowest adjacent final grade. No special reinforcement of the pad footings will be required.

Building Floor Slabs

- Building floor slabs should be a minimum of 4 inches thick and reinforced with a minimum of No. 3 bars spaced a maximum of 24 inches on center, each way. All floor slab reinforcement should be supported on concrete chairs or bricks to ensure the desired placement at mid-depth.

- Interior floor slabs, within living or moisture sensitive areas, should be underlain by a minimum 10-mil thick moisture/vapor barrier to help reduce the upward migration of moisture from the underlying earth materials. The moisture/vapor barrier used should meet the performance standards of an ASTM E 1745 Class A material, and be properly installed in accordance with ACI publication 318-05. It is the responsibility of the contractor to ensure that the moisture/vapor barriers are free of openings, rips, or punctures prior to placing concrete. As an option for additional moisture reduction, higher strength concrete, such as a minimum 28-day compressive strength of 5,000 pounds per square inch (psi) may be used. Ultimately, the design of the moisture/vapor barrier system and recommendations for concrete placement and curing are the purview of the foundation engineer, taking into consideration the project requirements provided by the architect and owner.

- Garage floor slabs should be a minimum of 4 inches thick and should be reinforced in a similar manner as living area floor slabs. Garage floor slabs should be placed separately from adjacent wall footings with a positive separation maintained with ⅜ inch minimum felt expansion joint materials and quartered with weakened plane joints. A 12-inch-wide turn down founded at the same depth as adjacent footings should be provided across garage entrances. The turn down should be reinforced with a minimum of two (2) No. 4 bars, one (1) top and one (1) bottom.

- The subgrade earth materials below all floor slabs should be pre-watered to promote uniform curing of the concrete and minimize the development of shrinkage cracks, prior to placing concrete. The pre-watering should be verified by Earth Strata Geotechnical Services during construction.

Corrosivity

Corrosion is defined by the National Association of Corrosion Engineers (NACE) as "a deterioration of a substance or its properties because of a reaction with its environment." From a geotechnical viewpoint, the "substances" are the reinforced concrete foundations or buried metallic elements (not surrounded by concrete) and the "environment" is the prevailing earth materials in contact with them. Many factors can contribute to corrosivity, including the presence of chlorides, sulfates, salts, organic materials, different oxygen levels, poor drainage, different soil types, and moisture content. It is not considered practical or realistic to test for all of the factors which may contribute to corrosivity.

The potential for concrete exposure to chlorides is based upon the recognized Caltrans reference standard "Bridge Design Specifications", under Subsection 8.22.1 of that document, Caltrans has determined that "Corrosive water or soil contains more than 500 parts per million (ppm) of chlorides". Based on limited preliminary laboratory testing, the onsite earth materials have chloride contents *less* than 500 ppm. As such, specific requirements resulting from elevated chloride contents are not required.

Specific guidelines for concrete mix design are provided in 2016 CBC Section 1904.1 and ACI 318, Section 4.3 Table 4.3.1 when the soluble sulfate content of earth materials exceeds 0.1 percent by weight. Based on limited preliminary laboratory testing, the onsite earth materials are classified in accordance with Table 4.3.1 as having a *negligible* sulfate exposure condition. Therefore, structural concrete in contact with onsite earth materials should utilize Type I or II.

Based on our laboratory testing of resistivity, the onsite earth materials in contact with buried steel should be considered *mildly to moderately corrosive*. Additionally, pH values below 9.7 are recognized as being corrosive to most common metallic components including, copper, steel, iron, and aluminum. The pH values for the earth materials tested were *lower* than 9.7. Therefore, any steel or metallic materials that are exposed to the earth materials should be encased in concrete or other measures should be taken to provide corrosion protection.

The preliminary test results for corrosivity are based on limited samples, and the initiation of grading may blend various earth materials together. This blending or imported material could alter and increase the detrimental properties of the onsite earth materials. Accordingly, additional testing for chlorides and sulfates along with testing for pH and resistivity should be performed upon completion of grading. Laboratory test results are presented in Appendix C.

RETAINING WALLS

Active and At-Rest Earth Pressures

Foundations may be designed in accordance with the recommendations provided in the Tentative Foundation Design Recommendation section of this report. The following table provides the minimum recommended equivalent fluid pressures for design of retaining walls a maximum of 8 feet high. The active earth pressure should be used for design of unrestrained retaining walls, which are free to tilt slightly. The at-rest earth pressure should be used for design of retaining walls that are restrained at the top, such as basement walls, curved walls with no joints, or walls restrained at corners. For curved walls, active pressure may be used if tilting is acceptable and construction joints are provided at each angle point and at a minimum of 15 foot intervals along the curved segments.

MINIMUM STATIC EQUIVALENT FLUID PRESSURES (pcf)		
PRESSURE TYPE	BACKSLOPE CONDITION	
	LEVEL	2:1 (h:v)
Active Earth Pressure	40	63
At-Rest Earth Pressure	60	95

The retaining wall parameters provided do not account for hydrostatic pressure behind the retaining walls. Therefore, the subdrain system is a very important part of the design. All retaining walls should be designed to resist surcharge loads imposed by other nearby walls, structures, or vehicles should be added to the above earth pressures, if the additional loads are being applied within a 1.5:1 (h:v) plane projected up from the heel of the retaining wall footing. As a way of minimizing surcharge loads and the settlement potential of nearby buildings, the footings for the building can be deepened below the 1.5:1 (h:v)plane projected up from the heel of the retaining wall footing.

Upon request and under a separate scope of work, more detailed analyses can be performed to address equivalent fluid pressures with regard to stepped retaining walls, actual retaining wall heights, actual backfill inclinations, specific backfill materials, higher retaining walls requiring earthquake design motions, etc.

Subdrain System

We recommend a perforated pipe and gravel subdrain system be provided behind all proposed retaining walls to prevent the buildup of hydrostatic pressure behind the proposed retaining walls. The perforated pipe should consist of 4-inch minimum diameter Schedule 40 PVC or ABS SDR-35, placed with the perforations facing down. The pipe should be surrounded by 1 cubic foot per foot of ¾- or 1½ inch open graded gravel wrapped in filter fabric. The filter fabric should consist of Mirafi 140N or equivalent to prevent infiltration of fines and subsequent clogging of the subdrain system.

In lieu of a perforated pipe and gravel subdrain system, weep holes or open vertical masonry joints may be provided in the lowest row of block exposed to the air to prevent the buildup of hydrostatic pressure behind the proposed retaining walls. Weep holes should be a minimum of 3 inches in diameter and provided at intervals of at least every 6 feet along the wall. Open vertical masonry joints should be provided at a minimum of 32 inch intervals. A continuous gravel fill, a minimum of 1 cubic foot per foot, should be placed behind the weep holes or open masonry joints. The gravel should be wrapped in filter fabric consisting of Mirafi 140N or equivalent.

The retaining walls should be adequately coated on the backfilled side of the walls with a proven waterproofing compound by an experienced professional to inhibit infiltration of moisture through the walls.

Temporary Excavations

All excavations should be made in accordance with Cal-OSHA requirements. Earth Strata Geotechnical Services is not responsible for job site safety.

Retaining Wall Backfill

Retaining wall backfill materials should be approved by the geotechnical engineer or his representative prior to placement as compacted fill. Retaining wall backfill should be placed in lifts no greater than 6 to 8 inches, watered or air dried as necessary to achieve near optimum moisture contents. All retaining wall backfill should be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D 1557. Retaining wall backfill should be capped with a paved surface drain.

CONCRETE FLATWORK

Thickness and Joint Spacing

Concrete sidewalks and patio type slabs should be at least 3½ inches thick and provided with construction or expansion joints every 6 feet or less, to reduce the potential for excessive cracking. Concrete driveway slabs should be at least 4 inches thick and provided with construction or expansion joints every 10 feet or less.

Subgrade Preparation

In order to reduce the potential for unsightly cracking, subgrade earth materials underlying concrete flatwork should be compacted at near optimum moisture to a minimum of 90 percent of the maximum dry density determined by ASTM test method D 1557 and then moistened to at least optimum or slightly above optimum moisture content. This moisture should extend to a depth of at least 12 inches below subgrade and be maintained prior to placement of concrete. Pre-watering of the earth materials prior to placing concrete will promote uniform curing of the concrete and minimize the development of shrinkage cracks. The project geotechnical engineer or his representative should verify the density and moisture content of the earth materials and the depth of moisture penetration prior to placing concrete.

Cracking within concrete flatwork is often a result of factors such as the use of too high a water to cement ratio and/or inadequate steps taken to prevent moisture loss during the curing of the concrete. Concrete distress can be reduced by proper concrete mix design and proper placement and curing of the concrete. Minor cracking within concrete flatwork is normal and should be expected.

GRADING PLAN REVIEW AND CONSTRUCTION SERVICES

This report has been prepared for the exclusive use of **Koll Custom Homes** and their authorized representative. It likely does not contain sufficient information for other parties or other uses. Earth Strata Geotechnical Services should be engaged to review the final design plans and specifications prior to construction. This is to verify that the recommendations contained in this report have been properly incorporated into the project plans and specifications. Should Earth Strata Geotechnical Services not be accorded the opportunity to review the project plans and specifications, we are not responsibility for misinterpretation of our recommendations.

We recommend that Earth Strata Geotechnical Services be retained to provide geologic and geotechnical engineering services during grading and foundation excavation phases of the work. In order to allow for design changes in the event that the subsurface conditions differ from those anticipated prior to construction.

Earth Strata Geotechnical Services should review any changes in the project and modify and approve in writing the conclusions and recommendations of this report. This report and the drawings contained within are intended for design input purposes only and are not intended to act as construction drawings or specifications. In the event that conditions encountered during grading or construction operations appear to be different than those indicated in this report, this office should be notified immediately, as revisions may be required.

REPORT LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists, practicing at the time and location this report was prepared. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

Earth materials vary in type, strength, and other geotechnical properties between points of observation and exploration. Groundwater and moisture conditions can also vary due to natural processes or the works of man on this or adjacent properties. As a result, we do not and cannot have complete knowledge of the subsurface conditions beneath the subject property. No practical study can completely eliminate uncertainty with regard to the anticipated geotechnical conditions in connection with a subject property. The conclusions and recommendations within this report are based upon the findings at the points of observation and are subject to confirmation by Earth Strata Geotechnical Services based on the conditions revealed during grading and construction.

This report was prepared with the understanding that it is the responsibility of the owner or their representative, to ensure that the conclusions and recommendations contained herein are brought to the attention of the other project consultants and are incorporated into the plans and specifications. The owners' contractor should properly implement the conclusions and recommendations during grading and construction, and notify the owner if they consider any of the recommendations presented herein to be unsafe or unsuitable.

APPENDIX A

REFERENCES

APPENDIX A

References

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National Association of Corrosion Engineers, 1984, *Corrosion Basics An Introduction*, page 191.

Southern California Earthquake Center (SCEC), 1999, *Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Liquefaction Hazards in California,* March.

APPENDIX B

EXPLORATORY LOGS

Geotechnical Test Pit Log TP-1

Date: October 5, 2017	**Project Name: Monte de Oro and De Portola Winery** **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: Backhoe**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0		0-5]				**Topsoil**
					SM	Silty SAND; dark brown, dry to slightly moist, medium dense, fine to coarse
						sand with clay
						Quaternary Pauba Formation (Qps)
						Silty SANDSTONE; yellowish brown, slightly moist, dense, fine to coarse sand with
5						trace clay
						Practical Refusal at 5 feet
						Total Depth: 5 feet
						No Groundwater
10						
15						
20						
25						
30						

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Geotechnical Test Pit Log TP-2

Date: October 5, 2017	**Project Name: Monte de Oro and De Portola Winery** **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: Backhoe**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil**
					SC	Clayey SAND; dark brown, slightly moist, dense, fine to coarse sand
						Quaternary Pauba Formatin (Qps)
					SC	Clayey SAND; dark brown, slgihtly moist, dense, fien to coarse sand
						Practical Refusal at 4 feet
5						Total Depth: 4 feet
						No Groundwater
10						
15						
20						
25						
30						

Geotechnical Test Pit Log TP-3

Date: October 5, 2017	**Project Name: Monte de Oro and De Portola Winery** **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: Backhoe**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil**
					SC	Clayey SAND; dark brown, slightly moist, dense, fine to coarse sand
						Quaternary Pauba Formatin (Qps)
					SC	Clayey SAND; dark brown, slgihtly moist, dense, fine to coarse sand
						Practical Refusal at 4.5 feet
5						Total Depth: 4.5 feet
						No Groundwater
10						
15						
20						
25						
30						

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Geotechnical Boring Log B-1

Date: October 6, 2017	**Project Name: Monte de Oro and De Portola Winery** **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil**
					SC	Clayey SAND; dark brown, slightly moist, medium dense, fine to coarse sand
	27	2.5'	93.1	5.8		**Quaternary Pauba Formation (Qps)**
						Silty SANDSTONE; dark yellowish brown, dry, very dense, fine to coarse sand
						with trace clay
5	57	5'	113.9	10.0		
	59	7.5'	111.3	5.5		
10	78/10.5"	10'	107.4	9..3		Dark yellowish brown below 10 feet
						Total Depth: 12.5 feet
						No Groundwater
15						
20						
25						
30						

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Geotechnical Boring Log B-2

Date: October 7, 2017	Project Name: Monte de Oro and De Portola Winery — Page: 1 of 1
Project Number: 171857-10A	Logged By: JF
Drilling Company: Drilling It	Type of Rig: B-61
Drive Weight (lbs): 140	Drop (in): 30 — Hole Diameter (in): 8
Top of Hole Elevation (ft): See Map	Hole Location: See Geotechnical Map

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil**
					SM	Silty SAND; light brown, loose, dry, fine to coarse sand
	23	2.5'	104.6	3.3		**Quaternary Pauba Formation (Qps)**
					SM	Silty SAND; dark orange brown, slightly moist, medium dense, fine to coarse sand
5	18	5'	97.1	4.6		
	25	7.5'	108.8	7.9	SP-SC	Poorly-Graded SAND with Clay; dark orange brown, slightly moist, medium dense, fine to coarse sand
10	34	10'	105.9	8.2		Dense below 10 feet
15	51	15'	116.9	7.4		Very dense below 15 feet
20	61	20'	113.2	8.2		
						Total Depth: 21.5 feet
						No Groundwater
25						
30						

Geotechnical Boring Log B-3

Date: October 7, 2017	**Project Name: Monte de Oro and De Portola Winery** **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil**
					SM	Silty SAND; light brown, dry, loose, fine to coarse sand
	36	2.5'	106.3	3.2		**Quaternary Pauba Formation (Qps)**
					SM	Silty SAND; light brown, dry, dense, fine to coarse sand with trace clay
5	62	5'	109.4	3.4		Very dense below 5 feet
	38	7.5'	106.8	4.7		Dark orange brown, slightly moist, dense below 7.5 feet
10	35	10'	99.9	5.4		
15	69	15'	105.7	6.5		Very dense below 15 feet
						Total Depth: 16.5 feet
						No Groundwater
20						
25						
30						

Geotechnical Boring Log B-4

Date: October 13, 2017	**Project Name: Monte de Oro and De Portola Winery** **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil**
					SM	Silty SAND; light brown, dry, loose, fine to coarse sand with trace clay
	23	2.5'	100.8	2.5		**Quaternary Pauba Formation (Qps)**
						Silty SAND; light brown, dry, medium dense, fine to coarse sand with trace clay
5	41	5'	114.3	4.7		Silty SANDSTONE; medium brown, dry, dense, fine to coarse sand with clay
	40	7.5'	107.0	4.5		
10	52	10'	103.4	7.2		
	97/11"	12.5'	107.0	4.1	SP-SM	Poorly-Graded SAND with Silt; medium brown, dry, very dense, fine with coarse sand with trace gravel
15						Total Depth: 14 feet
						No Groundwater
20						
25						
30						

42184 Remington Avenue, Temecula, CA 92590

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Geotechnical Boring Log B-5

Date: October 13, 2017	**Project Name: Monte de Oro and De Portola Winery** **Page: 1 of 1**
Project Number: 171857-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Topsoil**
					SM	Silty SAND; light brown, dry, loose, fine to coarse sand with trace clay
	34	2.5'	105.1	2.5		**Quaternary Pauba Formation (Qps)**
						Silty SAND; light brown, dry, dense, fine to coarse sand with trace clay
5	33	5'	108.8	3.6		
	13	7.5'	102.4	4.6		Medium dense below 7 feet
10	23	10'	93.5	2.1		
	27	12.5'	99.8	4.1	SP-SM	Poorly-Graded SAND with Silt; medium brown, dry, very dense, fine with coarse sand with trace gravel
15						Total Depth: 14 feet
						No Groundwater
20						
25						
30						

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APPENDIX C

LABORATORY PROCEDURES AND TEST RESULTS

APPENDIX C

Laboratory Procedures and Test Results

Laboratory testing provided quantitative and qualitative data involving the relevant engineering properties of the representative earth materials selected for testing. The representative samples were tested in general accordance with American Society for Testing and Materials (ASTM) procedures and/or California Test Methods (CTM).

Soil Classification: Earth materials encountered during exploration were classified and logged in general accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) of ASTM D 2488. Upon completion of laboratory testing, exploratory logs and sample descriptions were reconciled to reflect laboratory test results with regard to ASTM D 2487.

Moisture and Density Tests: For select samples moisture content was determined using the guidelines of ASTM D 2216 and dry density determinations were made using the guidelines of ASTM D 2937. These tests were performed on relatively undisturbed samples and the test results are presented on the exploratory logs.

Maximum Density Tests: The maximum dry density and optimum moisture content of representative samples were determined using the guidelines of ASTM D 1557. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT (%)
TP-1 @ 0-4 feet	Clayey SAND	118.5	10.5
B-2 @ 5-8 feet	Silty SAND	127.0	7.5

Expansion Index: The expansion potential of representative samples was evaluated using the guidelines of ASTM D 4829. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	EXPANSION INDEX	EXPANSION POTENTIAL
TP-1 @ 0-4 feet	Clayey SAND	6	Very Low
B-2 @ 5-8 feet	Silty SAND	5	Very Low

Minimum Resistivity and pH Tests: Minimum resistivity and pH Tests of select samples were performed using the guidelines of CTM 643. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	pH	MINIMUM RESISTIVITY (ohm-cm)
TP-1 @ 0-4 feet	Clayey SAND	8.6	2,000
B-2 @ 5-8 feet	Silty SAND	8.2	6,300

Soluble Sulfate: The soluble sulfate content of select samples was determined using the guidelines of CTM 417. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	SULFATE CONTENT (% by weight)	SULFATE EXPOSURE
TP-1 @ 0-4 feet	Clayey SAND	0.001	Negligible
B-2 @ 5-8 feet	Silty SAND	No Detection	Negligible

Chloride Content: Chloride content of select samples was determined using the guidelines of CTM 422. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	CHLORIDE CONTENT (ppm)
TP-1 @ 0-4 feet	Clayey SAND	40
B-2 @ 5-8 feet	Silty SAND	30

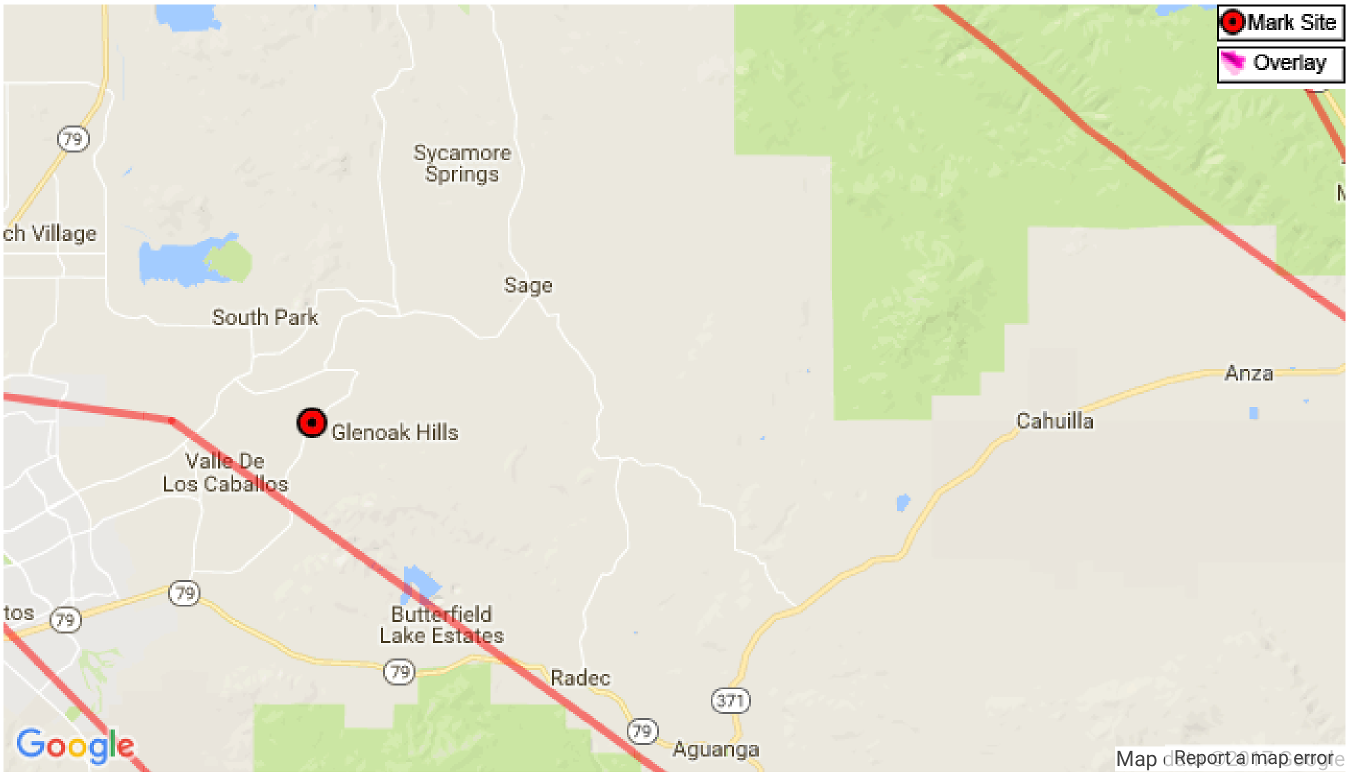
APPENDIX D

SEISMICITY

Caltrans ARS Online (v2.3.09)

This web-based tool calculates both deterministic and probabilistic acceleration response spectra for any location in California based on criteria provided in *Appendix B of Caltrans Seismic Design Criteria*. More...

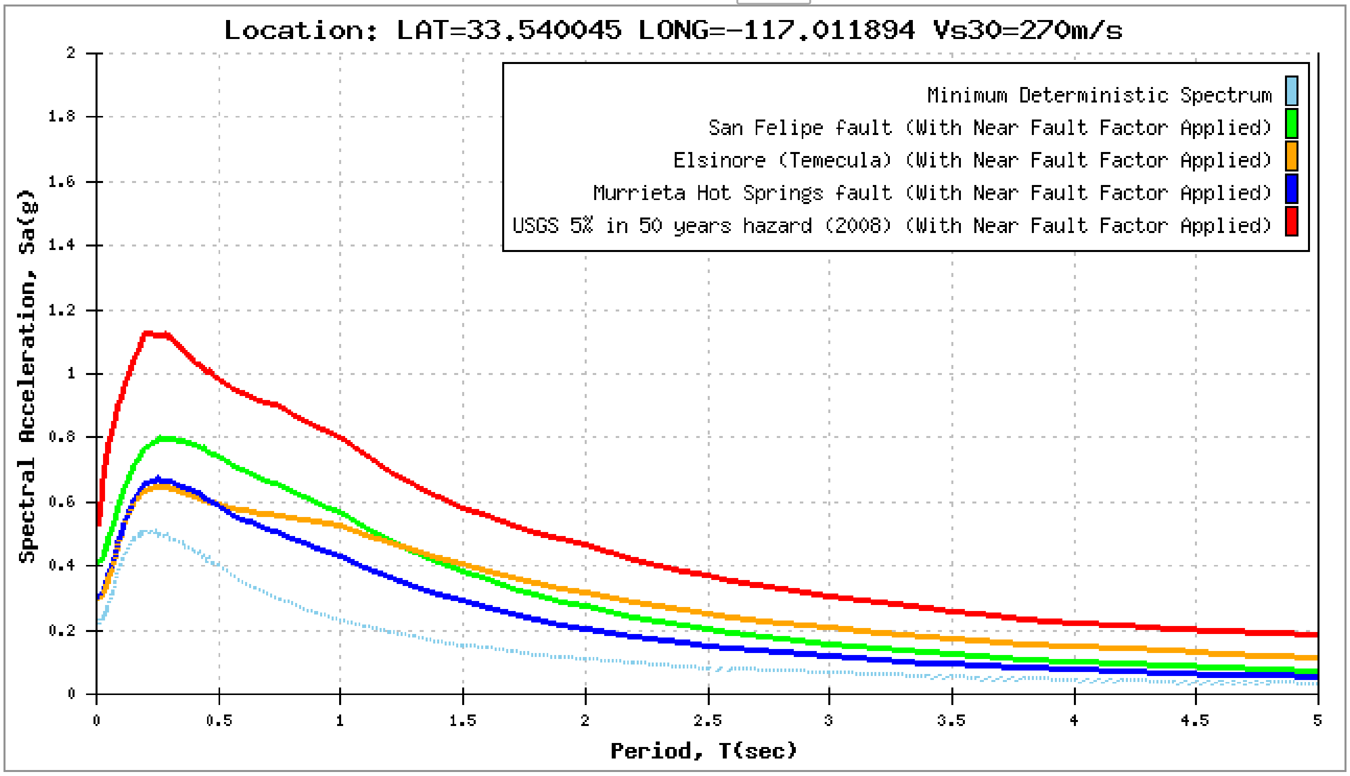
SELECT SITE LOCATION



Latitude: 33.540045 Longitude: -117.011894 Vs30: 270 m/s Calculate

CALCULATED SPECTRA

Display Curves: 3 ▼



Tabular Data | Envelope Only | Hide Near Fault | Axis Scale | Show Basin

Apply Near Fault Adjustment To:

NOTE: Caltrans SDC requires application of a Near Fault Adjustment factor for sites less than 25 km (Rrup) from the causative fault.

☑ Deterministic Spectrum Using

2.50	Km San Felipe fault
11.93	Km Elsinore (Temecula)
4.45	Km Murrieta Hot Springs fault

☑ Probabilistic Spectrum Using

2.50 Km (Recommend Performing Deaggregation To Verify)

◉ Show Spectrum with Adjustment Only

○ Show Spectrum with and without near fault Adjustment

OK

U.S. Geological Survey - Earthquake Hazards Program

2008 National Seismic Hazard Maps - Source Parameters

New Search

Distance in Kilometers	Name	State	Pref Slip Rate (mm/yr)	Dip (degrees)	Dip Dir	Slip Sense	Rupture Top (km)	Rupture Bottom (km)	Length (km)
11.92	Elsinore;GI+T+J+CM	CA	n/a	86	NE	strike slip	0	16	195
11.92	Elsinore;T+J	CA	n/a	86	NE	strike slip	0	17	127
11.92	Elsinore;T+J+CM	CA	n/a	85	NE	strike slip	0	16	169
11.92	Elsinore;W+GI+T	CA	n/a	84	NE	strike slip	0	14	124
11.92	Elsinore;W+GI+T+J	CA	n/a	84	NE	strike slip	0	16	199
11.92	Elsinore;W+GI+T+J+CM	CA	n/a	84	NE	strike slip	0	16	241
11.92	Elsinore;GI+T	CA	5	90	V	strike slip	0	14	78
11.92	Elsinore;T	CA	5	90	V	strike slip	0	14	52
11.92	Elsinore;GI+T+J	CA	n/a	86	NE	strike slip	0	17	153
22.09	Elsinore;J	CA	3	84	NE	strike slip	0	19	75
22.09	Elsinore;J+CM	CA	3	84	NE	strike slip	0	17	118
23.06	San Jacinto;SJV+A+CC	CA	n/a	90	V	strike slip	0	16	136
23.06	San Jacinto;A	CA	9	90	V	strike slip	0	17	71
23.06	San Jacinto;A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	178
23.06	San Jacinto;A+CC+B	CA	n/a	90	V	strike slip	0.1	15	152
23.06	San Jacinto;A+CC	CA	n/a	90	V	strike slip	0	16	118
23.06	San Jacinto;A+C	CA	n/a	90	V	strike slip	0	17	118
23.06	San Jacinto;SJV+A+CC+B+SM	CA	n/a	90	V	strike	0.1	15	196

						slip			
23.06	San Jacinto;SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	170
23.06	San Jacinto;SJV+A	CA	n/a	90	V	strike slip	0	17	89
23.06	San Jacinto;SJV+A+C	CA	n/a	90	V	strike slip	0	17	136
23.06	San Jacinto;SBV+SJV+A	CA	n/a	90	V	strike slip	0	16	134
23.06	San Jacinto;SBV+SJV+A+C	CA	n/a	90	V	strike slip	0	17	181
23.06	San Jacinto;SBV+SJV+A+CC	CA	n/a	90	V	strike slip	0	16	181
23.06	San Jacinto;SBV+SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	215
23.06	San Jacinto;SBV+SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	241
25.93	San Jacinto;SJV	CA	18	90	V	strike slip	0	16	43
25.93	San Jacinto;SBV+SJV	CA	n/a	90	V	strike slip	0	16	88
26.27	Elsinore;GI	CA	5	90	V	strike slip	0	13	37
26.27	Elsinore;W+GI	CA	n/a	81	NE	strike slip	0	14	83
44.20	San Jacinto;CC	CA	4	90	V	strike slip	0	16	43
44.20	San Jacinto;CC+B+SM	CA	n/a	90	V	strike slip	0.2	14	103
44.20	San Jacinto;CC+B	CA	n/a	90	V	strike slip	0.2	14	77
46.58	San Jacinto;C	CA	14	90	V	strike slip	0	17	47
49.07	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	449
49.07	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	85		strike slip	0	14	380
49.07	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	512
49.07	S. San Andreas;BG+CO	CA	n/a	72		strike slip	0.3	12	125
49.07	S. San Andreas;NM+SM+NSB+SSB+BG	CA	n/a	83		strike slip	0	14	271

49.07	S. San Andreas;NM+SM+NSB+SSB+BG+CO	CA	n/a	84		strike slip	0.1	13	340
49.07	S. San Andreas;NSB+SSB+BG	CA	n/a	75		strike slip	0	14	136
49.07	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0.1	13	479
49.07	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	548
49.07	S. San Andreas;SM+NSB+SSB+BG+CO	CA	n/a	83		strike slip	0.1	13	303
49.07	S. San Andreas;SM+NSB+SSB+BG	CA	n/a	81		strike slip	0	13	234
49.07	S. San Andreas;SSB+BG+CO	CA	n/a	77		strike slip	0.2	12	170
49.07	S. San Andreas;BB+NM+SM+NSB+SSB+BG	CA	n/a	84		strike slip	0	14	321
49.07	S. San Andreas;BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	85		strike slip	0.1	13	390
49.07	S. San Andreas;BG	CA	n/a	58		strike slip	0	13	56
49.07	S. San Andreas;SSB+BG	CA	n/a	71		strike slip	0	13	101
49.07	S. San Andreas;NSB+SSB+BG+CO	CA	n/a	79		strike slip	0.2	12	206
49.07	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0	14	442
49.75	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0.1	13	421
49.75	S. San Andreas;CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	322
49.75	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	384
49.75	S. San Andreas;NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	213
49.75	S. San Andreas;NSB+SSB	CA	n/a	90	V	strike slip	0	13	79
49.75	S. San Andreas;SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	176
49.75	S. San Andreas;SSB	CA	16	90	V	strike slip	0	13	43
49.75	S. San Andreas;BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	263
56.18	Earthquake Valley	CA	2	90	V	strike	0	19	20

						slip			
56.90	San Jacinto;SBV	CA	6	90	V	strike slip	0	16	45
57.01	Newport-Inglewood (Offshore)	CA	1.5	90	V	strike slip	0	10	66
57.01	Newport Inglewood Connected alt 2	CA	1.3	90	V	strike slip	0	11	208
57.01	Newport Inglewood Connected alt 1	CA	1.3	89		strike slip	0	11	208
60.14	Rose Canyon	CA	1.5	90	V	strike slip	0	8	70
60.32	Chino, alt 2	CA	1	65	SW	strike slip	0	14	29
61.88	San Joaquin Hills	CA	0.5	23	SW	thrust	2	13	27
62.52	Elsinore;W	CA	2.5	75	NE	strike slip	0	14	46
63.13	Pinto Mtn	CA	2.5	90	V	strike slip	0	16	74
64.41	Chino, alt 1	CA	1	50	SW	strike slip	0	9	24
70.43	S. San Andreas;NSB	CA	22	90	V	strike slip	0	13	35
70.43	S. San Andreas;SM+NSB	CA	n/a	90	V	strike slip	0	13	133
70.43	S. San Andreas;CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	279
70.43	S. San Andreas;BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	220
70.43	S. San Andreas;CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	341
70.43	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0.1	13	377
70.43	S. San Andreas;NM+SM+NSB	CA	n/a	90	V	strike slip	0	13	170
72.28	Burnt Mtn	CA	0.6	67	W	strike slip	0	16	21
76.09	S. San Andreas;CO	CA	20	90	V	strike slip	0.6	11	69
77.59	Eureka Peak	CA	0.6	90	V	strike slip	0	15	19
81.35	Cucamonga	CA	5	45	N	thrust	0	8	28
83.62	San Jacinto;B	CA	4	90	V	strike slip	0.7	13	34

83.62	San Jacinto;B+SM	CA	n/a	90	V	strike slip	0.4	12	61
84.33	Cleghorn	CA	3	90	V	strike slip	0	16	25
84.87	Palos Verdes Connected	CA	3	90	V	strike slip	0	10	285
84.87	Coronado Bank	CA	3	90	V	strike slip	0	9	186
86.06	Newport-Inglewood, alt 1	CA	1	88		strike slip	0	15	65
88.53	Landers	CA	0.6	90	V	strike slip	0	15	95
88.73	Puente Hills (Coyote Hills)	CA	0.7	26	N	thrust	2.8	15	17
88.75	Elsinore;CM	CA	3	82	NE	strike slip	0	13	39
88.92	Helendale-So Lockhart	CA	0.6	90	V	strike slip	0	13	114
89.07	Palos Verdes	CA	3	90	V	strike slip	0	14	99
89.43	North Frontal (West)	CA	1	49	S	reverse	0	16	50
89.47	San Jose	CA	0.5	74	NW	strike slip	0	15	20
90.52	North Frontal (East)	CA	0.5	41	S	thrust	0	16	27
93.47	Sierra Madre	CA	2	53	N	reverse	0	14	57
93.47	Sierra Madre Connected	CA	2	51		reverse	0	14	76
96.06	Lenwood-Lockhart-Old Woman Springs	CA	0.9	90	V	strike slip	0	13	145
99.44	S. San Andreas;CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	243
99.44	S. San Andreas;SM	CA	29	90	V	strike slip	0	13	98
99.44	S. San Andreas;CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	306
99.44	S. San Andreas;NM+SM	CA	n/a	90	V	strike slip	0	14	134
99.44	S. San Andreas;PK+CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0.1	13	342
99.44	S. San Andreas;BB+NM+SM	CA	n/a	90	V	strike slip	0	14	184
99.85	Johnson Valley (No)	CA	0.6	90	V	strike slip	0	16	35

Search Results

10 of 10 earthquakes in map area.

Click for more information

6.3	**7km SSE of Big Bear City, CA** 1992-06-28 15:05:30 (UTC)	3.6 km
7.3	**10km N of Yucca Valley, CA** 1992-06-28 11:57:34 (UTC)	-0.1 km
6.1	**17km NNE of Thousand Palms, California** 1992-04-23 04:50:23 (UTC)	11.6 km
6.0	**6km SSW of Morongo Valley, CA** 1986-07-08 09:20:44 (UTC)	9.5 km
6.6	**5km NNE of Ocotillo Wells, CA** 1968-04-09 02:28:58 (UTC)	10.0 km
6.4	**12km W of Salton City, CA** 1954-03-19 09:54:27 (UTC)	6.0 km
6.0	**16km E of Desert Hot Springs, CA** 1948-12-04 23:43:16 (UTC)	6.0 km
6.0	**16km WSW of Oasis, CA** 1937-03-25 16:49:02 (UTC)	6.0 km
6.4	**7km WNW of Newport Beach, CA** 1933-03-11 01:54:09 (UTC)	6.0 km
6.7	**Southern California** 1918-04-21 22:32:29 (UTC)	10.0 km

Didn't find what you were looking for?

Earthquakes updated

Design Maps Summary Report

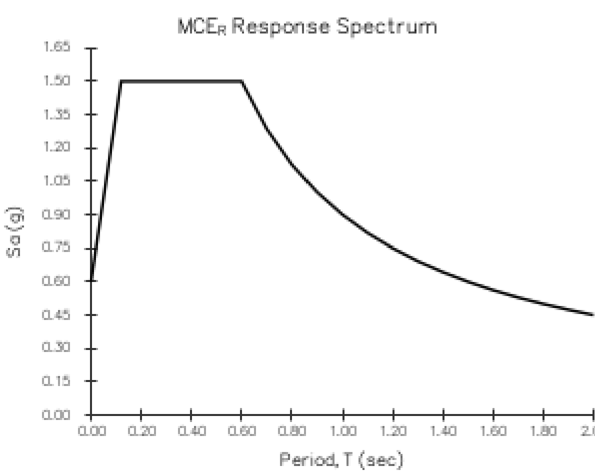
User–Specified Input

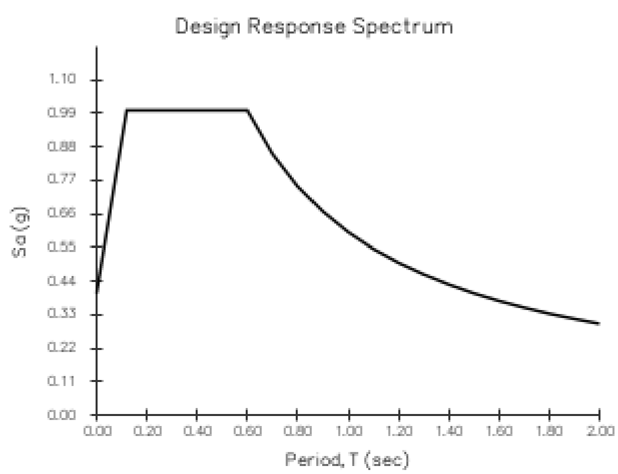
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	33.54005°N, 117.01189°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

S_S =	1.500 g	S_{MS} =	1.500 g	S_{DS} =	1.000 g
S_1 =	0.600 g	S_{M1} =	0.900 g	S_{D1} =	0.600 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.

Design Maps Detailed Report

ASCE 7-10 Standard (33.54005°N, 117.01189°W)

Site Class D – "Stiff Soil", 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 = 1.500 g
From Figure 22-2 [2]	S_1 = 0.600 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 D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_S$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
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 ≥ 40%, and • Undrained shear strength $\bar{s}_u$ < 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				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
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	$\boxed{1.0}$
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 = D and S_S = 1.500 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				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
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	$\boxed{1.5}$
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 = D and S_1 = 0.600 g, F_v = 1.500

Equation (11.4–1): $S_{MS} = F_a S_S = 1.000 \times 1.500 = 1.500$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 1.500 \times 0.600 = 0.900$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

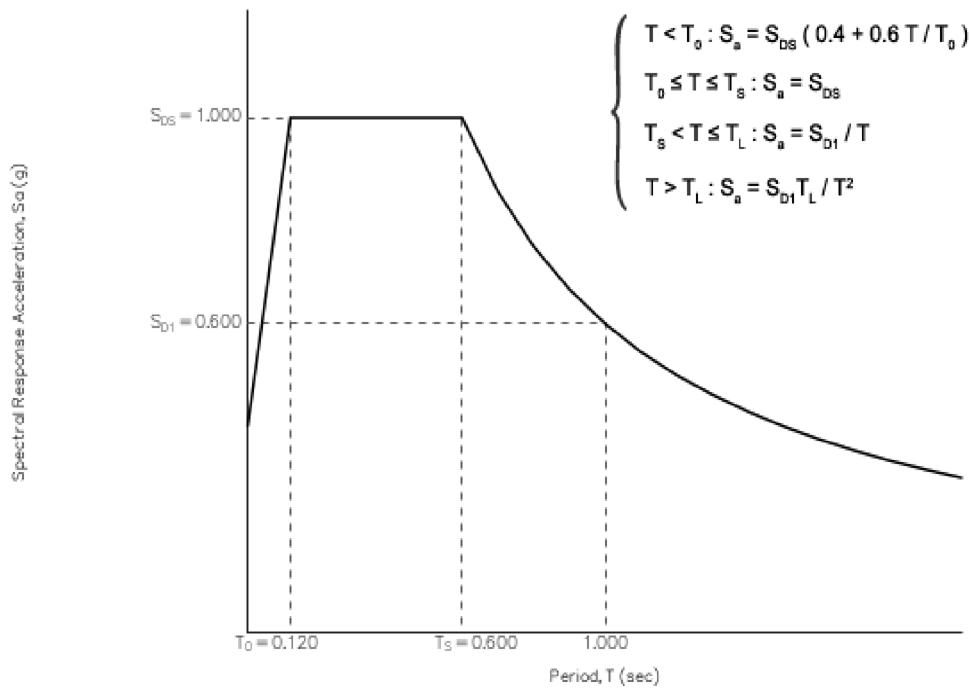
Equation (11.4–3): $S_{DS} = ⅔\, S_{MS} = ⅔ \times 1.500 = 1.000$ g

Equation (11.4–4): $S_{D1} = ⅔\, S_{M1} = ⅔ \times 0.900 = 0.600$ g

Section 11.4.5 — Design Response Spectrum

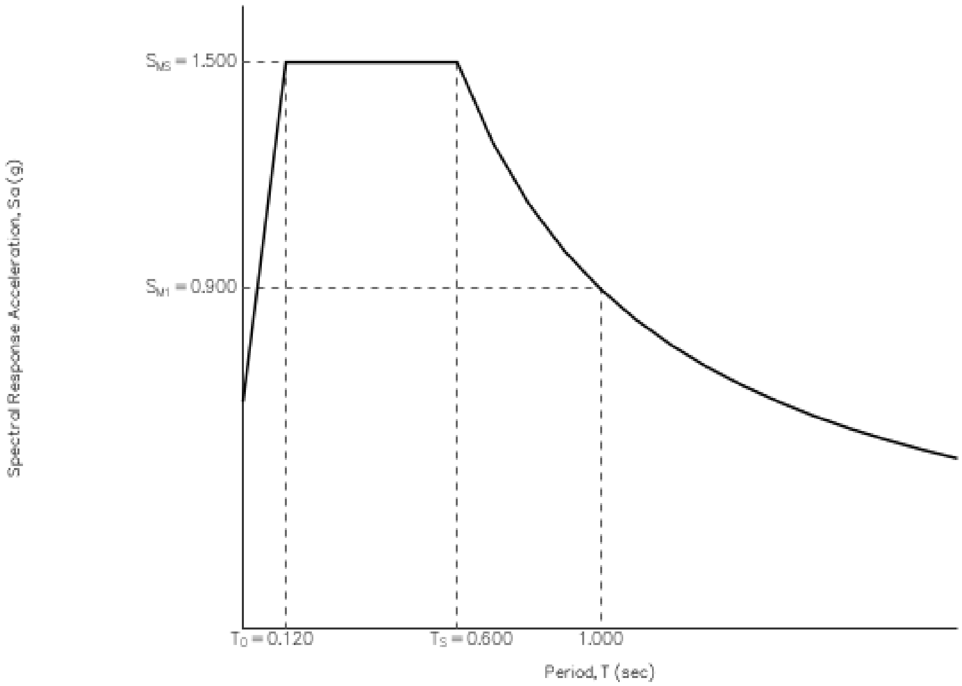
From [Figure 22-12][3] T_L = 8 seconds

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 = 0.505
Equation (11.8–1):	$PGA_M = F_{PGA}PGA = 1.000 \times 0.505 = 0.505$ 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	$\boxed{1.0}$
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 = D and PGA = 0.505 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} = 1.030
From Figure 22-18 [6]	C_{R1} = 1.017

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} = 0.600 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

APPENDIX E

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

EARTH-STRATA

General Earthwork and Grading Specifications

General

Intent: These General Earthwork and Grading Specifications are intended to be the minimum requirements for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These General Earthwork and Grading Specifications should be considered a part of the recommendations contained in the geotechnical report(s) and if they are in conflict with the geotechnical report(s), the specific recommendations in the geotechnical report shall supersede these more general specifications. Observations made during earthwork operations by the project Geotechnical Consultant may result in new or revised recommendations that may supersede these specifications and/or the recommendations in the geotechnical report(s).

The Geotechnical Consultant of Record: The Owner shall employ a qualified Geotechnical Consultant of Record (Geotechnical Consultant), prior to commencement of grading or construction. The Geotechnical Consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading or construction.

Prior to commencement of grading or construction, the Owner shall coordinate with the Geotechnical Consultant, and Earthwork Contractor (Contractor) to schedule sufficient personnel for the appropriate level of observation, mapping, and compaction testing.

During earthwork and grading operations, the Geotechnical Consultant shall observe, map, and document the subsurface conditions to confirm assumptions made during the geotechnical design phase of the project. Should the observed conditions differ significantly from the interpretive assumptions made during the design phase, the Geotechnical Consultant shall recommend appropriate changes to accommodate the observed conditions, and notify the reviewing agency where required.

The Geotechnical Consultant shall observe the moisture conditioning and processing of the excavations and fill materials. The Geotechnical Consultant should perform periodic relative density testing of fill materials to verify that the attained level of compaction is being accomplished as specified.

The Earthwork Contractor: The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of earth materials to receive compacted fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall be provided with the approved grading plans and geotechnical report(s) for his review and acceptance of responsibilities, prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the approved grading plans and geotechnical report(s). Prior to commencement of grading, the Contractor shall prepare and submit to the Owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "equipment" of work and the estimated quantities of daily earthwork contemplated for the site. The Contractor shall inform the Owner and the Geotechnical Consultant of work schedule changes and revisions to the work plan at least 24 hours in advance of such changes so that appropriate personnel will be available for observation and testing. No assumptions shall be made by the Contractor with regard to whether the Geotechnical Consultant is aware of all grading operations.

It is the sole responsibility of the Contractor to provide adequate equipment and methods to accomplish the earthwork operations in accordance with the applicable grading codes and agency ordinances, these specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). At the sole discretion of the Geotechnical Consultant, any unsatisfactory conditions, such as unsuitable earth materials, improper moisture conditioning, inadequate compaction, insufficient buttress keyway size, adverse weather conditions, etc., resulting in a quality of work less than required in the approved grading plans and geotechnical report(s), the Geotechnical Consultant shall reject the work and may recommend to the Owner that grading be stopped until conditions are corrected.

Preparation of Areas for Compacted Fill

Clearing and Grubbing: Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed in a method acceptable to the Owner, Geotechnical Consultant, and governing agencies.

The Geotechnical Consultant shall evaluate the extent of these removals on a site by site basis. Earth materials to be placed as compacted fill shall not contain more than 1 percent organic materials (by volume). No compacted fill lift shall contain more than 10 percent organic matter.

Should potentially hazardous materials be encountered, the Contractor shall stop work in the affected area, and a hazardous materials specialist shall immediately be consulted to evaluate the potentially hazardous materials, prior to continuing to work in that area.

It is our understanding that the State of California defines most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) as hazardous waste. As such, indiscriminate dumping or spillage of these fluids may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall be prohibited. The contractor is responsible for all hazardous waste related to his operations. The Geotechnical Consultant does not have expertise in this area. If hazardous waste is a concern, then the Owner should contract the services of a qualified environmental assessor.

Processing: Exposed earth materials that have been observed to be satisfactory for support of compacted fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Exposed earth materials that are not observed to be satisfactory shall be removed or alternative recommendations may be provided by the Geotechnical Consultant. Scarification shall continue until the exposed earth materials are broken down and free of oversize material and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction. The earth materials should be moistened or air dried to near optimum moisture content, prior to compaction.

Overexcavation: The Cut Lot Typical Detail and Cut/Fill Transition Lot Typical Detail, included herein provides a graphic illustration that depicts typical overexcavation recommendations made in the approved geotechnical report(s) and/or grading plan(s).

Keyways and Benching: Where fills are to be placed on slopes steeper than 5:1 (horizontal to vertical units), the ground shall be thoroughly benched as compacted fill is placed. Please see the three Keyway and Benching Typical Details with subtitles Cut Over Fill Slope, Fill Over Cut Slope, and Fill Slope for a graphic illustration. The lowest bench or smallest keyway shall be a minimum of 15 feet wide (or ½ the proposed slope height) and at least 2 feet into competent earth materials as advised by the Geotechnical Consultant. Typical benches shall be excavated a minimum height of 4 feet into competent earth materials or as recommended by the Geotechnical Consultant. Fill placed on slopes steeper than 5:1 should be thoroughly benched or otherwise excavated to provide a flat subgrade for the compacted fill.

Evaluation/Acceptance of Bottom Excavations: All areas to receive compacted fill (bottom excavations), including removal excavations, processed areas, keyways, and benching, shall be observed, mapped, general elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive compacted fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to placing compacted fill. A licensed surveyor shall provide the survey control for determining elevations of bottom excavations, processed areas, keyways, and benching. The Geotechnical Consultant is not responsible for erroneously located, fills, subdrain systems, or excavations.

Fill Materials

General: Earth material to be used as compacted fill should to a large extent be free of organic matter and other deleterious substances as evaluated and accepted by the Geotechnical Consultant.

Oversize: Oversize material is rock that does not break down into smaller pieces and has a maximum diameter greater than 8 inches. Oversize rock shall not be included within compacted fill unless specific methods and guidelines acceptable to the Geotechnical Consultant are followed. For examples of methods and guidelines of oversize rock placement see the enclosed Oversize Rock Disposal Detail. The inclusion of oversize materials in the compacted fill shall only be acceptable if the oversize material is completely surrounded by compacted fill or thoroughly jetted granular materials. No oversize material shall be placed within 10 vertical feet of finish grade or within 2 feet of proposed utilities or underground improvements.

Import: Should imported earth materials be required, the proposed import materials shall meet the requirements of the Geotechnical Consultant. Well graded, very low expansion potential earth materials free of organic matter and other deleterious substances are usually sought after as import materials. However, it is generally in the Owners best interest that potential import earth materials are provided to the Geotechnical Consultant to determine their suitability for the intended purpose. At least 48 hours should be allotted for the appropriate laboratory testing to be performed, prior to starting the import operations.

Fill Placement and Compaction Procedures

Fill Layers: Fill materials shall be placed in areas prepared to receive fill in nearly horizontal layers not exceeding 8 inches in loose thickness. Thicker layers may be accepted by the Geotechnical Consultant, provided field density testing indicates that the grading procedures can adequately compact the thicker layers. Each layer of fill shall be spread evenly and thoroughly mixed to obtain uniformity within the earth materials and consistent moisture throughout the fill.

Moisture Conditioning of Fill: Earth materials to be placed as compacted fill shall be watered, dried, blended, and/or mixed, as needed to obtain relatively uniform moisture contents that are at or slightly above optimum. The maximum density and optimum moisture content tests should be performed in accordance with the American Society of Testing and Materials (ASTM test method D1557-00).

Compaction of Fill: After each layer has been moisture-conditioned, mixed, and evenly spread, it should be uniformly compacted to a minimum of 90 percent of maximum dry density as determined by ASTM test method D1557-00. Compaction equipment shall be adequately sized and be either specifically designed for compaction of earth materials or be proven to consistently achieve the required level of compaction.

Compaction of Fill Slopes: In addition to normal compaction procedures specified above, additional effort to obtain compaction on slopes is needed. This may be accomplished by backrolling of slopes with sheepsfoot rollers as the fill is being placed, by overbuilding the fill slopes, or by other methods producing results that are satisfactory to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill and the slope face shall be a minimum of 90 percent of maximum density per ASTM test method D1557-00.

Compaction Testing of Fill: Field tests for moisture content and relative density of the compacted fill earth materials shall be periodically performed by the Geotechnical Consultant. The location and frequency of tests shall be at the Geotechnical Consultant's discretion based on field observations. Compaction test locations will not necessarily be random. The test locations may or may not be selected to verify minimum compaction requirements in areas that are typically prone to inadequate compaction, such as close to slope faces and near benching.

Frequency of Compaction Testing: Compaction tests shall be taken at minimum intervals of every 2 vertical feet and/or per 1,000 cubic yards of compacted materials placed. Additionally, as a guideline, at least one (1) test shall be taken on slope faces for each 5,000 square feet of slope face and/or for each 10 vertical feet of slope. The Contractor shall assure that fill placement is such that the testing schedule described herein can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork operations to a safe level so that these minimum standards can be obtained.

Compaction Test Locations: The approximate elevation and horizontal coordinates of each test location shall be documented by the Geotechnical Consultant. The Contractor shall coordinate with the Surveyor to assure that sufficient grade stakes are established. This will provide the Geotechnical Consultant with sufficient accuracy to determine the approximate test locations and elevations. The Geotechnical Consultant can not be responsible for staking erroneously located by the Surveyor or Contractor. A minimum of two grade stakes should be provided at a maximum horizontal distance of 100 feet and vertical difference of less than 5 feet.

<u>Subdrain System Installation</u>

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the approved grading plan, and the typical details provided herein. The Geotechnical Consultant may recommend additional subdrain systems and/or changes to the subdrain systems described herein, with regard to the extent, location, grade, or material depending on conditions encountered during grading or other factors. All subdrain systems shall be surveyed by a licensed land surveyor (except for retaining wall subdrain systems) to verify line and grade after installation and prior to burial. Adequate time should be allowed by the Contractor to complete these surveys.

<u>Excavation</u>

All excavations and over-excavations for remedial purposes shall be evaluated by the Geotechnical Consultant during grading operations. Remedial removal depths indicated on the geotechnical plans are estimates only. The actual removal depths and extent shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading operations. Where fill over cut slopes are planned, the cut portion of the slope shall be excavated, evaluated, and accepted by the Geotechnical Consultant prior to placement of the fill portion of the proposed slope, unless specifically addressed by the Geotechnical Consultant. Typical details for cut over fill slopes and fill over cut slopes are provided herein.

<u>Trench Backfill</u>

1) The Contractor shall follow all OHSA and Cal/OSHA requirements for trench excavation safety.

2) Bedding and backfill of utility trenches shall be done in accordance with the applicable provisions in the Standard Specifications of Public Works Construction. Bedding materials shall have a Sand Equivalency more than 30 (SE>30). The bedding shall be placed to 1 foot over the conduit and thoroughly jetting to provide densification. Backfill should be compacted to a minimum of 90 percent of maximum dry density, from 1 foot above the top of the conduit to the surface.

3) Jetting of the bedding materials around the conduits shall be observed by the Geotechnical Consultant.

4) The Geotechnical Consultant shall test trench backfill for the minimum compaction requirements recommended herein. At least one test should be conducted for every 300 linear feet of trench and for each 2 vertical feet of backfill.

5) For trench backfill the lift thicknesses shall not exceed those allowed in the Standard Specifications of Public Works Construction, unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment or method.

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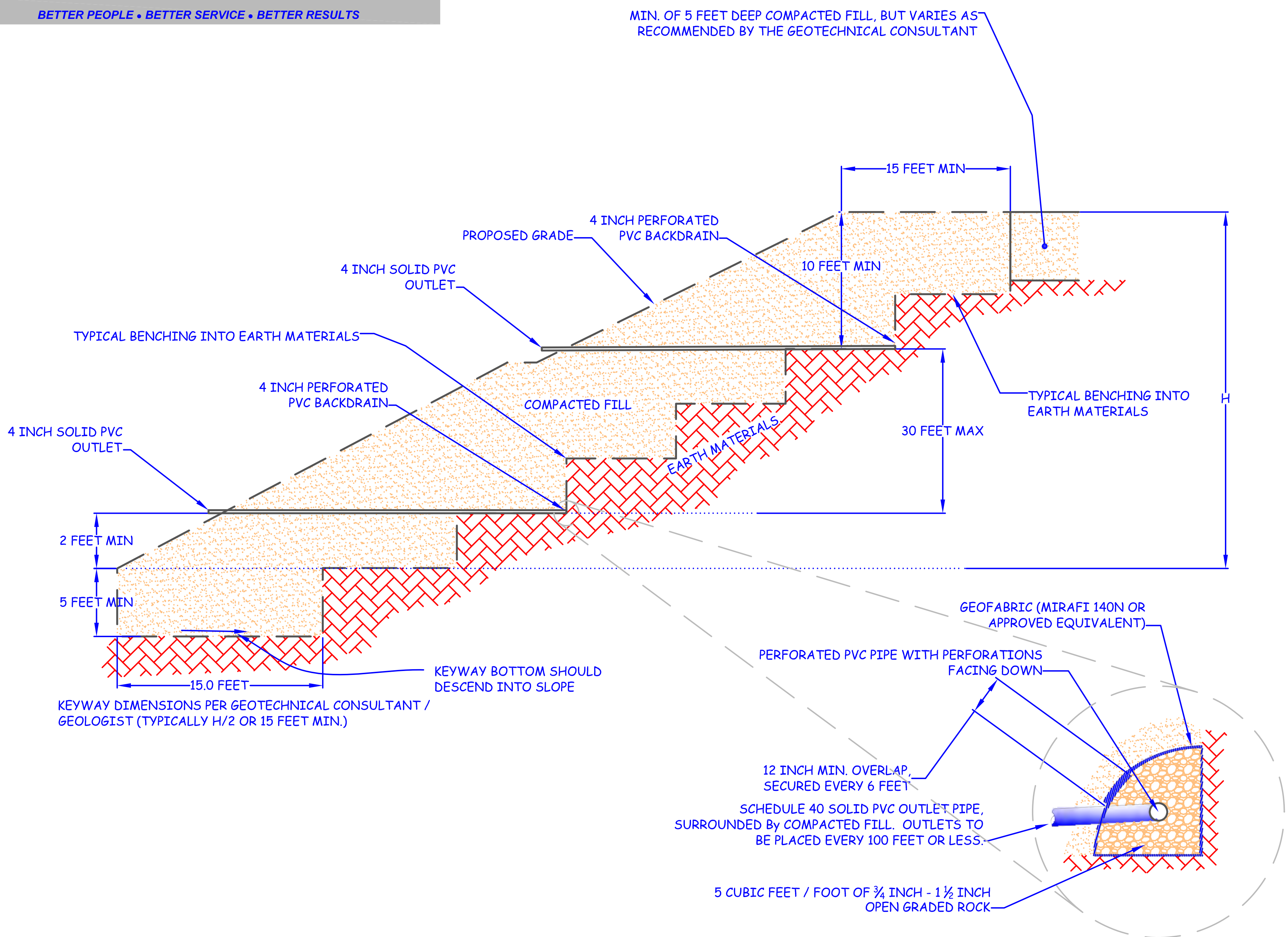
STABILIZATION FILL TYPICAL DETAIL



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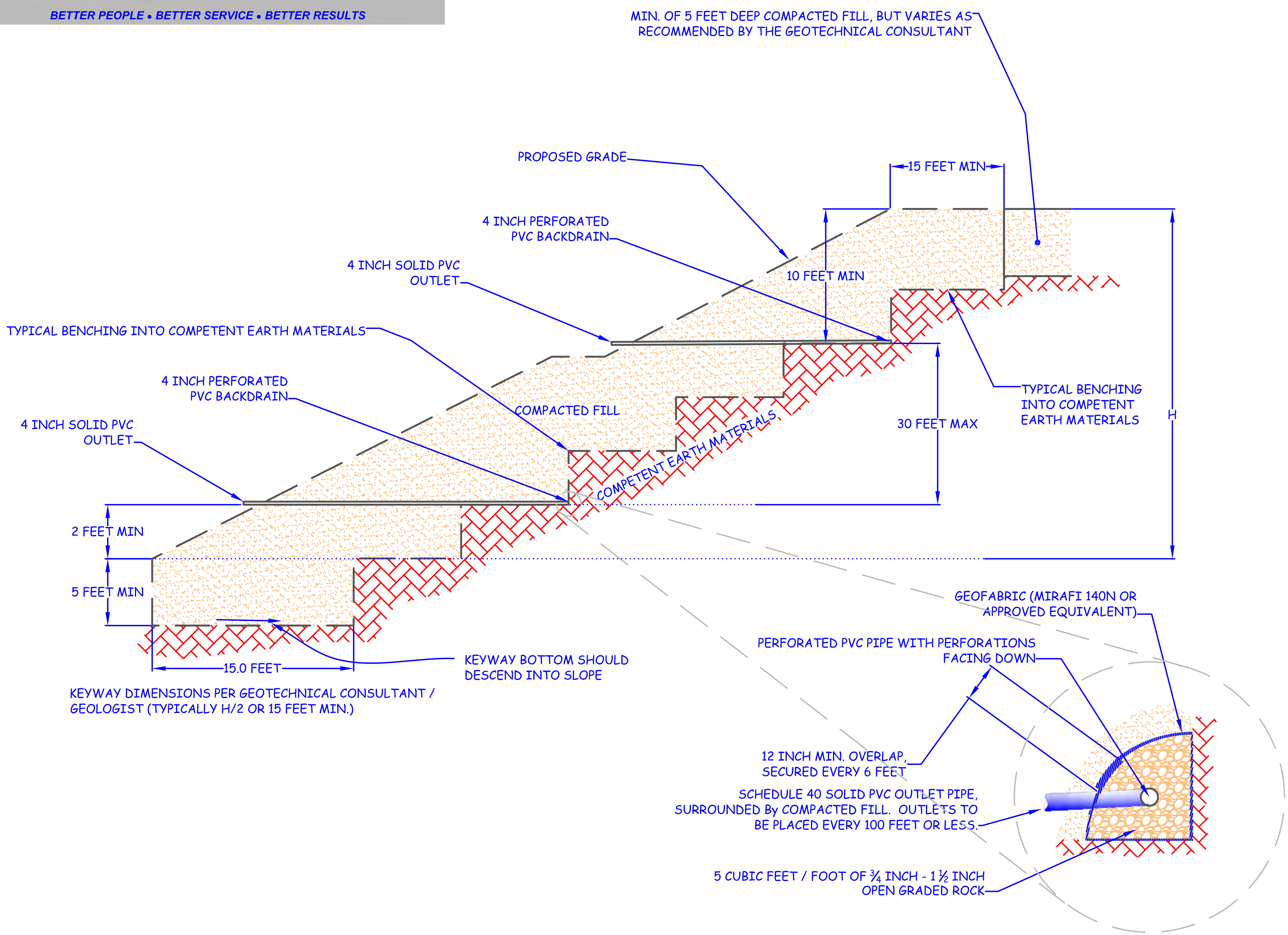
BUTTRESS TYPICAL DETAIL



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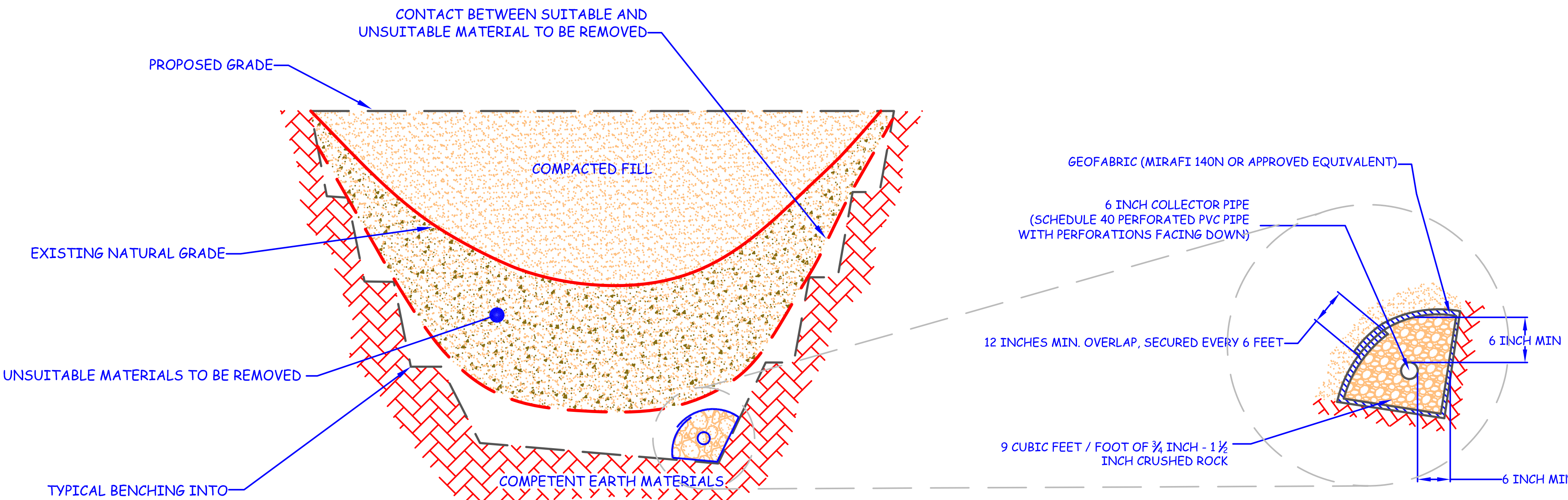
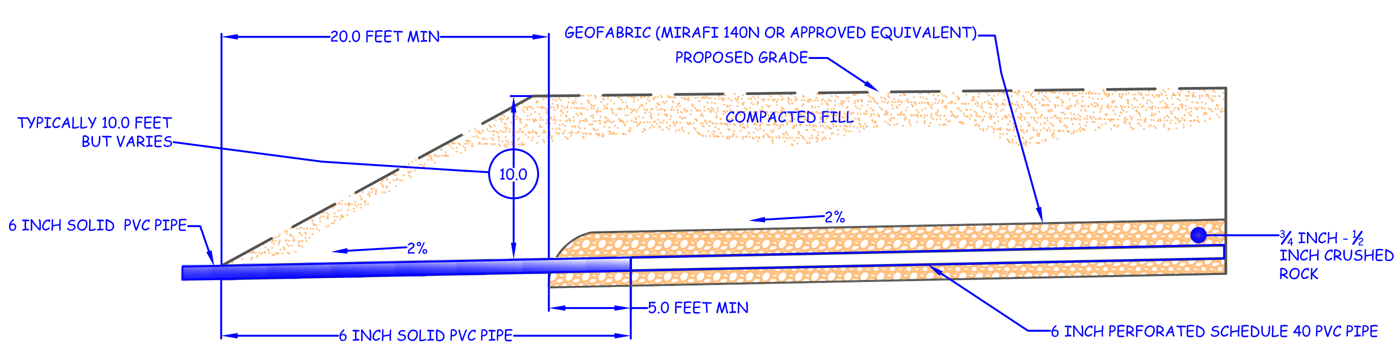
CANYON SUBDRAIN SYSTEM TYPICAL DETAIL



NOTES:
1 - CONTINUOUS RUNS IN EXCESS OF 500 FEET LONG WILL REQUIRE AN 8 INCH DIAMETER PIPE.

2 - FINAL 20 FEET OF PIPE AT OUTLET WILL BE SOLID AND BACKFILLED WITH COMPACTED FINE-GRAINED EARTH MATERIALS.

CANYON SUBDRAIN TYPICAL OUTLET



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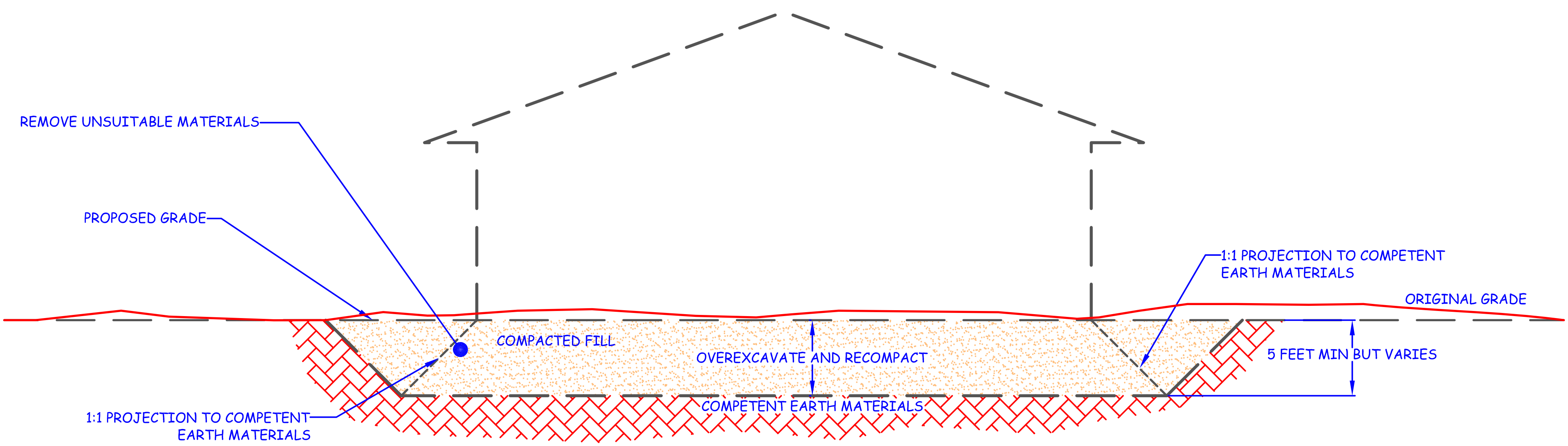
CUT LOT TYPICAL DETAIL



NOTE; REMOVAL BOTTOMS SHOULD BE GRADED WITH A MINIMUM 2% FALL TOWARDS STREET OR OTHER SUITABLE AREA (AS DETERMINED BY THE GEOTECHNICAL CONSULTANT) TO AVOID PONDING BELOW THE BUILDING

NOTE: WHERE DESIGN CUT LOTS ARE EXCAVATED ENTIRELY INTO COMPETENT EARTH MATERIALS, OVEREXCAVATION MAY STILL BY NEEDED FOR HARD-ROCK CONDITIONS OR MATERIALS WITH VARIABLE EXPANSION POTENTIALS

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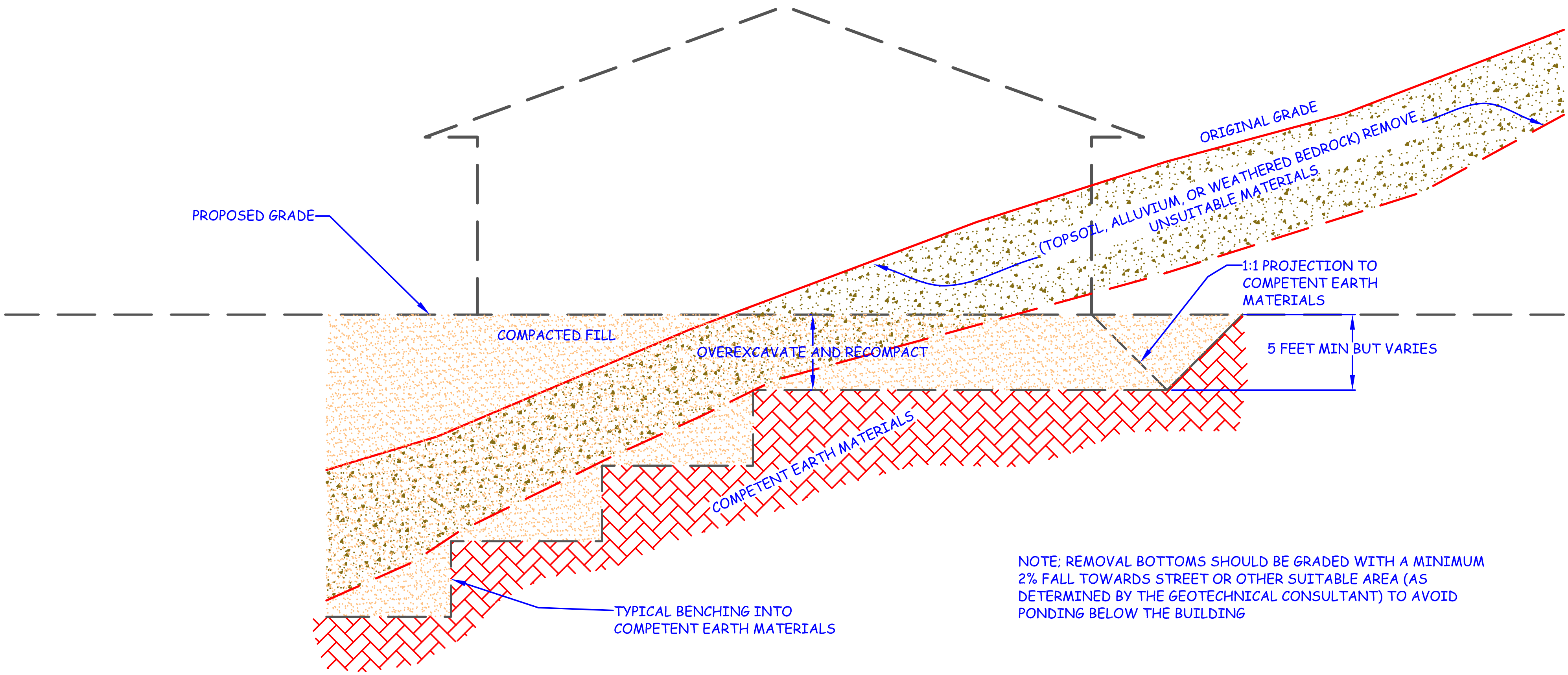
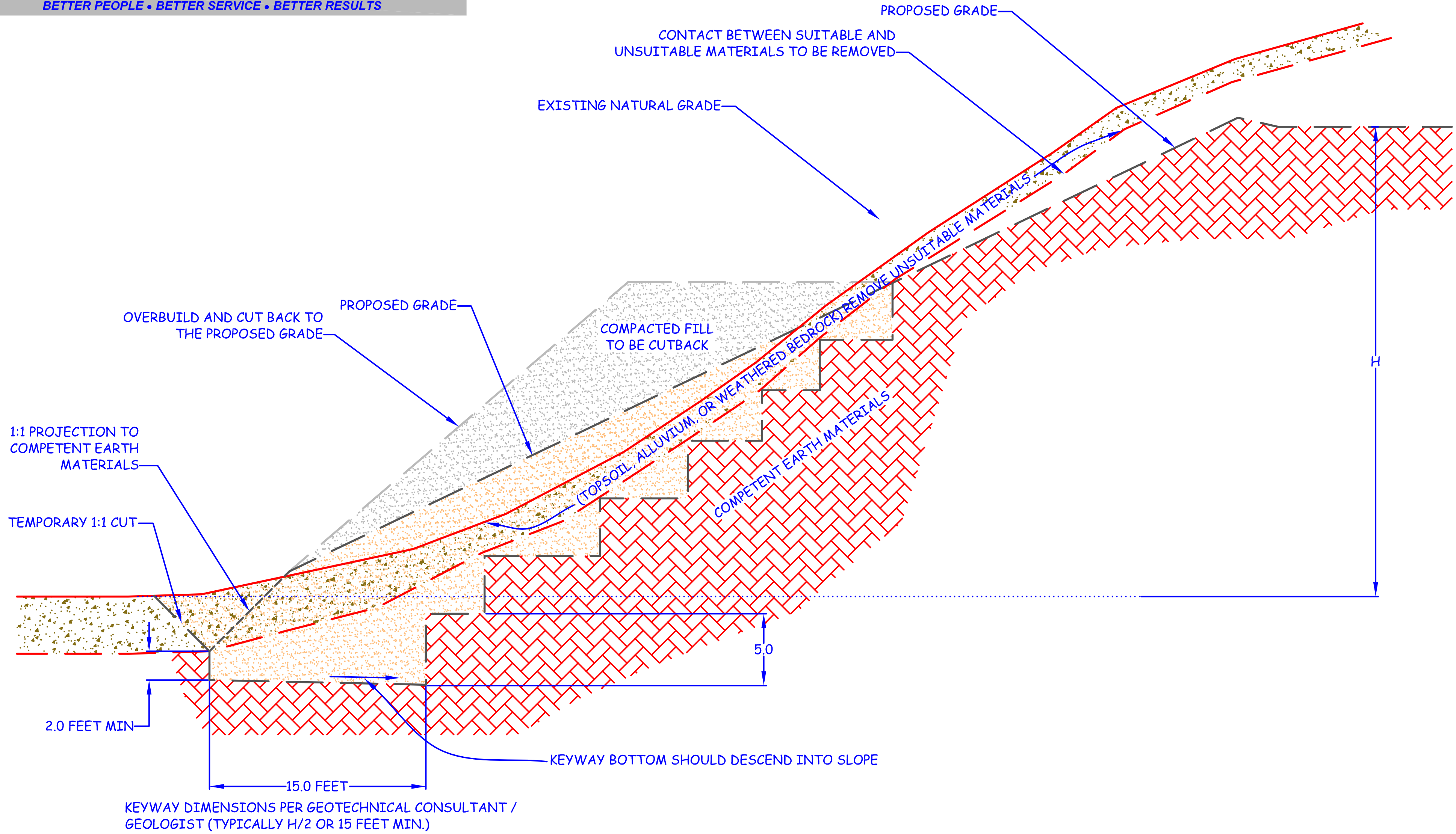
CUT / FILL TRANSITION LOT TYPICAL DETAIL



NOTE: REMOVAL BOTTOMS SHOULD BE GRADED WITH A MINIMUM 2% FALL TOWARDS STREET OR OTHER SUITABLE AREA (AS DETERMINED BY THE GEOTECHNICAL CONSULTANT) TO AVOID PONDING BELOW THE BUILDING

NOTE: WHERE DESIGN CUT LOTS ARE EXCAVATED ENTIRELY INTO COMPETENT EARTH MATERIALS, OVEREXCAVATION MAY STILL BY NEEDED FOR HARD-ROCK CONDITIONS OR MATERIALS WITH VARIABLE EXPANSION POTENTIALS

KEYWAY & BENCHING TYPICAL DETAILS
CUT OVER FILL SLOPE



NOTE:

NATURAL SLOPES STEEPER THAN 5:1 (H:V) MUST BE BENCHED INTO COMPETENT EARTH MATERIALS

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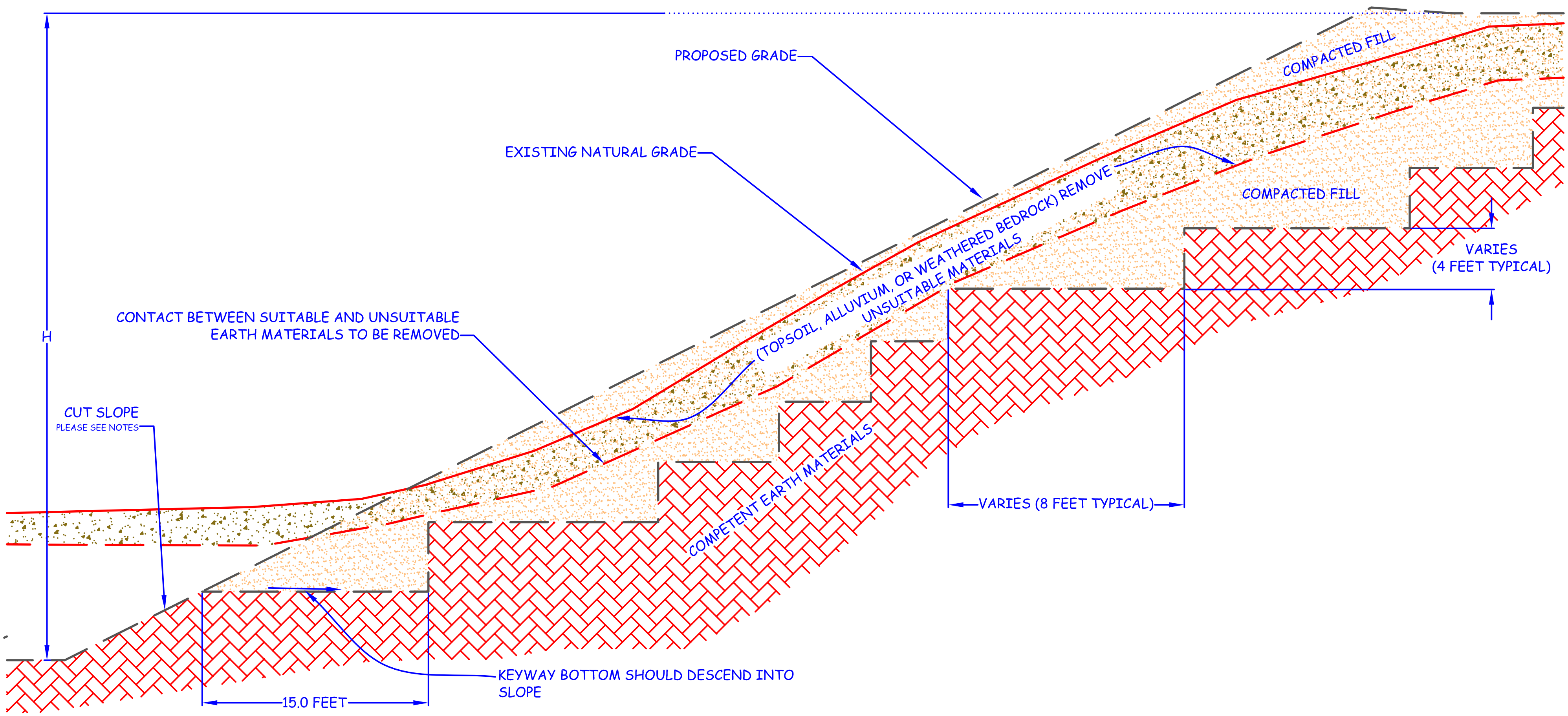
KEYWAY & BENCHING TYPICAL DETAILS
FILL OVER CUT SLOPE



KEYWAY DIMENSIONS PER GEOTECHNICAL CONSULTANT / GEOLOGIST (TYPICALLY H/2 OR 15 FEET MIN.)

NOTES:

NATURAL SLOPES STEEPER THAN 5:1 (H:V) MUST BE BENCHED INTO COMPETENT EARTH MATERIALS

THE CUT SLOPE MUST BE CONSTRUCTED FIRST

KEYWAY & BENCHING TYPICAL DETAILS
FILL SLOPE

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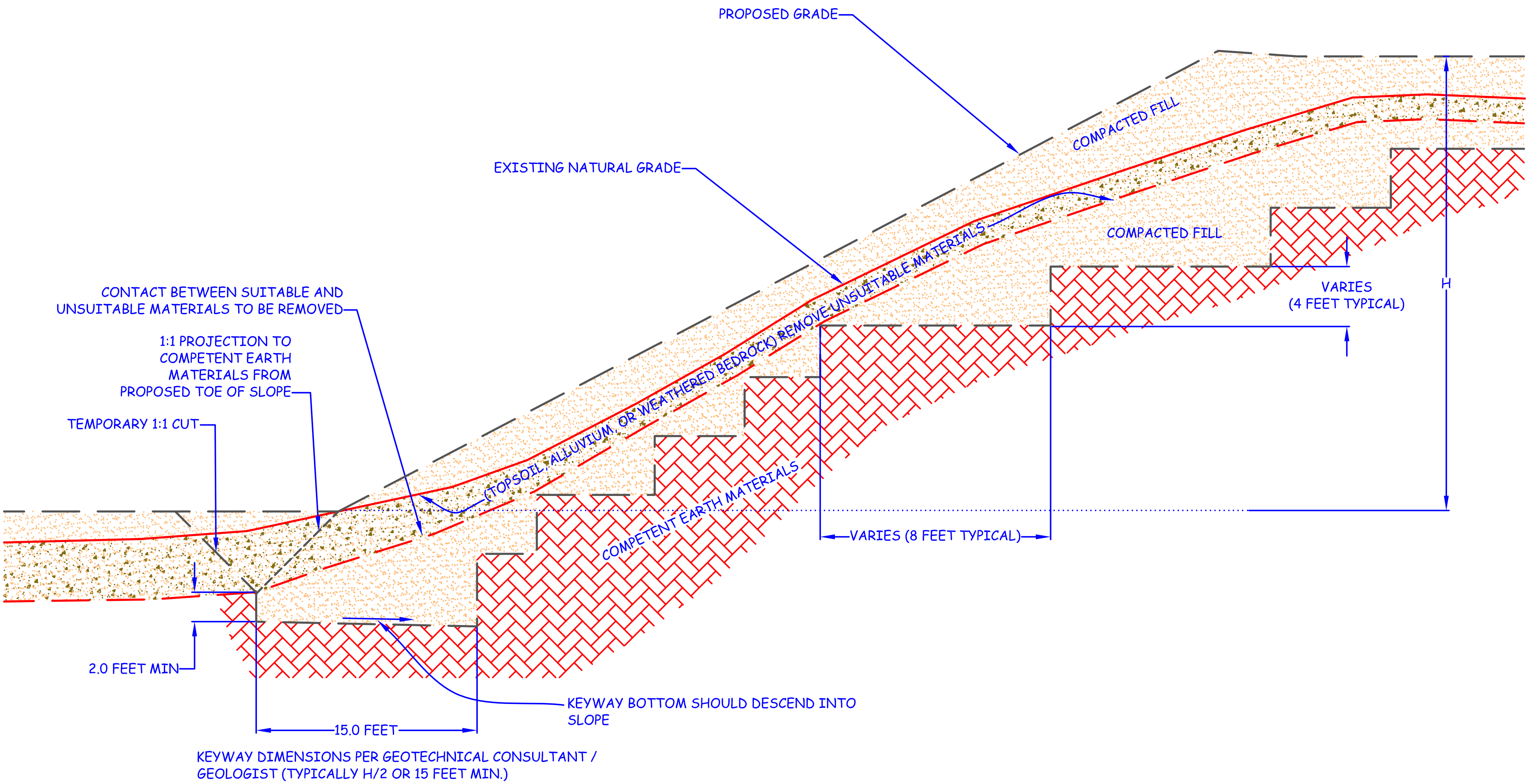

NOTES:

NATURAL SLOPES STEEPER THAN 5:1 (H:V) MUST BE BENCHED INTO COMPETENT EARTH MATERIALS

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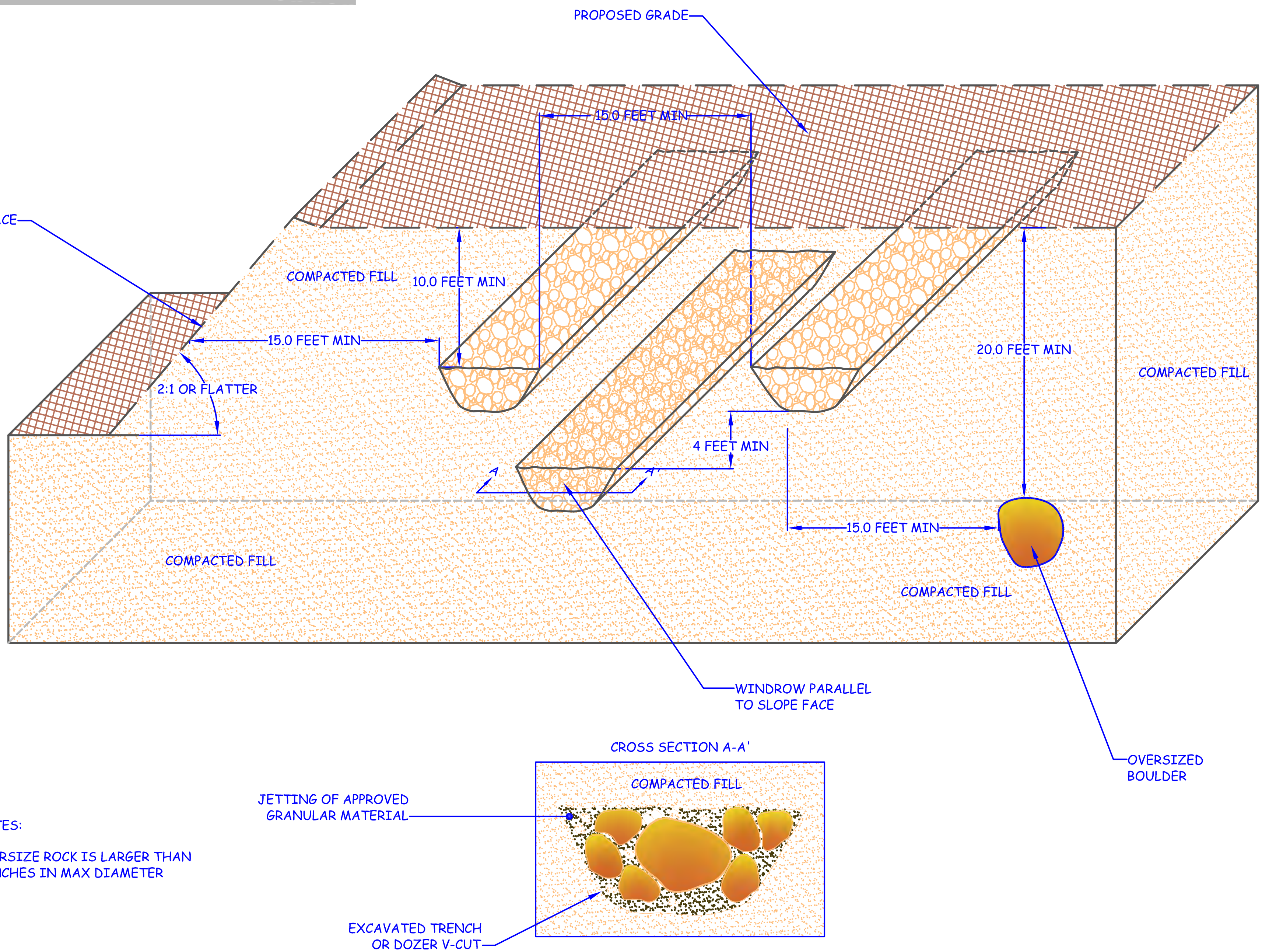
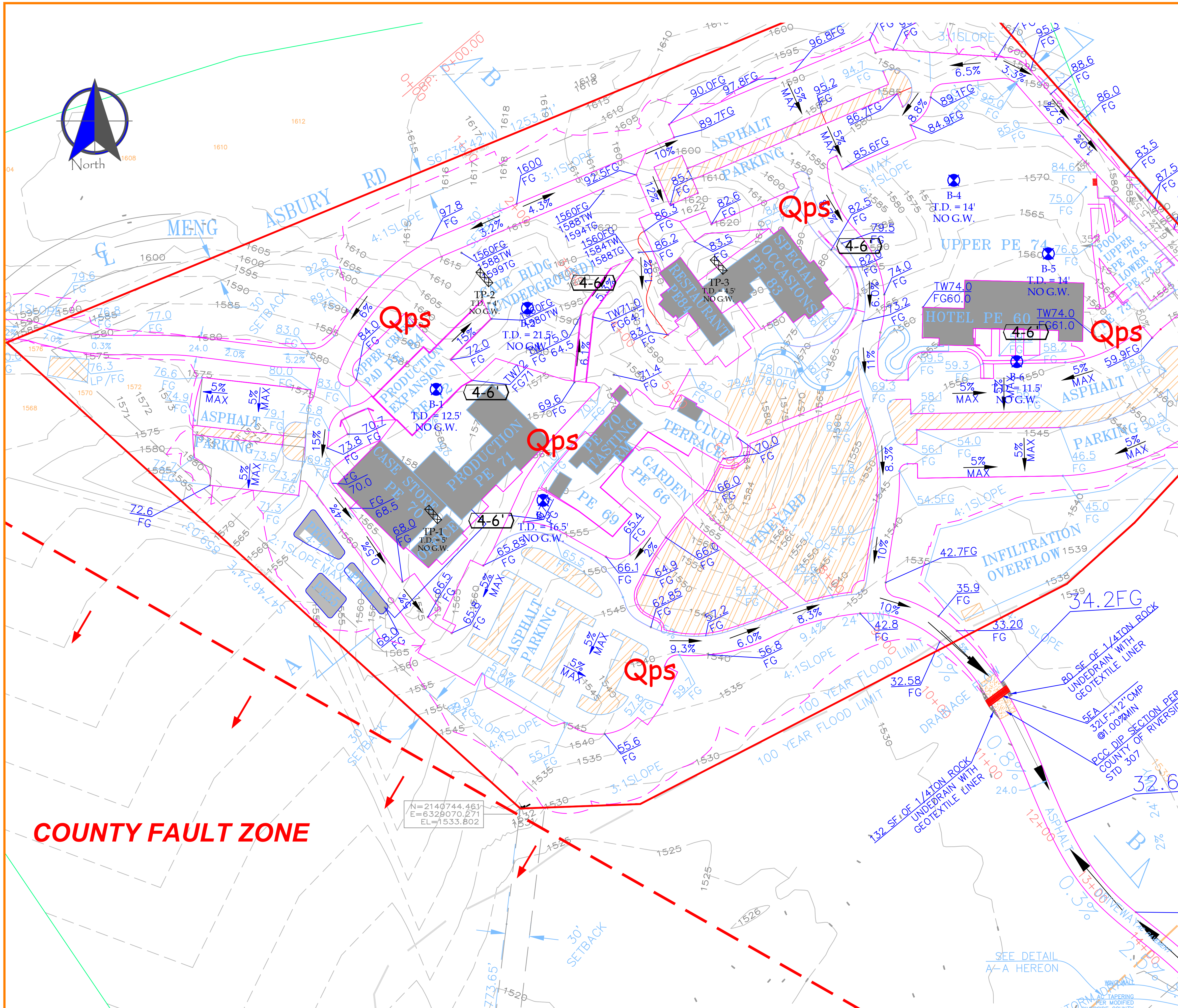
OVERSIZE ROCK TYPICAL DETAIL



NOTES:

OVERSIZE ROCK IS LARGER THAN
8 INCHES IN MAX DIAMETER



LEGEND

Locations are Approximate

Geologic Units

Qps - Quaternary Pauba Formation

Symbols

- Limits of Report

- Eastern Limit of County Fault Zone

TP-3 T.D. = 4.5' NO G.W. - Test Pit Location
Including Total Depth and Depth to Groundwater

B-6 T.D. = 11.5' NO G.W. - Boring Location
Including Total Depth and Depth to Groundwater

0 120′ 240′

GEOTECHNICAL MAP

LOCATED ON THE NORTHEAST CORNER OF DE PORTOLA ROAD AND MORTE DE ORO ROAD

TEMECULA AREA, RIVERSIDE COUNTY, CALIFORNIA

APN 941-180-032

PROJECT	PROPOSED WINERY		
CLIENT	KOLL CUSTOM HOMES		
PROJECT NO.	171857-10A		
DATE	OCTOBER 2017		
SCALE	SEE SCALE		
DWG XREFS			
REVISION	2	10-23-2019	
DRAWN BY	JDG	PLATE	1 OF 2

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www.ESGSINC.com (951) 397-8315

Appendix 4: Historical Site Conditions

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

Examples of material to provide in Appendix 4 may include but are not limited to the following:

- Environmental Site Assessments conducted for the project,
- Other information on Past Site Use that impacts the feasibility of LID BMP implementation on the site.

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 2.3 of the SMR WQMP and Sections D of this Template.

WQMP Project Report

County of Riverside Stormwater Program

Santa Ana River Watershed Geodatabase

Tuesday, December 12, 2017

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 applicant's Water Quality Management Plan (WQMP) and should not be relied upon without independent verification.

Project Site Parcel Number(s):	941180032, 941160007, 941170006, 941160002
Latitude/Longitude:	33.5399, -117.0121
Thomas Brothers Page:	960
Project Site Acreage:	44.16
Watershed(s):	SANTA MARGARITA
This Project Site Resides in the following Hydrologic Unit (s) (HUC):	**HUC Name** - HUC Number **Santa Gertudis Creek** - 180703020406
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 **Santa Margarita River (Lower)** - CAR9021100019980911161346 **Santa Margarita River (Upper)** - CAR9022200020011001141050 **Murrieta Creek** - CAR9023200020010924152136 **Santa Gertrudis Creek** - CAR9024200020080825001546
These 303d listed Water bodies and TMDLs have the following Pollutants of Concern (POC):	**Bacterial Indicators** - Enterococcus, Escherichia coli (E. coli), Fecal Coliform **Metals/Metalloids** - Copper, Iron, Manganese **Nutrients** - Nitrogen, Phosphorus, Total Nitrogen as N **Pesticides** - Chlorpyrifos **Toxicity** - Toxicity
Limitations on Infiltration:	**Project Site Onsite Soils Group(s)** - A, 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., RANCHO CALIFORNIA W.D.. Your local wholesaler contact agency is METROPOLITAN WATER DISTRICT.
Environmentally Sensitive Areas within 200'(Fish and Wildlife Habitat/Species):	None
Environmentally Sensitive Areas within 200'(CVMSHCP):	None
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):	0.572
Groundwater Basin:	TEMECULA VALLEY
MSHCP/CVMSHCP Criteria Cell(s):	No Data
Retention Ordinance Information:	No Data
Studies and Reports Related to Project Site:	IBI Scores - Southern Cal bulletin118_4-sc water_fact_3_7.11 Murrieta Creek Santa Margarita River Watershed Annual Watermaster Murrieta Creek/Murrieta Valley ADP Map 1 Murrieta Creek/Murrieta Valley ADP Map 2 Murrieta Creek/Murrieta Valley ADP Report SMR Annual Report 2009-10

Riverside County Parcel Report

APN(s) 941180032

MAPS/IMAGES

PARCEL

APN	941-180-032-4
Previous APN	941-180-026
Owners	Not Available Online
Address	941-180-032 NOT AVAILABLE
Mailing Address	941-180-032 79 DUNMORE IRVINE CA 92620
Legal Description	941-180-032 Recorded Book/Page: RS 50/68 Subdivision Name: Lot/Parcel: K14 Block: Tract Number: 0
Lot Size	941-180-032 Recorded lot size is 42.63 acres
Property Characteristics	941-180-032 Year Constructed: 0000 Number of Baths: 0 Number of Bedrooms: 0 Construction Type: SPECIAL CONSTRUCTION Garage Type: Property Area (sq ft): 0 Roof Type: UNKNOWN Number of Stories: Pool: NO Central Cool: NO Central Heat: NO
Supervisorial District	CHUCK WASHINGTON, DISTRICT 3
Township/Range	T7SR1W SEC 29 RHO T7SR1W SEC 30 RHO
Elevation Range (ft.)	1520 - 1620
Thomas Bros. Maps Page/Grid	Page: 930 GRID: F7 Page: 960 GRID: F1
Indian Tribal Land	Not in a Tribal Land
City Boundary	Not in a city
City Spheres of Influence	Not in a city sphere
Annexation Date	N/A
LAFCO Case	N/A
Proposals	N/A
March Joint Powers Authority	Not in the jurisdiction of the March Joint Powers Authority

County Service Area	WINE COUNTRY #149 - ROAD MAINT

PLANNING more...

Specific Plans	Not in a Specific Plan
Land Use Designations	AG
General Plan Policy Overlays	TEMECULA VALLEY WINE COUNTRY POLICY AREA - WINERY DISTRICT
Area Plan (RCIP)	Southwest Area
General Plan Policy Areas	Not in a General Plan Policy Area
Zoning Classifications (ORD. 348)	Zoning: C/V-10 CZ Number: 5487
Zoning Overlays	Not in a Zoning Overlay
Historical Preservation Districts	Not in a Historical Preservation District
Agricultural Preserve	RANCHO CALIFORNIA NO. 1 MAP NO. 282
Airport Influence Areas	NOT IN AN AIRPORT INFLUENCE AREA
Airport Compatibility Zones	NOT IN AN AIRPORT COMPATIBILITY ZONE
Zoning Districts/Areas	RANCHO CALIFORNIA AREA
Community Advisory Councils	Not in a Community Advisory Council
Residential Permit Statistics	N/A Expected Units: BRS Permit Units Final Issued Active Current Permits: Cumulative Total: % of Expected:

ENVIRONMENTAL more...

CVMSHCP (Coachella Valley Multi-Species Habitat Conservation Plan) Plan Area	NOT IN THE COACHELLA VALLEY MSHCP FEE
CVMSHCP (Coachella Valley Multi-Species Habitat Conservation Plan) Conservation Area	NOT COACHELLA VALLEY CONSERVATION
CVMSHCP Fluvial Sand Transport Special Provision Areas	NOT IN A FLUVIAL SAND TRANSPORT
WRMSHCP (Western Riverside County Multi-Species Habitat Conservation Plan) Plan Area	WESTERN RIVERSIDE COUNTY
WRMSHCP (Western Riverside County Multi-Species Habitat Conservation Plan) Cell Group	Not in a Cell Group
WRMSHCP Cell Number	Not in a Cell Number
Vegetation (2005)	California Annual Grassland Alliance California Buckwheat Alliance Mulefat Alliance Urban or development Mapping Unit

FIRE

Fire Hazard Classification (Ord. 787)	HIGH MODERATE VERY HIGH
Fire Responsibility Area	SRA

DEVELOPMENT FEES

CVMSHCP (Coachella Valley Multi-Species Habitat Conservation Plan) Fee Area (Ord 875)	NOT IN THE COACHELLA VALLEY MSHCP FEE
WRMSHCP (Western Riverside County Multi-Species Habitat Conservation Plan) Fee Area (Ord 810)	WESTERN RIVERSIDE COUNTY
Western TUMF (Transportation Uniform Mitigation Fee Ord. 824)	IN OR PARTIALLY WITHIN A TUMF FEE AREA.
Eastern TUMF (Transportation Uniform Mitigation Fee Ord. 673)	NOT IN THE EASTERN TUMF FEE AREA
Road & Bridge Benefit District	NOT IN AN ROAD/BRIDGE BENEFIT DISTRICT
DIF (Development Impact Fee Area Ord. 659)	SOUTHWEST AREA, AREA 19
SKR Fee Area (Stephen's Kagaroo Rat Ord. 663.10)	In or partially within the SKR Fee Area
Development Agreements	Agreement # Not in a Dev Agreement Amendment # Expiration Date Line

TRANSPORTATION more...

Circulation Element Ultimate Right-of-Way	IN OR PARTIALLY WITHIN A CIRCULATION
Road Book Page	130

Transportation Agreements	Contract Number: Not in a Trans Agreement Approval Date: Comments:
CETAP (Community and Environmental Transportation Acceptability Process) Corridors	Not in a CETAP Corridor

HYDROLOGY

Flood Plain Review	*MAYBE REQUIRED, CONTACT RIVERSIDE OUTSIDE FLOODPLAIN, REVIEW NOT
Flood Control District	RIVERSIDE COUNTY FLOOD CONTROL
Watershed	SAN DIEGO
Water District	EASTERN MUNICIPAL WATER DISTRICT

GEOLOGIC

Fault Zone	COUNTY FAULT ZONE
Faults	NOT IN A FAULT LINE
Liquefaction Potential	Moderate
Subsidence	Susceptible
Paleontological Sensitivity	HIGH SENSITIVITY (HIGH A): BASED ON GEOLOGIC FORMATIONS OR MAPPABLE ROCK UNITS THAT ARE ROCKS THAT CONTAIN FOSSILIZED BODY ELEMENTS, AND TRACE FOSSILS SUCH AS TRACKS, NESTS AND EGGS. THESE FOSSILS OCCUR ON OR BELOW THE SURFACE

MISCELLANEOUS

School Districts	TEMECULA VALLEY UNIFIED
Communities	Rancho California
Lighting (Ord. 655)	Zone: B
2010 Census Tract	432.39
Farmland	LOCAL IMPORTANCE OTHER LANDS STATEWIDE IMPORTANCE UNIQUE FARMLAND UNIQUE FARMLAND
Special Notes	NO SPECIAL NOTES
Tax Rate Area & District Name	094147 - CO FREE LIBRARY 094147 - CO STRUCTURE FIRE PROTECTION 094147 - CO WASTE RESOURCE MGMT DIST 094147 - CSA 149 094147 - CSA 152 094147 - ELS MURRIETA ANZA RESOURCE 094147 - ELSINORE AREA ELEM SCHOOL 094147 - EMWD 094147 - EMWD IMP DIST B 094147 - FLOOD CONTROL ADMIN 094147 - FLOOD CONTROL ZN 7 094147 - GENERAL 094147 - GENERAL PURPOSE 094147 - MT SAN JACINTO JR COLLEGE 094147 - MWD EAST 1301999 094147 - RCWD JT WATER 094147 - RCWD R DIV DS 094147 - RIV CO REGIONAL PARK & OPEN SF 094147 - RIVERSIDE CO OFC OF EDUCATION 094147 - SO. CALIF,JT(19,30,33,36,37,56) 094147 - TEMECULA PUBLIC CEMETERY 094147 - TEMECULA UNIFIED 094147 - TEMECULA UNIFIED B&I

PLUS PERMITS & CASES

Administrative Cases

Case	Case Description	Status
N/A	N/A	N/A

Building and Safety Cases

Case	Case Description	Status
BFE170055	AGRICULTURAL GRADING EXEMPTION	APPLIED

Fire Cases

Case	Case Description	Status
FHAZ0203573		
FHAZ0308736		
FHAZ0404865		
FHAZ0505970		
FHAZ0607993		
FHAZ0707961		
FHAZ0902648		
FHAZ1003913		
FHAZ1101634		
FHAZ1206518		
FHAZ1306050		
FHAZ1406156		
FHAZ1503718		
FHAZ1607439		
FHAZ1701464		

Planning Cases

Case	Case Description	Status
AGN00119	NONR FOR RANCHO CA AG PRESERVE 1 MAP 282	APPROVED
CZ07929	ZONE CHANGE FOR TEMECULA VALLEY WINE COUNTRY POLICY AREA - WINERY DISTRICT	ADOPTED
PAR01536	PROJECT FOR MULTI-PHASE DEVEL. CLASS VI WINERY	LDC REVIEW

Survey Cases

Case	Case Description	Status
N/A	N/A	N/A

Transportation Cases

Case	Case Description	Status
N/A	N/A	N/A

DEPARTMENT of ENVIRONMENTAL HEALTH PERMITS

Septic Permits

Record Id	Application Date	Plan Check Approved Date	Final Inspection Date	Approved Date
N/A	N/A	N/A	N/A	N/A

Transportation Permits

Case	Case Description	Status
N/A	CASE_TYPE_DESC	N/A

Well Water Permits

Record Id	PE	Permit Paid Date	Permit Approved Date	Well Finaled Date
N/A	N/A	N/A	N/A	N/A

PERMITS & CASES (HISTORICAL)

Building Permits

Case	Case Description	Status
BFE170055	AGRICULTURAL GRADING EXEMPTION	APPLIED

Code Cases

Case	Case Description	Status
N/A	N/A	N/A

Environmental Health Permits

Case	Case Description	Status
N/A	CASE_TYPE_DESC	N/A

Planning Permits

Case	Case Description	Status
AGN00119	CASE_TYPE_DESC	APPROVED
CZ07929	CASE_TYPE_DESC	APPLIED
PAR01536	CASE_TYPE_DESC	DRT

* DISCLAIMER *

Appendix 5: LID Feasibility Supplemental Information

Information that supports or supplements the determination of LID technical feasibility documented in Section D

Examples of material to provide in Appendix 5 may include but are not limited to the following:

- Technical feasibility criteria for DMAs
- Site specific analysis of technical infeasibility of all LID BMPs (if Alternative Compliance is needed)
- Documentation of Approval criteria for Proprietary Biofiltration BMPs

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 2.3 of the SMR WQMP and Sections D of this Template.

The project site has infiltration rates of 4.54 in/hr @ testing location DR-1 and 1.84 in/hr @ testing location DR-2. Full infiltration will be allowed on the project site and LID BMPs will not be needed.

Appendix 6: LID BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation to supplement Section D

Examples of material to provide in Appendix 6 may include but are not limited to the following:

- DCV calculations,
- LID BMP sizing calculations from Exhibit C of the SMR WQMP
- Design details/drawings from manufacturers for proprietary BMPs

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 3.4 of the SMR WQMP and Sections D.4 of this Template.

APPENDIX 6
PART A
VBMP CALCULATION SPREADSHEETS

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA1 - DG1		

Enter the Area Tributary to this Feature $A_T =$ 0.078 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85th Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Class 2 Base

Effective Impervious Fraction $I_f =$ 0.30

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.23

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.13 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\,(ft^3) = \frac{V_U\,(in\text{-}ac/ac) \times A_T\,(ac) \times 43{,}560\,(ft^2/ac)}{12\,(in/ft)}$$

$V_{BMP} =$ 37 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA1 - IB1		

Enter the Area Tributary to this Feature $A_T =$ 0.159 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu) Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 35 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA1 - IP1		

Enter the Area Tributary to this Feature $A_T =$ 0.529 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 979 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA1 - LS1		

Enter the Area Tributary to this Feature $A_T =$ 0.266 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 58 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA1 - LS2		

Enter the Area Tributary to this Feature A_T = 0.008 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth D_{85} = 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction I_f = 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 2 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA1 - LS3		

Enter the Area Tributary to this Feature A_T = 0.036 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth D_{85} = 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction I_f = 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 8 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA1 - LS4		

Enter the Area Tributary to this Feature $A_T =$ 0.088 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\,(ft^3) = \frac{V_U\,(in\text{-}ac/ac) \times A_T\,(ac) \times 43{,}560\,(ft^2/ac)}{12\,(in/ft)}$$

$V_{BMP} =$ 19 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA1 - LS6		

Enter the Area Tributary to this Feature $A_T =$ 0.067 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85th Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 15 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA1 - LS7		

Enter the Area Tributary to this Feature $A_T =$ 0.006 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 1 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - DG2		

Enter the Area Tributary to this Feature $A_T =$ 0.237 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Class 2 Base

Effective Impervious Fraction $I_f =$ 0.30

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.23

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.13 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 112 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - IB2		

Enter the Area Tributary to this Feature $A_T =$ 0.233 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 51 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - IP2		

Enter the Area Tributary to this Feature $A_T =$ 0.046 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 85 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - IP3		

Enter the Area Tributary to this Feature $A_T =$ 1.508 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 2,792 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA1 - LS5		

Enter the Area Tributary to this Feature $A_T =$ 0.052 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 11 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - LS8		

Enter the Area Tributary to this Feature $A_T =$ 0.078 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 17 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - LS10		

Enter the Area Tributary to this Feature A_T = 0.69 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction I_f = 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 150 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - LS11		

Enter the Area Tributary to this Feature $A_T =$ 0.874 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85th Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 190 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - LS12		

Enter the Area Tributary to this Feature $A_T =$ 0.014 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 3 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - LS13		

Enter the Area Tributary to this Feature $A_T =$ 0.006 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 1 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - LS14		

Enter the Area Tributary to this Feature $A_T =$ 0.025 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 5 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - LS15		

Enter the Area Tributary to this Feature A_T = 0.08 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction I_f = 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 17 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - LS16		

Enter the Area Tributary to this Feature $A_T =$ 0.015 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 3 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - LS17		

Enter the Area Tributary to this Feature $A_T =$ 0.165 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 36 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - R1		

Enter the Area Tributary to this Feature $A_T =$ 0.168 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location	Township	T7S
	Range	R1W
	Section	SEC 29&30

Enter the 85th Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Roofs

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 311 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA2 - R9		

Enter the Area Tributary to this Feature $A_T =$ 0.029 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Roofs

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 54 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - IB3		

Enter the Area Tributary to this Feature $A_T =$ 1.562 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 340 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - IP4		

Enter the Area Tributary to this Feature $A_T =$ 0.218 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 404 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - IP5		

Enter the Area Tributary to this Feature $A_T =$ 0.166 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85th Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 307 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - LS18		

Enter the Area Tributary to this Feature $A_T =$ 0.025 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 5 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - LS19		

Enter the Area Tributary to this Feature $A_T =$ 0.014 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 3 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - LS20		

Enter the Area Tributary to this Feature $A_T =$ 0.007 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 2 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - LS21		

Enter the Area Tributary to this Feature A_T = 0.008 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth D_{85} = 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction I_f = 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 2 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - LS22		

Enter the Area Tributary to this Feature $A_T =$ 0.016 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (\text{in-ac/ac}) \times A_T\ (\text{ac}) \times 43{,}560\ (ft^2/\text{ac})}{12\ (\text{in/ft})}$$

$V_{BMP} =$ 3 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - LS23		

Enter the Area Tributary to this Feature $A_T =$ 0.01 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 2 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - LS24		

Enter the Area Tributary to this Feature $A_T =$ 0.201 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (\text{in-ac/ac}) \times A_T\ (\text{ac}) \times 43{,}560\ (ft^2/\text{ac})}{12\ (\text{in/ft})}$$

$V_{BMP} =$ 44 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - LS25		

Enter the Area Tributary to this Feature $A_T =$ 0.044 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85th Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 10 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - LS26		

Enter the Area Tributary to this Feature $A_T =$ 0.042 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 9 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - LS27		

Enter the Area Tributary to this Feature $A_T =$ 0.052 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 11 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - LS28		

Enter the Area Tributary to this Feature $A_T =$ 0.079 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\,(ft^3) = \frac{V_U\,(in\text{-}ac/ac) \times A_T\,(ac) \times 43{,}560\,(ft^2/ac)}{12\,(in/ft)}$$

$V_{BMP} =$ 17 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - LS29		

Enter the Area Tributary to this Feature $A_T =$ 0.056 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 12 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - LS30		

Enter the Area Tributary to this Feature $A_T =$ 0.067 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 15 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - R2		

Enter the Area Tributary to this Feature $A_T =$ 0.407 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Roofs

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 753 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - R3		

Enter the Area Tributary to this Feature $A_T =$ 0.127 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Roofs

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 235 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - R4		

Enter the Area Tributary to this Feature $A_T =$ 0.123 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Roofs

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 228 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA3 - R5		

Enter the Area Tributary to this Feature $A_T =$ 0.088 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Roofs

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 163 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA4 - IB4		

Enter the Area Tributary to this Feature $A_T =$ 0.189 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85th Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 41 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA4 - IP6		

Enter the Area Tributary to this Feature $A_T =$ 1.935 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 3,582 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA4 - LS31		

Enter the Area Tributary to this Feature $A_T =$ 0.263 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 57 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA4 - LS32		

Enter the Area Tributary to this Feature $A_T =$ 0.274 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85th Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 60 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT18003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA4 - LS33		

Enter the Area Tributary to this Feature A_T = 0.08 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth D_{85} = 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction I_f = 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 17 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA4 - LS34		

Enter the Area Tributary to this Feature $A_T =$ 0.046 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 10 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA4 - LS35		

Enter the Area Tributary to this Feature $A_T =$ 0.009 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 2 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA4 - LS36		

Enter the Area Tributary to this Feature $A_T =$ 0.033 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 7 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA4 - R6		

Enter the Area Tributary to this Feature $A_T =$ 0.495 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Roofs

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 916 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA5 - IB5		

Enter the Area Tributary to this Feature $A_T =$ 0.06 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 13 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA5 - IP7		

Enter the Area Tributary to this Feature $A_T =$ 0.562 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 1,040 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA5 - LS37		

Enter the Area Tributary to this Feature $A_T =$ 0.411 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85th Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (\text{in-ac/ac}) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 90 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA5 - LS38		

Enter the Area Tributary to this Feature $A_T =$ 0.124 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 27 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA5 - LS39		

Enter the Area Tributary to this Feature $A_T =$ 0.294 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 64 ft^3

Notes:

Santa Margarita Watershed BMP Design Volume, V_{BMP} (Rev. 03-2012)	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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA5 - LS40		

Enter the Area Tributary to this Feature $A_T =$ 0.036 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location	Township	T7S
	Range	R1W
	Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 8 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA5 - R7		

Enter the Area Tributary to this Feature $A_T =$ 0.407 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Roofs

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\,(ft^3) = \frac{V_U\,(in\text{-}ac/ac) \times A_T\,(ac) \times 43{,}560\,(ft^2/ac)}{12\,(in/ft)}$$

$V_{BMP} =$ 753 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA5 - R8		

Enter the Area Tributary to this Feature $A_T =$ 0.135 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Roofs

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 250 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA6 - IB6		

Enter the Area Tributary to this Feature $A_T =$ 0.008 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 2 ft^3

Notes:

Santa Margarita Watershed BMP Design Volume, V_{BMP} (Rev. 03-2012)	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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA6 - IP8		

Enter the Area Tributary to this Feature $A_T =$ 0.289 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 535 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA7 - IB7		

Enter the Area Tributary to this Feature $A_T =$ 0.017 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township: T7S

Range: R1W

Section: SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 4 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA7 - IP9		

Enter the Area Tributary to this Feature $A_T =$ 0.202 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 374 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA7 - LS41		

Enter the Area Tributary to this Feature $A_T =$ 0.02 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 4 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA7 - LS42		

Enter the Area Tributary to this Feature $A_T =$ 0.031 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 7 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA8 - IP10		

Enter the Area Tributary to this Feature $A_T =$ 0.574 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction $I_f =$ 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.51 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 1,063 ft^3

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

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	8/27/2019
Designed by	Robert	County/City Case No	PPT180003
Company Project Number/Name	De Portola Winery		
Drainage Area Number/Name	DMA8 - IB8		

Enter the Area Tributary to this Feature $A_T =$ 0.019 acres

85^{th} Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township	T7S
Range	R1W
Section	SEC 29&30

Enter the 85^{th} Percentile, 24-hour Rainfall Depth $D_{85} =$ 0.57

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Ornamental Landscaping

Effective Impervious Fraction $I_f =$ 0.10

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.11

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ $V_u =$ 0.06 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

$V_{BMP} =$ 4 ft^3

Notes:

APPENDIX 6
PART B
BMP DESIGN PROCEDURE CALCULATIONS

Infiltration Trench - Design Procedure	BMP ID	Legend:	Required Entries
	DMA1-IB1		Calculated Cells

Company Name:	Ventura Engineering, Inland	Date:	8/27/19
Designed by:	Robert	County/City Case No.:	PPT180003

Design Volume

Enter the area tributary to this feature, Max = 10 acres — A_t= 1 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 1,154 ft^3

Calculate Maximium Depth of the Reservoir Layer

Enter measured infiltration rate — I = 1.8 in/hr

Enter Factor of Safety, FS (unitless) — FS = 2

Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook

n = 40 %

Calculate D_1. $$D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times (n/100) \times FS}$$ D_1 = 13.50 ft

Enter depth to historic high groundwater mark (measured from finished grade) — 441 ft

Enter depth to top of bedrock or impermeable layer (measured from finished grade) — 550 ft

D_2 is the smaller of:

Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft — D_2 = 430.0 ft

D_{MAX} is the smaller value of D_1 and D_2, must be less than or equal to 8 feet. — D_{MAX}= 8.0 ft

Trench Sizing

Enter proposed reservoir layer depth D_R, must be $\leq D_{MAX}$ — D_R = 2.00 ft

Calculate the design depth of water, d_W

Design $d_W = (D_R) \times (n/100)$ — Design d_W= 0.80 ft

Minimum Surface Area, A_S $$A_S = \frac{V_{BMP}}{d_W}$$ A_S = 1,443 ft^2

Proposed Design Surface Area — A_D = 6,905 ft^2

Minimum Width = D_R + 1 foot pea gravel — 3.00 ft

Sediment Control Provided? (Use pulldown) — Yes

Geotechnical report attached? (Use pulldown) — Yes

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

Infiltration Trench - Design Procedure	BMP ID	Legend:	Required Entries
	DMA2-IB2		Calculated Cells

Company Name:	Ventura Engineering, Inland	Date:	8/27/19
Designed by:	Robert	County/City Case No.:	PPT180003

Design Volume

Enter the area tributary to this feature, Max = 10 acres — A_t= 4 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 3,838 ft^3

Calculate Maximium Depth of the Reservoir Layer

Enter measured infiltration rate — I = 1.8 in/hr

Enter Factor of Safety, FS (unitless) — FS = 2

Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook

n = 40 %

Calculate D_1.

$$D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times (n/100) \times FS}$$

D_1 = 13.50 ft

Enter depth to historic high groundwater mark (measured from finished grade) — 441 ft

Enter depth to top of bedrock or impermeable layer (measured from finished grade) — 550 ft

D_2 is the smaller of:

Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft — D_2 = 430.0 ft

D_{MAX} is the smaller value of D_1 and D_2, must be less than or equal to 8 feet. — D_{MAX}= 8.0 ft

Trench Sizing

Enter proposed reservoir layer depth D_R, must be ≤ D_{MAX} — D_R = 2.00 ft

Calculate the design depth of water, d_W

Design d_W = $(D_R) \times (n/100)$ — Design d_W= 0.80 ft

Minimum Surface Area, A_S — $A_S = \frac{V_{BMP}}{d_W}$ — A_S = 4,798 ft^2

Proposed Design Surface Area — A_D = 10,140 ft^2

Minimum Width = D_R + 1 foot pea gravel — 3.00 ft

Sediment Control Provided? (Use pulldown) — Yes

Geotechnical report attached? (Use pulldown) — Yes

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

Infiltration Trench - Design Procedure	BMP ID	Legend:	Required Entries
	DMA3-IB3		Calculated Cells

Company Name: Ventura Engineering, Inland — Date: 8/19/19

Designed by: Robert — County/City Case No.: PPT180003

Design Volume

Enter the area tributary to this feature, Max = 10 acres — A_t= 3 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 2,565 ft^3

Calculate Maximium Depth of the Reservoir Layer

Enter measured infiltration rate — I = 1.8 in/hr

Enter Factor of Safety, FS (unitless) — FS = 2

Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook

n = 40 %

Calculate D_1.

$$D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times (n/100) \times FS}$$

D_1 = 13.50 ft

Enter depth to historic high groundwater mark (measured from finished grade) — 441 ft

Enter depth to top of bedrock or impermeable layer (measured from finished grade) — 550 ft

D_2 is the smaller of:

Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft — D_2 = 430.0 ft

D_{MAX} is the smaller value of D_1 and D_2, must be less than or equal to 8 feet. — D_{MAX}= 8.0 ft

Trench Sizing

Enter proposed reservoir layer depth D_R, must be $\leq D_{MAX}$ — D_R = 1.00 ft

Calculate the design depth of water, d_W

Design $d_W = (D_R) \times (n/100)$ — Design d_W= 0.40 ft

Minimum Surface Area, A_S — $A_S = \frac{V_{BMP}}{d_W}$ — A_S = 6,413 ft^2

Proposed Design Surface Area — A_D = 68,030 ft^2

Minimum Width = D_R + 1 foot pea gravel — 2.00 ft

Sediment Control Provided? (Use pulldown) — Yes

Geotechnical report attached? (Use pulldown) — Yes

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

Infiltration Trench - Design Procedure	BMP ID	Legend:	Required Entries
	DMA4-IB4		Calculated Cells

Company Name: Ventura Engineering, Inland — Date: 8/27/19

Designed by: Robert — County/City Case No.: PPT180003

Design Volume

Enter the area tributary to this feature, Max = 10 acres — A_t= 3 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 4,692 ft^3

Calculate Maximium Depth of the Reservoir Layer

Enter measured infiltration rate — I = 1.8 in/hr

Enter Factor of Safety, FS (unitless) — FS = 2

Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook

n = 40 %

Calculate D_1. $D_1 = \dfrac{\text{I (in/hr) x 72 hrs}}{\text{12 (in/ft) x (n /100) x FS}}$ — D_1 = 13.50 ft

Enter depth to historic high groundwater mark (measured from finished grade) — 441 ft

Enter depth to top of bedrock or impermeable layer (measured from finished grade) — 550 ft

D_2 is the smaller of:

Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft — D_2 = 430.0 ft

D_{MAX} is the smaller value of D_1 and D_2, must be less than or equal to 8 feet. — D_{MAX}= 8.0 ft

Trench Sizing

Enter proposed reservoir layer depth D_R, must be $\leq D_{MAX}$ — D_R = 5.00 ft

Calculate the design depth of water, d_W

Design d_W = (D_R) x (n/100) — Design d_W= 2.00 ft

Minimum Surface Area, A_S — $A_S = \dfrac{V_{BMP}}{d_W}$ — A_S = 2,346 ft^2

Proposed Design Surface Area — A_D = 2,829 ft^2

Minimum Width = D_R + 1 foot pea gravel — 6.00 ft

Sediment Control Provided? (Use pulldown) — Yes

Geotechnical report attached? (Use pulldown) — Yes

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

Infiltration Trench - Design Procedure	BMP ID	Legend:	Required Entries
	DMA5-IB5		Calculated Cells

Company Name:	Ventura Engineering, Inland	Date:	8/27/19
Designed by:	Robert	County/City Case No.:	PPT180003

Design Volume

Enter the area tributary to this feature, Max = 10 acres — A_t= 2 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 2,245 ft^3

Calculate Maximium Depth of the Reservoir Layer

Enter measured infiltration rate — I = 1.8 in/hr

Enter Factor of Safety, FS (unitless) — FS = 2

Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook

n = 40 %

Calculate D_1.

$$D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times (n/100) \times FS}$$

D_1 = 13.50 ft

Enter depth to historic high groundwater mark (measured from finished grade) — 441 ft

Enter depth to top of bedrock or impermeable layer (measured from finished grade) — 550 ft

D_2 is the smaller of:

Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft — D_2 = 430.0 ft

D_{MAX} is the smaller value of D_1 and D_2, must be less than or equal to 8 feet. — D_{MAX}= 8.0 ft

Trench Sizing

Enter proposed reservoir layer depth D_R, must be $\leq D_{MAX}$ — D_R = 3.00 ft

Calculate the design depth of water, d_W

Design $d_W = (D_R) \times (n/100)$ — Design d_W= 1.20 ft

Minimum Surface Area, A_S — $A_S = \frac{V_{BMP}}{d_W}$ — A_S = 1,871 ft^2

Proposed Design Surface Area — A_D = 2,608 ft^2

Minimum Width = D_R + 1 foot pea gravel — 4.00 ft

Sediment Control Provided? (Use pulldown) — Yes

Geotechnical report attached? (Use pulldown) — Yes

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

Infiltration Trench - Design Procedure	BMP ID	Legend:	Required Entries
	DMA6-IB6		Calculated Cells

Company Name: Ventura Engineering, Inland — Date: 8/27/19

Designed by: Robert — County/City Case No.: PPT180003

Design Volume

Enter the area tributary to this feature, Max = 10 acres — A_t= 0 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 537 ft^3

Calculate Maximium Depth of the Reservoir Layer

Enter measured infiltration rate — I = 1.8 in/hr

Enter Factor of Safety, FS (unitless) — FS = 2

Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook

n = 40 %

Calculate D_1.

$$D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times (n/100) \times FS}$$

D_1 = 13.50 ft

Enter depth to historic high groundwater mark (measured from finished grade) — 441 ft

Enter depth to top of bedrock or impermeable layer (measured from finished grade) — 550 ft

D_2 is the smaller of:

Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft — D_2 = 430.0 ft

D_{MAX} is the smaller value of D_1 and D_2, must be less than or equal to 8 feet. — D_{MAX}= 8.0 ft

Trench Sizing

Enter proposed reservoir layer depth D_R, must be $\leq D_{MAX}$ — D_R = 4.00 ft

Calculate the design depth of water, d_W

$$\text{Design } d_W = (D_R) \times (n/100)$$

Design d_W= 1.60 ft

Minimum Surface Area, A_S

$$A_S = \frac{V_{BMP}}{d_W}$$

A_S = 336 ft^2

Proposed Design Surface Area — A_D = 350 ft^2

Minimum Width = D_R + 1 foot pea gravel — 5.00 ft

Sediment Control Provided? (Use pulldown) — Yes

Geotechnical report attached? (Use pulldown) — Yes

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

Infiltration Trench - Design Procedure	BMP ID	Legend:	Required Entries
	DMA7-IB7		Calculated Cells

Company Name:	Ventura Engineering, Inland	Date:	8/27/19
Designed by:	Robert	County/City Case No.:	PPT180003

Design Volume

Enter the area tributary to this feature, Max = 10 acres — A_t= 0 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 389 ft^3

Calculate Maximium Depth of the Reservoir Layer

Enter measured infiltration rate — I = 1.8 in/hr

Enter Factor of Safety, FS (unitless) — FS = 2

Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook

n = 40 %

Calculate D_1. $$D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times (n/100) \times FS}$$ D_1 = 13.50 ft

Enter depth to historic high groundwater mark (measured from finished grade) — 441 ft

Enter depth to top of bedrock or impermeable layer (measured from finished grade) — 550 ft

D_2 is the smaller of:

Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft — D_2 = 430.0 ft

D_{MAX} is the smaller value of D_1 and D_2, must be less than or equal to 8 feet. — D_{MAX}= 8.0 ft

Trench Sizing

Enter proposed reservoir layer depth D_R, must be ≤ D_{MAX} — D_R = 5.00 ft

Calculate the design depth of water, d_W

Design d_W = $(D_R) \times (n/100)$ — Design d_W= 2.00 ft

Minimum Surface Area, A_S $$A_S = \frac{V_{BMP}}{d_W}$$ A_S = 195 ft^2

Proposed Design Surface Area — A_D = 750 ft^2

Minimum Width = D_R + 1 foot pea gravel — 6.00 ft

Sediment Control Provided? (Use pulldown) — Yes

Geotechnical report attached? (Use pulldown) — Yes

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

Infiltration Trench - Design Procedure	BMP ID	Legend:	Required Entries
	DMA8-IB8		Calculated Cells

Company Name:	Ventura Engineering, Inland	Date:	8/27/19
Designed by:	Robert	County/City Case No.:	PPT180003

Design Volume

Enter the area tributary to this feature, Max = 10 acres — A_t= 1 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 1,067 ft^3

Calculate Maximium Depth of the Reservoir Layer

Enter measured infiltration rate — I = 1.8 in/hr

Enter Factor of Safety, FS (unitless) — FS = 2

Obtain from Table 1, Appendix A: "Infiltration Testing" of this BMP Handbook

n = 40 %

Calculate D_1.

$$D_1 = \frac{I\ (in/hr) \times 72\ hrs}{12\ (in/ft) \times (n/100) \times FS}$$

D_1 = 13.50 ft

Enter depth to historic high groundwater mark (measured from finished grade) — 441 ft

Enter depth to top of bedrock or impermeable layer (measured from finished grade) — 550 ft

D_2 is the smaller of:

Depth to groundwater - 11 ft; & Depth to impermeable layer - 6 ft — D_2 = 430.0 ft

D_{MAX} is the smaller value of D_1 and D_2, must be less than or equal to 8 feet. — D_{MAX}= 8.0 ft

Trench Sizing

Enter proposed reservoir layer depth D_R, must be $\leq D_{MAX}$ — D_R = 5.00 ft

Calculate the design depth of water, d_W

Design $d_W = (D_R) \times (n/100)$ — Design d_W= 2.00 ft

Minimum Surface Area, A_S

$$A_S = \frac{V_{BMP}}{d_W}$$

A_S = 534 ft^2

Proposed Design Surface Area — A_D = 825 ft^2

Minimum Width = D_R + 1 foot pea gravel — 6.00 ft

Sediment Control Provided? (Use pulldown) — Yes

Geotechnical report attached? (Use pulldown) — Yes

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

APPENDIX 6
PART C
DESIGN REFERENCES

3.2 INFILTRATION TRENCH

Type of BMP	LID – Infiltration
Priority Level	Priority 1 – Full Retention
Treatment Mechanisms	Infiltration, Evapotranspiration (when vegetated), Evaporation
Infiltration Rate Range	> 0.8 in/hr factored design infiltration rate
Maximum Drainage Area	10 acres

Description

Infiltration trenches are shallow excavated areas that are filled with rock material to create a subsurface reservoir layer. The trench is sized to store the design capture volume, V_{BMP}, in the void space between the rocks. Over a period of 72 hours, the stormwater infiltrates through the bottom of the trench into the surrounding soil. Infiltration basins are highly effective in removing all targeted pollutants from stormwater runoff.

Figure 1 shows the components of an infiltration trench. The section shows the reservoir layer and observation well, which is used to monitor water depth. An overflow pipe that is used to bypass flows once the trench fills with stormwater is also shown.

Site Considerations

The use of infiltration trenches may be restricted by concerns over groundwater contamination, soil permeability, and clogging at the site. See the Santa Margarita Region (SMR) Water Quality Management Plan (WQMP) for any specific feasibility considerations for using infiltration BMPs. Where this BMP is being used, the soil beneath the basin must be thoroughly evaluated in a geotechnical report since the underlying soils are critical to the basin's long term performance. These basins may not be appropriate for the following site conditions:

- Industrial sites or locations where spills of toxic materials may occur.
- Sites with very low soil infiltration rates.
- Sites with high groundwater tables or excessively high soil infiltration rates, where pollutants can affect groundwater quality.
- Sites with unstabilized soil or construction activity upstream.
- On steeply sloping terrain.
- Infiltration trenches located in a fill condition should refer to Appendix A of this Handbook for details on special requirements/restrictions.

This BMP has a flat surface area, so it may be challenging to incorporate into steeply sloping terrain.

Setbacks

Always consult your geotechnical engineer for site specific recommendations regarding setbacks for infiltration trenches. Recommended setbacks are needed to protect buildings, walls, onsite or nearby wells, streams, and tanks. Setbacks should be considered early in the design process as they affect where infiltration facilities may be placed and how deep they are allowed to be. For instance, depth setbacks can dictate fairly shallow facilities that will have a larger footprint and, in some cases, may make an infiltration trench infeasible. In that instance, another BMP must be selected.

In addition to setbacks recommended by the geotechnical engineer, infiltration trenches must be set back:

- 10 feet from the historic high groundwater mark (measured vertically from the bottom of the trench, as shown in Figure 1)
- 5 feet from bedrock or impermeable surface layer (measured vertically from the bottom of the trench, as shown in Figure 1)
- From all mature tree drip lines as indicated in Figure 1
- 100 feet horizontally from wells, tanks or springs

Setbacks to walls and foundations must be included as part of the Geotechnical Report.

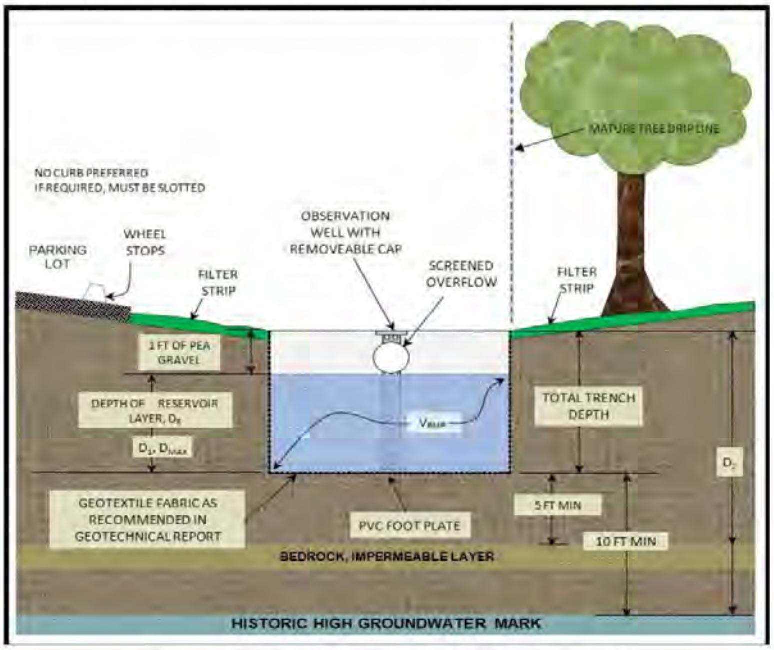
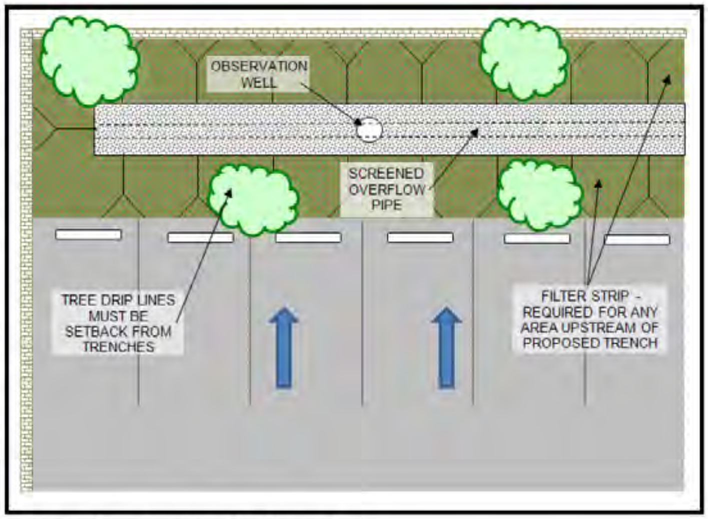


Figure 1 Section View of an Infiltration Trench

Sediment Control



Infiltration BMPs have the risk of becoming plugged over time. To prevent this, sediment must be removed before stormwater enters the trench. Both sheet and concentrated flow types have requirements that should be considered in the design of an infiltration trench.

When sheet type flows approach the trench along its length (as illustrated in Figure 2), a vegetated filter strip should be placed between the trench and the upstream drainage area. The filter strip must be a minimum of 5 feet wide and planted with grasses (preferably native) or covered with mulch.

Concentrated flows require a different approach. A 2004 Caltrans BMP Retrofit Report found that flow spreaders recommended in many water quality manuals are ineffective in distributing concentrated flows. As such, concentrated flows should either be directed toward a traditional vegetated swale (as shown on the right side of Figure 3) or to catch basin filters that can remove litter and sediment. Catch basins must discharge runoff as surface flow above the trench; they cannot outlet directly into the reservoir layer of the infiltration trench. If catch basins are used, the short and long term costs of the catch basin filters should be considered.

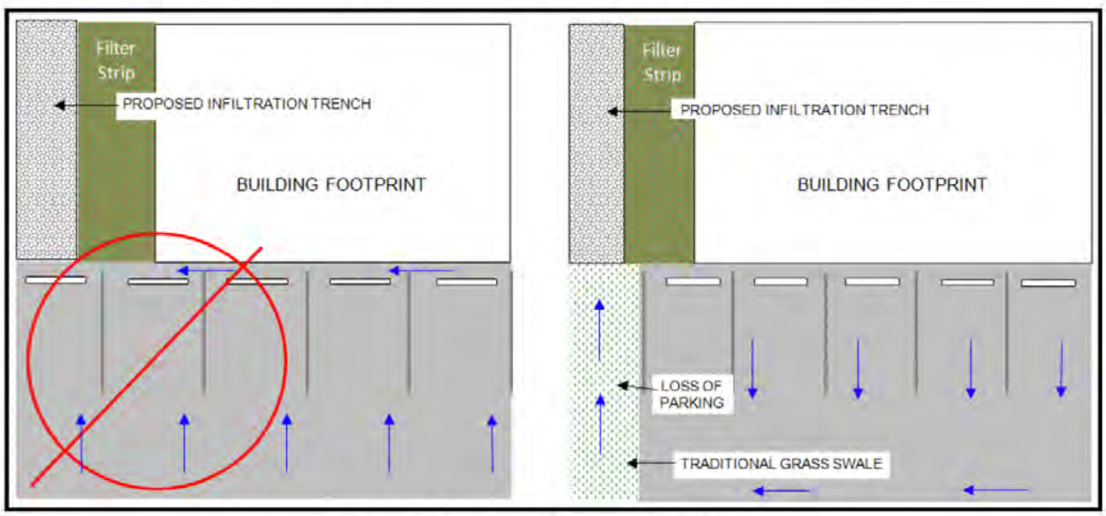


Figure 3 Plan View, Concentrated Flows

Additional Considerations

Class V Status

In certain circumstances, for example, if an infiltration trench is "deeper than its widest surface dimension," or includes an assemblage of perforated pipes, drain tiles, or other similar mechanisms intended to distribute fluids below the surface of the ground, it would probably be considered by the EPA to be a Class V injection well. Class V injection wells are subject to regulations and reporting requirements via the Underground Injection Control (UIC) Program. To ensure that infiltration trenches are not considered Class V wells, the design procedure in this manual requires that the trench not be deeper than it is wide.

Geotechnical Report

A geotechnical report must be included for all infiltration trenches. Appendix A of this Handbook entitled "Infiltration Testing Guidelines", details which types of infiltration tests are acceptable and how many tests or boring logs must be performed. A Geotechnical Report must be submitted in support of all infiltration trenches. Setbacks to walls and foundations must be included in the Geotechnical Report.

Observation Wells

One or more observation wells should be provided. The observation well consists of a vertical section of perforated pipe, 4 to 6 inches in diameter, installed flush with top of trench on a foot plate and have a locking, removable cap.

Overflow

An overflow route is needed to bypass storm flows larger than the V_{BMP} or in the event of clogging. Overflow systems must connect to an acceptable discharge point such as a downstream conveyance system.

Maintenance Access

Normal maintenance of an infiltration trench includes maintenance of the filter strip as well as debris and trash removal from the surface of the trench and filter strip. More substantial maintenance requiring vehicle access may be required every 5 to 10 years. Vehicular access along the length of the swale should be provided to all infiltration trenches. It is preferred that trenches be placed longitudinally along a street or adjacent to a parking lot area. These conditions have high visibility which makes it more likely that the trench will be maintained on a regular basis.

INFILTRATION TRENCH BMP FACT SHEET

Inspection and Maintenance

Schedule	Inspection and Maintenance Activity
Every two weeks, or as often as necessary to maintain a pleasant appearance	- Maintain adjacent landscaped areas. Remove clippings from landscape maintenance activities. - Remove trash & debris
3 days after Major Storm Events	- Check for surface ponding. If ponding is only above the trench, remove, wash and replace pea gravel. May be needed every 5-10 years. - Check observation well for ponding. If the trench becomes plugged, remove rock materials. Provide a fresh infiltration surface by excavating an additional 2-4 inches of soil. Replace the rock materials.

Design and Sizing Criteria

Design Parameter	Design Criteria
Design Volume	V_{BMP}
Design Drawdown time	72 hrs
Maximum Tributary Drainage Area	10 acres
Maximum Trench Depth	8.0 ft
Width to Depth Ratio	Width must be greater than depth
Reservoir Rock Material	AASHTO #3 or 57 material or a clean, washed aggregate 1 to 3-in diameter equivalent
Filter Strip Width	Minimum of 5 feet in the direction of flow for all areas draining to trench
Filter Strip Slope	Max slope = 1%
Filter Strip Materials	Mulch or grasses (non-mowed variety preferred)
Historic High Groundwater Mark	10 ft or more below bottom of trench
Bedrock/Impermeable Layer Setback	5 ft or more below bottom of trench
Tree Setbacks	Mature tree drip line must not overhang the trench
Trench Lining Material	As recommended in Geotechnical Report

Infiltration Trench Design Procedure

1. Enter the area tributary to the trench, maximum drainage area is 10 acres.

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

3. Enter the site infiltration rate, found in the geotechnical report.

4. Enter the factor of safety from Table 1 of Appendix A, Infiltration Testing.

5. Determine the maximum reservoir layer depth, D_{MAX}. The value is obtained by taking the smaller of two depth equations but may never exceed 8 feet. The first depth, D_1 is related to the infiltration rate of the soil. The second depth, D_2, is related to required setbacks to groundwater, bedrock/impermeable layer. These parameters are shown in Figure 1.

   Calculate D_1.

$$D_1 = \frac{I\left(^{in}/_{hr}\right) \times 72\ (hrs)}{12\left(^{in}/_{ft}\right) \times {}^{n}/_{100} \times FS}$$

   Where:
   - I = site infiltration rate (in/hr), found in the geotechnical report
   - FS = factor of safety, refer to Appendix A - Infiltration Testing
   - n = porosity of the trench material, 40%

   Calculate D_2. Enter the depth to the seasonal high groundwater and bedrock/impermeable layer measured from the finished grade. The spreadsheet checks the minimum setbacks shown in Figure 1 and selects the smallest value. The equations are listed below for those doing hand calculations.

   Minimum Setbacks (includes 1 foot for pea gravel):
   = Depth to historic high groundwater mark - 11 feet
   = Depth to impermeable layer - 6 feet

   D_2 is the smaller of the two values.

   D_{MAX} is the smaller value of D_1 and D_2, and must be less than or equal to 8 feet.

6. Enter the proposed reservoir layer depth, D_R. The value must be no greater than D_{MAX}.

7. Find the required surface area of the trench, A_S. Once D_R is entered, the spreadsheet will calculate the corresponding depth of water and the minimum surface area of the trench.

$$Design\ d_W = D_R \times \left({}^{n}/_{100}\right) \qquad A_S = \frac{V_{BMP}}{Design\ d_W}$$

Where:

A_S = minimum area required (ft^2)
V_{BMP} = BMP storage volume (ft^3)
Design d_W = Depth of water in reservoir layer (ft)

8. Enter the proposed design surface area; it must be greater than the minimum surface area.

9. Calculate the minimum trench width. This is to ensure that EPA's Class V Injection well status is not triggered. The total trench depth (shown in Figure 1) includes the upper foot where the overflow pipe is located. The minimum surface dimension is D_R + 1 foot.

Additional Items

The following items detailed in the preceding sections should also be addressed in the design.

- Sediment Control
- Geotechnical Report
- Observation well(s)
- Overflow

Reference Material

California Stormwater Quality Association. California Stormwater BMP Handbook New Development and Redevelopment. 2003.

County of Los Angeles Department of Public Works. Stormwater BMP Best Management Practice Design and Maintenance Manual for Publicly Maintained Storm Drain Systems. Los Angeles, CA, 2009.

LandSaver Stormwater Management System. Tech Sheet - Porosity of Structural Backfill. 2006.

United States Environmental Protection Agency. Office of Water, Washington D.C. Storm Water Technology Fact Sheet Vegetated Swales. 1999.

United States Environmental Protection Agency. Office of Water. Memorandum on Clarification on Which Stormwater Infiltration Practices/technologies Have the Potential to Be Regulated as "Class V" Wells by Underground Injection Control Program. By Linda Boornazian and Steve Heare. Washington D.C., 2008.

Ventura Countywide Stormwater Quality Management Program. Land Development Guidelines Biofilter Fact Sheet. Ventura, CA, 2001.

Ventura Countywide Stormwater Quality Management Program. Technical Guidance Manual for Stormwater Quality Control Measures. Ventura, CA, 2002.

APPENDIX 6
PART D
GROUNDWATER DATA

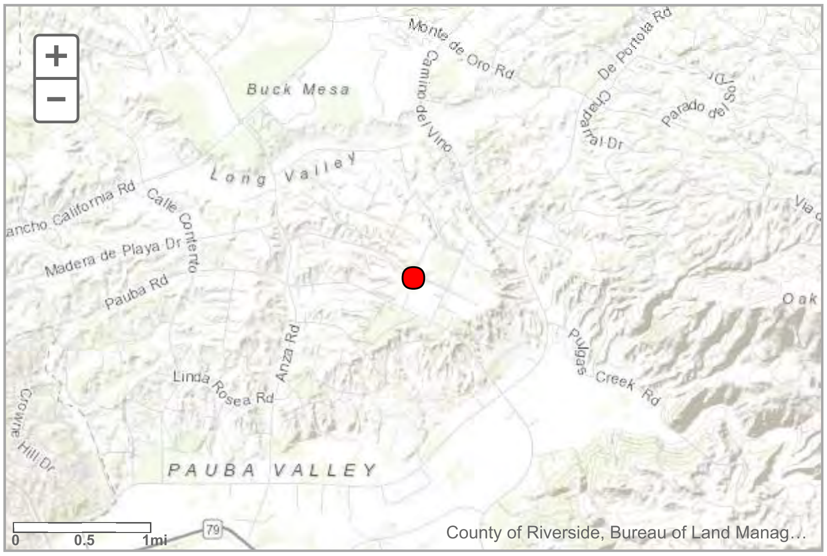
Groundwater Levels for Station 335174N1170339W001

Data for your selected well is shown in the tabbed interface below. To view data managed in the updated WDL tables, including data collected under the CASGEM program, click the "Recent Groundwater Level Data" tab. To view data stored in the former WDL tables, click the "Historical Groundwater Level Data" tab. To download the data in CSV format, click the "Download CSV File" button on the respective tab. Please note that the vertical datum for "recent" measurements is NAVD88, while the vertical datum for "historical" measurements is NGVD29. To change your well selection criteria, click the "Perform a New Well Search" button.

Station Data Recent Groundwater Level Data Historical Groundwater Level Data

State Well Number:
Local Well ID: RCWD 462
Site Code: 335174N1170339W001
Latitude (NAD83): 33.517374
Longitude (NAD83): -117.033937
Groundwater Basin (code): Temecula Valley (9-005)

Well Use: Observation
Well Status: Active
Well Completion Report Number:
Reference Point Elevation (NAVD88 ft): 1485.600
Ground Surface Elevation (NAVD88 ft): 1483.400
Total Depth (ft): 885
Perforated Interval Depths (ft):



Perform a New Well Search

Groundwater Levels for Station 335174N1170339W001

Data for your selected well is shown in the tabbed interface below. To view data managed in the updated WDL tables, including data collected under the CASGEM program, click the "Recent Groundwater Level Data" tab. To view data stored in the former WDL tables, click the "Historical Groundwater Level Data" tab. To download the data in CSV format, click the "Download CSV File" button on the respective tab. Please note that the vertical datum for "recent" measurements is NAVD88, while the vertical datum for "historical" measurements is NGVD29. To change your well selection criteria, click the "Perform a New Well Search" button.

Station Data **Recent Groundwater Level Data** Historical Groundwater Level Data

Download CSV File

Date	RPE	GSE	RPWS	WSE	GS to WS	Msmt Code	CASGEM Msmt	Agency	Comments
10/02/2011 10:00	1485.600	1483.400	408.5	1077.1	406.3		Y	413	
10/30/2011 07:27	1485.600	1483.400	407.5	1078.1	405.3		Y	413	
12/04/2011 10:09	1485.600	1483.400	396.2	1089.4	394		Y	413	
01/02/2012 11:00	1485.600	1483.400	394.2	1091.4	392		Y	413	
01/29/2012 14:45	1485.600	1483.400	397.1	1088.5	394.9		Y	413	
02/26/2012 11:13	1485.600	1483.400	394.6	1091	392.4		Y	413	
04/01/2012 14:29	1485.600	1483.400	389.6	1096	387.4		Y	413	
04/29/2012 13:00	1485.600	1483.400	385.8	1099.8	383.6		Y	413	
06/03/2012 11:30	1485.600	1483.400	395	1090.6	392.8		Y	413	
07/01/2012 12:31	1485.600	1483.400	393.1	1092.5	390.9		Y	413	
08/01/2012 09:40	1485.600	1483.400	397.2	1088.4	395		Y	413	
09/01/2012 13:57	1485.600	1483.400	404	1081.6	401.8		Y	413	
09/30/2012 13:19	1485.600	1483.400	409.8	1075.8	407.6		Y	413	
10/28/2012 09:30	1485.600	1483.400	413	1072.6	410.8		Y	413	
12/02/2012 09:35	1485.600	1483.400	414.1	1071.5	411.9		Y	413	
01/02/2013 11:00	1485.600	1483.400	403	1082.6	400.8		Y	413	
01/27/2013 10:00	1485.600	1483.400	408.4	1077.2	406.2		Y	413	
03/03/2013 13:40	1485.600	1483.400	406.3	1079.3	404.1		Y	413	
03/31/2013 15:45	1485.600	1483.400	411.9	1073.7	409.7		Y	413	
04/28/2013 08:43	1485.600	1483.400	417	1068.6	414.8		Y	413	
06/02/2013 13:16	1485.600	1483.400	419.7	1065.9	417.5		Y	413	
06/27/2013 09:52	1485.600	1483.400	416.6	1069	414.4		Y	413	
07/28/2013 10:29	1485.600	1483.400	422.3	1063.3	420.1		Y	413	
09/08/2013 10:47	1485.600	1483.400	423.7	1061.9	421.5		Y	413	
09/29/2013 13:45	1485.600	1483.400	421.2	1064.4	419		Y	413	
10/31/2013 13:24	1485.600	1483.400	424.2	1061.4	422		Y	413	
12/03/2013 13:47	1485.600	1483.400	420	1065.6	417.8		Y	413	
01/06/2014 10:04	1485.600	1483.400	421.6	1064	419.4		Y	413	
02/03/2014 11:17	1485.600	1483.400	421.2	1064.4	419		Y	413	
03/03/2014 12:55	1485.600	1483.400	422.8	1062.8	420.6		Y	413	
04/02/2014 13:52	1485.600	1483.400	358.2	1127.4	356		Y	413	
05/04/2014 09:00	1485.600	1483.400	440.62	1044.98	438.42		Y	413	
06/01/2014 09:30	1485.600	1483.400	390.7	1094.9	388.5		Y	413	
06/29/2014 09:06	1485.600	1483.400	394.37	1091.23	392.17		Y	413	
07/27/2014 09:36	1485.600	1483.400	441.39	1044.21	439.19		Y	413	

09/07/2014 11:30	1485.600	1483.400	362.6	1123	360.4		Y	413	
10/05/2014 08:22	1485.600	1483.400	364.57	1121.03	362.37		Y	413	
11/02/2014 12:30	1485.600	1483.400	362.2	1123.4	360		Y	413	
12/02/2014 11:07	1485.600	1483.400	441.87	1043.73	439.67		Y	413	
01/06/2015 10:10	1485.600	1483.400	362.4	1123.2	360.2		Y	413	
02/02/2015 10:54	1485.600	1483.400	434.71	1050.89	432.51		Y	413	
03/02/2015 12:00	1485.600	1483.400	436.75	1048.85	434.55		Y	413	
03/29/2015 10:30	1485.600	1483.400	438.8	1046.8	436.6		Y	413	
05/03/2015 09:20	1485.600	1483.400	446.31	1039.29	444.11		Y	413	
05/31/2015 11:10	1485.600	1483.400	445.91	1039.69	443.71		Y	413	
06/28/2015 08:15	1485.600	1483.400	362	1123.6	359.8	Q-6	Y	413	
08/02/2015 08:44	1485.600	1483.400	361.36	1124.24	359.16	Q-6	Y	413	
08/30/2015 09:15	1485.600	1483.400	543.3	942.3	541.1	Q-6	Y	413	
09/27/2015 09:53	1485.600	1483.400	549.4	936.2	547.2	Q-6	Y	413	
11/01/2015 10:35	1485.600	1483.400	553.4	932.2	551.2	Q-6	Y	413	
12/06/2015 09:27	1485.600	1483.400	462.53	1023.07	460.33		Y	413	
01/04/2016 10:24	1485.600	1483.400	453.23	1032.37	451.03		Y	413	
01/31/2016 09:52	1485.600	1483.400	410.7	1074.9	408.5		Y	413	
02/28/2016 12:52	1485.600	1483.400	398.36	1087.24	396.16	Q-6	Y	413	
04/03/2016 08:34	1485.600	1483.400	447.23	1038.37	445.03		Y	413	
05/01/2016 08:22	1485.600	1483.400	447.86	1037.74	445.66		Y	413	
06/05/2016 07:57	1485.600	1483.400	449.15	1036.45	446.95		Y	413	
07/03/2016 08:00	1485.600	1483.400	364.6	1121	362.4	Q-6	Y	413	
08/28/2016 09:29	1485.600	1483.400	450.41	1035.19	448.21		Y	413	
10/02/2016 09:24	1485.600	1483.400	451.52	1034.08	449.32		Y	413	
10/30/2016 09:36	1485.600	1483.400	450.66	1034.94	448.46		Y	413	hit the wrong ke
12/04/2016 09:29	1485.600	1483.400	452.39	1033.21	450.19		Y	413	
01/01/2017 09:52	1485.600	1483.400	457.46	1028.14	455.26		Y	413	
02/01/2017 15:30	1485.600	1483.400	364.12	1121.48	361.92		Y	413	
03/01/2017 13:12	1485.600	1483.400	364.74	1120.86	362.54		Y	413	
04/01/2017 10:39	1485.600	1483.400	433.94	1051.66	431.74		Y	413	
05/01/2017 11:35	1485.600	1483.400	439.12	1046.48	436.92		Y	413	
06/01/2017 12:32	1485.600	1483.400	440.17	1045.43	437.97		Y	413	
07/03/2017 14:09	1485.600	1483.400	442.23	1043.37	440.03		Y	413	
08/06/2017 14:05	1485.600	1483.400	440	1045.6	437.8		Y	413	
09/03/2017 12:50	1485.600	1483.400	437.13	1048.47	434.93		Y	413	
10/01/2017 08:38	1485.600	1483.400	436.45	1049.15	434.25		Y	413	
11/05/2017 10:15	1485.600	1483.400	436.98	1048.62	434.78		Y		
12/03/2017 10:01	1485.600	1483.400	429.76	1055.84	427.56		Y		

All elevation and depth measurements are in feet. The vertical datum for recent measurements is NAVD88.

Perform a New Well Search

Groundwater Levels for Station 335174N1170339W001

Data for your selected well is shown in the tabbed interface below. To view data managed in the updated WDL tables, including data collected under the CASGEM program, click the "Recent Groundwater Level Data" tab. To view data stored in the former WDL tables, click the "Historical Groundwater Level Data" tab. To download the data in CSV format, click the "Download CSV File" button on the respective tab. Please note that the vertical datum for "recent" measurements is NAVD88, while the vertical datum for "historical" measurements is NGVD29. To change your well selection criteria, click the "Perform a New Well Search" button.

Station Data | Recent Groundwater Level Data | **Historical Groundwater Level Data**

No historical data found.

Perform a New Well Search

APPENDIX 6
PART E
TRASH BMP REFERENCES

Certified Multi-Benefit Treatment Systems Complying With Trash Full Capture System Requirements

The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Boards) promote Low Impact Development (LID) designs to capture, reuse, treat, and/or infiltrate storm water runoff. The LID systems and individual treatment controls that provide multiple benefits and comply with the trash Full Capture System definition within the Trash Policy Amendments[1] are termed "Multi-Benefit Treatment Systems." Per the Trash Policy Amendments, the State Water Board Executive Director certifies a Multi-Benefit Treatment System that performs and complies with the following criteria:

1. Traps all particles that are 5 mm or greater up to the region specific design flow[2] or corresponding volume;
2. Complies with one of the following trash treatment designs applicable to the Multi-Benefit Treatment System:
   a. **Flow-based design** that includes:
      1) A trash treatment capacity equal to or greater than the peak runoff flow collected during the region specific one-year, one-hour storm event from the applicable drainage area, or
      2) A trash treatment capacity equal to or greater than the corresponding flow capacity; or
   b. **Volume-based design** that includes a trash treatment capacity that is:
      1) Equal to or greater than the volumetric sizing criteria for treatment systems in the applicable State or Regional Water Board storm water permit, and
      2) Equal or greater than the volume generated from a one-year, one-hour storm event.
3. Incorporates an operation and maintenance plan sufficient to ensure that the captured trash does not migrate from the site; and
4. Is constructed per design plans that are stamped and signed by a registered California licensed professional civil engineer (see Bus. & Prof. Code Section 6700, et seq.).

The Multi-Benefit Treatment Systems listed below are certified by the State Water Board Executive Director. The Executive Director reserves the right to remove any Multi-Benefit Treatment System from this list.

State Water Board Certified Multi-Benefit Treatment Systems
(Click links to access description and information sheets)
Bioretention
Capture and Use Systems
Detention Basin
Infiltration Trench or Basin
Media Filter

[1] Resolution 2015-0019. Amendment to the Water Quality Control Plan for Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California.

[2] The region specific one-year, one-hour storm (or design flow) may be obtained from the National Oceanic and Atmospheric Administration's Atlas 14 Point Precipitation Frequency Estimates at https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html

Infiltration Trench or Basin

Trash Best Management Practices (BMP) Minimum Specifications

Figure A: Urban Infiltration Trench BMP

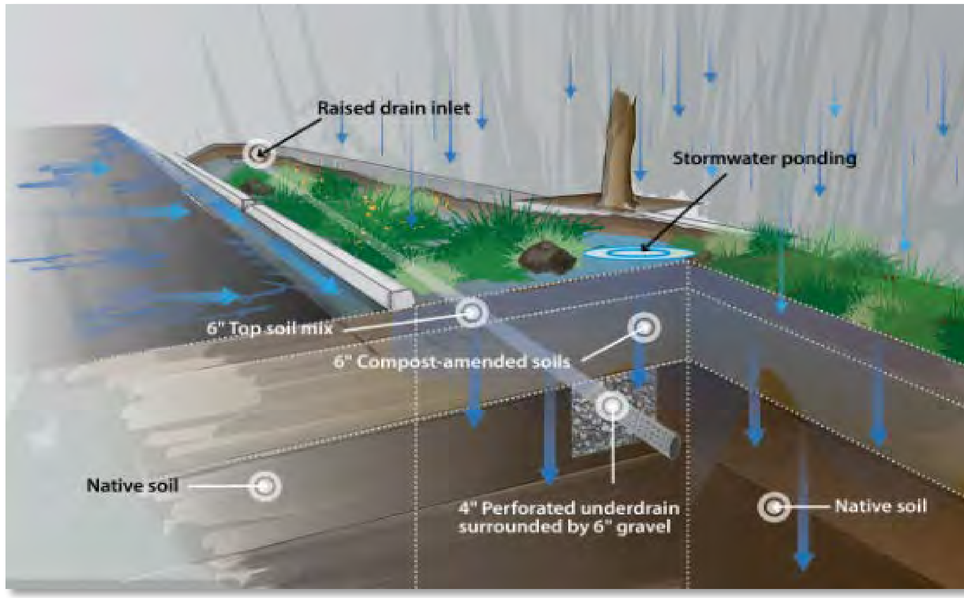


Figure B: CSUS-Sacramento Generic Urban Infiltration Trench BMP Detail

Description

An infiltration trench or basin BMP captures and infiltrates storm water runoff into native soils. Infiltration trench or basin BMPs come in a variety of shapes and sizes and the final appearance may vary substantially. Infiltration trenches may be backfilled with porous media such as gravel, sand, Cornell Soil, or various locally earthed rocks known not to generate pollutants of concern to the downstream waters. Subsurface designs may be comprised of perforated pipe, chambers, open bottom concrete galleries or other high voids structures. These trenches and basins store the design water quality volume for infiltration to underlying soils.

Performance and Design

1. The infiltration trench BMPs must trap trash particles that are 5 mm or greater, and include a screen[1] at the BMP inlet, overflow, or bypass outlet to trap these particles from either of the following BMP designs:
   a. A flow-based design for: 1) the peak flow rates generated by the region specific one-year, one-hour storm event from the applicable subdrainage area; or 2) the trash treatment capacity equal to or greater than the corresponding storm drain's design flow rate; or
   b. A volume-based design that includes a trash treatment capacity that is equal to or greater than the volumetric sizing criteria for treatment systems in the applicable storm water permit, but not less than the volume generated from a one-year, one-hour storm event.
2. A screen is not required if the BMP has capacity to treat either of these flows through media filtration or infiltration into native or amended soils;
3. The infiltration trench BMPs must have a minimum treatment capacity for either of the flow rates described in 1.a. or 1.b. above. State Water Board recommends using the Rational Equation method to calculate the peak flow rate for runoff from a small subdrainage area that is approximately 50 acres or less. The Rational Equation is expressed as Q = CiA, where
   Q = design peak runoff rate, cfs,
   C = runoff coefficient, dimensionless,
   i = rainfall intensity as determined per the rainfall isohyetal map specific to each region, inches/hour, and
   A = subdrainage area, acres.
   State Water Board allows other calculation methods for drainage areas greater than 50 acres to accurately calculate and predict the peak flow rates; provided a registered California licensed professional engineer documents the calculations within the design plans.
4. The infiltration trench BMPs design plans must be stamped and signed by a registered California licensed professional civil engineer (see Bus. & Prof. Code Section 6700, et seq.).

Maintenance

Regular maintenance is required to maintain adequate trash capture capacity and to ensure that captured trash does not migrate offsite. The owner should establish a maintenance schedule based on site-specific factors, including the size of the infiltration trench BMP, storm frequency, and characterization of upstream trash and vegetation accumulation.

[1] Upon approval by the Regional Water Quality Control Board Executive Officer, a 5mm screen will not be required if there is an external design feature or up-gradient structure designed to bypass flows exceeding the region specific one-year, one-hour storm event; or when the BMP's capacity to trap particles exceeds flows generated by the one-year, one-hour storm event.

Appendix 7: Hydromodification

Supporting Detail Relating to compliance with the Hydromodification Performance Standards

Santa Margarita Region - County HydroMod Iterative Spreadsheet Model

Only for use the unincorporated portions of Riverside County, unless otherwise approved by the Co-Permittee

Development Project Number(s):	Monarch Winery - PAR01536 - DMA1 8/27/19	Rain Gauge	Temecula Valley
Latitude (decimal format):	33.540542	BMP Type (per WQMP):	Infiltration
Longitude (decimal format):	-117.012125	BMP Number (Sequential):	DMA1-IB1

Pre-Development - Hydrology Information

Pre-Development			
DRAINAGE AREA (ACRES) - 10 acre max[1]	1.237	2-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.3	0.49
LONGEST WATERCOURSE (FT) - 1,000' max[1]	720	10-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.1 or D-4.5	0.88
UPSTREAM ELEVATION OF WATERCOURSE (FT)	1615	SLOPE OF THE INTENSITY DURATION - Plate D-4.6	0.56
DOWNSTREAM ELEV. OF WATERCOURSE (FT)	1580	CLOSEST IMPERVIOUS PERCENTAGE (%)	0% Undeveloped - Fair Cover
EXISTING IMPERVIOUS PERCENTAGE (%)	0		
Use 10% of Q2 to avoid Field Screening requirements	Yes		

Pre-Development - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
5	1.237 Ac.	Chaparral, Narrowleaf	Poor Cover				100	80	**91**	97
								0	**0**	0
								0	**0**	0
	1.24 Ac.						**Weighted Average RI Numbers =**	**80.0**	**91.0**	**97.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Pre-Development - Calculated Range of Flow Rates analyzed for Hydromod (Suceptible Range of Flows)

Calculated Upper Flow-rate limit	Calculated Lower Flow-rate limit
Ex. 10-year Flowrate[1] = **1.782** cfs	Ex. 10% of the 2-year Flowrate[1] = **0.079** cfs
(Co-Permitte Approval is required) User-Defined Discharge Values with accompanying Hydrology Study[1]	
Ex. 10-year Flowrate (Attach Study) = cfs	Ex. 2-year Flowrate (Attach Study) = cfs

[1]The equations used to determine the 10-year and 10% of the 2-yr are limited to 10-acres and 1,000'. Flowrates from a separate study can be used to over-ride the calculated values so that larger areas (up to 20 acres) and longer watercourse lengths can be used. All values still need to be filled out, even when there is a user-defined discharge value entered.

Post-Project - Hydrograph Information

Post-Project		
DRAINAGE AREA (ACRES)	1.237	Go to "BMP Design" tab to design your BMP, then check results below. Print both this "HydroMod" Sheet and the "BMP Design" sheet for your submittal.
LONGEST WATERCOURSE (FT)	930	
DIFFERENCE IN ELEV (FT) - along watercourse	13.3	
PROPOSED IMPERVIOUS PERCENTAGE (%)	65	

Post-Project - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
22	1.237 Ac.	Urban Landscaping	Good Cover				100	57	**75**	88
								0	**0**	0
								0	**0**	0
	1.24 Ac.						**Weighted Average RI Numbers =**	**57.0**	**75.0**	**88.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Results

		First result out of compliance in the rainfall record				See below for the Height in the Basin (Stage) that is causing a non-compliant result	
Hydromod Ponded depth	**0.20 feet**	Requirement		Proposed			
Hydromod Drain Time (unclogged)	4.14 hours						
Is the HydroMod BMP properly sized?	**Yes, this is acceptable**	---	---	---	---		
Mitigated Q < 110% of Pre-Dev. Q?	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---
Mitigated Duration < 110% of Pre-Dev?*	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---

Responsible-in-charge: ____________________ Date: __________

Signature: ____________________

Spreadsheet Developed by: Benjie Cho, P.E.

BMP Design

Fill in **blue** shaded areas

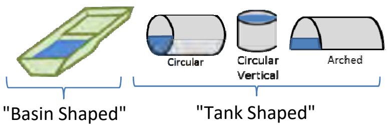
BMP Geometry & Detention Calculations

0.1 **feet, Stage Intervals** Larger Stage Intervals may incr. the Q at the bottom stg.

PROPOSED BMP DIMENSIONS

STEP1: Size the BMP, so that the Total Volume > Max HydroMod Vol. (Deeper is ok, it will be refined in the Design Geometry)

Is the BMP a Tank shape? 2 1 for yes; 2 for no.

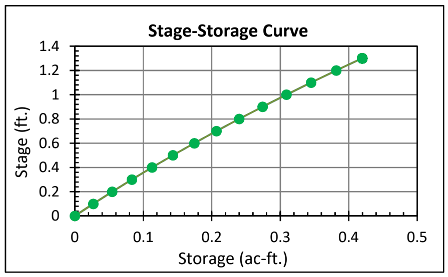


Basin Shaped BMP (Bottom Stage 1st)

Bottom Stage H= 1.3' SS= 4 :1

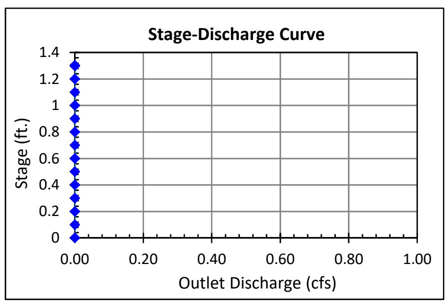
Top Area		Bottom Area		
Width	470.4	Width	460	FT
Length	35.4	Length	25	FT
area =	16652.16	area =	11500	

Top Stage H=



Prop. Top Stg. Vol. =	-	FT3
Prop Bottom Stg Vol =	18,196	FT3
Total Prop. Volume[1] =	18,196	FT3
Max HydroMod Volume =	1,791	FT3
Total Surface Area[2] =	16,652	FT2
BMP % of Site =	30.90%	
Max HydroMod Depth[3] =	0.20	FT

[1]Does not include forebay, or low flow trench
[2]Does not account for freeboard or access roads
[3]Does not consider Increased Runoff



Stage-Storage-Discharge*

Stage (FT)	Storage (AC-FT)	Storage (FT3)	Q (CFS)
0	0	0	0
0.10	0.027	1169	0.00
0.20	0.055	2378	0.00
0.30	0.083	3625	0.00
0.40	0.113	4912	0.00
0.50	0.143	6237	0.00
0.60	0.175	7603	0.00
0.70	0.207	9008	0.00
0.80	0.240	10452	0.00
0.90	0.274	11937	0.00
1.00	0.309	13461	0.00
1.10	0.345	15025	0.00
1.20	0.382	16630	0.00
1.30	*0.420*	*18275*	*0.00*
1.30	0.420	18,275	

MINIMUM DESIGN GEOMETRY

STEP2: Delete outlets, then propose the largest lowest orifice that does not, exceed the ex. Q or Duration. If the Q is acceptable, but the duration is exceeded, try decreasing orifice, then adding a weir slightly below the stage that has an issue.

OUTLETS (for Stage-Discharge)

Orifice Outlets			Weir Outlets		
Invert Height (ft)	Diameter (inches)	No. of Orifices	Crest Height (ft)	Crest Width (ft)	No. of Weirs
0					

Hydromod Depth =	0.20 FT	
+ 1' Freeboard =	1.20 FT	

Resize with Hydromod Depth +1' Freeboard

Top Surface Area

Based on HydroMod Depth +1' of Freeboard

Bottom Stage		
Width	469.6	FT
Length	34.6	FT

STEP3: Complete an increased runoff analysis, if the project can impact downstream properties. Incorporate these designs into the WQMP site plan.
Add emergency overflow weir, for flows that exceed the Hydromod volumes, sized to the 100-year peak flow rate. Add access roads (< 10% longitudnal slope) with enough width & turn around access for equipment that would be needed to scarify the bottom or remove Bioretention soil media.

Add Infiltration

Enter information from actual infiltration tests or design BSM rate

Yes	Consider Infiltration, Biofiltration, or Biofiltration (Yes or No)?	0.4792	FT3/sec, Unfactored Infiltration (over entire bottom)
1.8	Infiltration/Biofiltration rate thru the finish surface of the BMP (in/hr)[3]	**0.1597**	**FT3/sec, Infiltration / Factor of Safety**
3	Factor of Safety[3]	2,875.00	FT3, Vol. Infiltrated, over representative time
300	mins, Time represented by Infil. Tests or Biofiltraton Routing Time[4]	0.0607	FT3/sec, Low-Loss after representative time

[3]Measured Infiltration Rate per the LID Manual, Appendix A for Infiltration/BioRetention. For BioFiltration use a rate thru the media of 2.5 in/hr (long term design rate).
[4]Time that infiltration rate is being applied for Hydromod analysis for Infiltration/BioRention. Use 300 minutes (5hrs) for BioFiltration. Pore space is not accounted for at this time.

Santa Margarita Region - County HydroMod Iterative Spreadsheet Model

Only for use the unincorporated portions of Riverside County, unless otherwise approved by the Co-Permittee

Development Project Number(s):	Monarch Winery - PAR01536 - DMA2 8/27/19	Rain Gauge	Temecula Valley
Latitude (decimal format):	33.540542	BMP Type (per WQMP):	Infiltration
Longitude (decimal format):	-117.012125	BMP Number (Sequential):	DMA2-IB2

Pre-Development - Hydrology Information

DRAINAGE AREA (ACRES) - 10 acre max[1]	4.271	2-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.3	0.49
LONGEST WATERCOURSE (FT) - 1,000' max[1]	875	10-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.1 or D-4.5	0.88
UPSTREAM ELEVATION OF WATERCOURSE (FT)	1595	SLOPE OF THE INTENSITY DURATION - Plate D-4.6	0.56
DOWNSTREAM ELEV. OF WATERCOURSE (FT)	1545	CLOSEST IMPERVIOUS PERCENTAGE (%)	0% Undeveloped - Fair Cover
EXISTING IMPERVIOUS PERCENTAGE (%)	0		
Use 10% of Q2 to avoid Field Screening requirements	Yes		

Pre-Development - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
5	4.271 Ac.	Chaparral, Narrowleaf	Poor Cover				100	80	**91**	97
								0	**0**	0
								0	**0**	0
	4.27 Ac.						**Weighted Average RI Numbers =**	**80.0**	**91.0**	**97.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Pre-Development - Calculated Range of Flow Rates analyzed for Hydromod (Suceptible Range of Flows)

Calculated Upper Flow-rate limit	**Calculated Lower Flow-rate limit**
Ex. 10-year Flowrate[1] = **5.988** cfs	Ex. 10% of the 2-year Flowrate[1] = **0.265** cfs
(Co-Permitte Approval is required) User-Defined Discharge Values with accompanying Hydrology Study[1]	
Ex. 10-year Flowrate (Attach Study) = cfs	Ex. 2-year Flowrate (Attach Study) = cfs

[1]The equations used to determine the 10-year and 10% of the 2-yr are limited to 10-acres and 1,000'. Flowrates from a separate study can be used to over-ride the calculated values so that larger areas (up to 20 acres) and longer watercourse lengths can be used. All values still need to be filled out, even when there is a user-defined discharge value entered.

Post-Project - Hydrograph Information

DRAINAGE AREA (ACRES)	4.271	Go to "BMP Design" tab to design your BMP, then check results below. Print both this "HydroMod" Sheet and the "BMP Design" sheet for your submittal.
LONGEST WATERCOURSE (FT)	1215	
DIFFERENCE IN ELEV (FT) - along watercourse	37.1	
PROPOSED IMPERVIOUS PERCENTAGE (%)	41	

Post-Project - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
22	4.271 Ac.	Urban Landscaping	Good Cover				100	57	**75**	88
								0	**0**	0
								0	**0**	0
	4.27 Ac.						**Weighted Average RI Numbers =**	**57.0**	**75.0**	**88.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Results

		First result out of compliance in the rainfall record				See below for the Height in the Basin (Stage) that is causing a non-compliant result	
Hydromod Ponded depth	**0.30 feet**	Requirement		Proposed			
Hydromod Drain Time (unclogged)	6.14 hours						
Is the HydroMod BMP properly sized?	**Yes, this is acceptable**	---	---	---	---		
Mitigated Q < 110% of Pre-Dev. Q?	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---
Mitigated Duration < 110% of Pre-Dev?*	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---

Responsible-in-charge: ____________ Date: ____________

Signature: ____________

Spreadsheet Developed by: Benjie Cho, P.E.

BMP Design

Fill in **blue** shaded areas

BMP Geometry & Detention Calculations

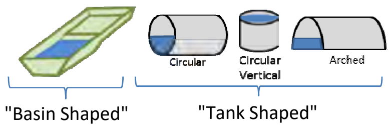
0.1 **feet, Stage Intervals**

Larger Stage Intervals may incr. the Q at the bottom stg.

PROPOSED BMP DIMENSIONS

STEP1: Size the BMP, so that the Total Volume > Max HydroMod Vol. (Deeper is ok, it will be refined in the Design Geometry)

Is the BMP a Tank shape? 2 1 for yes; 2 for no.



Basin Shaped BMP (Bottom Stage 1st)

Bottom Stage H= 1.3' SS= 4 :1

Top Area		Bottom Area		
Width	396.4	Width	386	FT
Length	70.4	Length	60	FT
area =	27906.56	area =	23160	

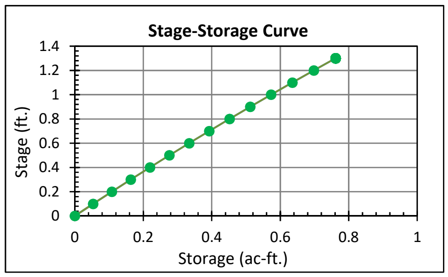
Top Stage H=

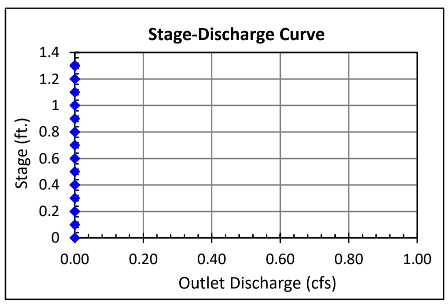
Prop. Top Stg. Vol. =	-	FT3
Prop Bottom Stg Vol =	33,145	FT3
Total Prop. Volume[1] =	33,145	FT3
Max HydroMod Volume =	5,925	FT3
Total Surface Area[2] =	27,907	FT2
BMP % of Site =	15.00%	
Max HydroMod Depth[3] =	0.30	FT

[1]Does not include forebay, or low flow trench

[2]Does not account for freeboard or access roads

[3]Does not consider Increased Runoff





Stage-Storage-Discharge*

Stage (FT)	Storage (AC-FT)	Storage (FT3)	Q (CFS)
0	0	0	0
0.10	0.054	2334	0.00
0.20	0.108	4704	0.00
0.30	0.163	7109	0.00
0.40	0.219	9551	0.00
0.50	0.276	12029	0.00
0.60	0.334	14543	0.00
0.70	0.392	17093	0.00
0.80	0.452	19681	0.00
0.90	0.512	22304	0.00
1.00	0.573	24965	0.00
1.10	0.635	27663	0.00
1.20	0.698	30398	0.00
1.30	0.761	33170	0.00
1.30	0.761	33,170	

MINIMUM DESIGN GEOMETRY

STEP2: Delete outlets, then propose the largest lowest orifice that does not, exceed the ex. Q or Duration. If the Q is acceptable, but the duration is exceeded, try decreasing orifice, then adding a weir slightly below the stage that has an issue.

OUTLETS (for Stage-Discharge)

Orifice Outlets			Weir Outlets		
Invert Height (ft)	Diameter (inches)	No. of Orifices	Crest Height (ft)	Crest Width (ft)	No. of Weirs
0					

Hydromod Depth = 0.30 FT

+ 1' Freeboard = 1.30 FT

Resize with Hydromod Depth +1' Freeboard

Top Surface Area

Based on HydroMod Depth +1' of Freeboard

Bottom Stage		
Width	396.4	FT
Length	70.4	FT

STEP3: Complete an increased runoff analysis, if the project can impact downstream properties. Incorporate these designs into the WQMP site plan.
Add emergency overflow weir, for flows that exceed the Hydromod volumes, sized to the 100-year peak flow rate. Add access roads (< 10% longitudnal slope) with enough width & turn around access for equipment that would be needed to scarify the bottom or remove Bioretention soil media.

Add Infiltration

Enter information from actual infiltration tests or design BSM rate			
Yes	Consider Infiltration, Biofiltration, or Biofiltration (Yes or No)?	0.9650	FT3/sec, Unfactored Infiltration (over entire bottom)
1.8	Infiltration/Biofiltration rate thru the finish surface of the BMP (in/hr)[3]	**0.3217**	**FT3/sec, Infiltration / Factor of Safety**
3	Factor of Safety[3]	5,790.00	FT3, Vol. Infiltrated, over representative time
300	mins, Time represented by Infil. Tests or Biofiltraton Routing Time[4]	0.1840	FT3/sec, Low-Loss after representative time

[3]Measured Infiltration Rate per the LID Manual, Appendix A for Infiltration/BioRetention. For BioFiltration use a rate thru the media of 2.5 in/hr (long term design rate).

[4]Time that infiltration rate is being applied for Hydromod analysis for Infiltration/BioRention. Use 300 minutes (5hrs) for BioFiltration. Pore space is not accounted for at this time.

Santa Margarita Region - County HydroMod Iterative Spreadsheet Model

Only for use the unincorporated portions of Riverside County, unless otherwise approved by the Co-Permittee

Development Project Number(s):	Monarch Winery - PAR01536 - DMA3 8/27/19	Rain Gauge	Temecula Valley
Latitude (decimal format):	33.540542	BMP Type (per WQMP):	Infiltration
Longitude (decimal format):	-117.012125	BMP Number (Sequential):	DMA3-IB3

Pre-Development - Hydrology Information

Pre-Development			
DRAINAGE AREA (ACRES) - 10 acre max[1]	3.314	2-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.3	0.49
LONGEST WATERCOURSE (FT) - 1,000' max[1]	765	10-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.1 or D-4.5	0.88
UPSTREAM ELEVATION OF WATERCOURSE (FT)	1605	SLOPE OF THE INTENSITY DURATION - Plate D-4.6	0.56
DOWNSTREAM ELEV. OF WATERCOURSE (FT)	1550	CLOSEST IMPERVIOUS PERCENTAGE (%)	0% Undeveloped - Fair Cover
EXISTING IMPERVIOUS PERCENTAGE (%)	0		
Use 10% of Q2 to avoid Field Screening requirements	Yes		

Pre-Development - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
5	3.314 Ac.	Chaparral, Narrowleaf	Poor Cover				100	80	**91**	97
								0	**0**	0
								0	**0**	0
	3.31 Ac.						**Weighted Average RI Numbers =**	**80.0**	**91.0**	**97.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Pre-Development - Calculated Range of Flow Rates analyzed for Hydromod (Suceptible Range of Flows)

Calculated Upper Flow-rate limit	Calculated Lower Flow-rate limit
Ex. 10-year Flowrate[1] = **4.932** cfs	Ex. 10% of the 2-year Flowrate[1] = **0.221** cfs
(Co-Permitte Approval is required) User-Defined Discharge Values with accompanying Hydrology Study[1]	
Ex. 10-year Flowrate (Attach Study) = cfs	Ex. 2-year Flowrate (Attach Study) = cfs

[1]The equations used to determine the 10-year and 10% of the 2-yr are limited to 10-acres and 1,000'. Flowrates from a separate study can be used to over-ride the calculated values so that larger areas (up to 20 acres) and longer watercourse lengths can be used. All values still need to be filled out, even when there is a user-defined discharge value entered.

Post-Project - Hydrograph Information

Post-Project		
DRAINAGE AREA (ACRES)	3.314	Go to "BMP Design" tab to design your BMP, then check results below. Print both this "HydroMod" Sheet and the "BMP Design" sheet for your submittal.
LONGEST WATERCOURSE (FT)	895	
DIFFERENCE IN ELEV (FT) - along watercourse	23.1	
PROPOSED IMPERVIOUS PERCENTAGE (%)	34	

Post-Project - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
22	3.314 Ac.	Urban Landscaping	Good Cover				100	57	**75**	88
								0	**0**	0
								0	**0**	0
	3.31 Ac.						**Weighted Average RI Numbers =**	**57.0**	**75.0**	**88.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Results

		First result out of compliance in the rainfall record				See below for the Height in the Basin (Stage) that is causing a non-compliant result	
Hydromod Ponded depth	**0.10 feet**	Requirement		Proposed			
Hydromod Drain Time (unclogged)	2.01 hours						
Is the HydroMod BMP properly sized?	**Yes, this is acceptable**	---	---	---	---		
Mitigated Q < 110% of Pre-Dev. Q?	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---
Mitigated Duration < 110% of Pre-Dev?*	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---

Responsible-in-charge: ____________________ Date: __________

Signature: ____________________

Spreadsheet Developed by: Benjie Cho, P.E.

BMP Design

Fill in **blue** shaded areas

BMP Geometry & Detention Calculations

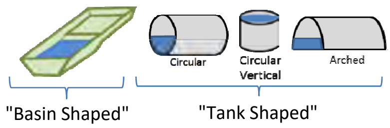
0.1 **feet, Stage Intervals**

Larger Stage Intervals may incr. the Q at the bottom stg.

PROPOSED BMP DIMENSIONS

STEP1: Size the BMP, so that the Total Volume > Max HydroMod Vol. (Deeper is ok, it will be refined in the Design Geometry)

Is the BMP a Tank shape? 2 1 for yes; 2 for no.



Basin Shaped BMP (Bottom Stage 1st)

Bottom Stage **H=** 1.1' **SS=** 4 :1

Top Area		Bottom Area		
Width	268.8	Width	260	FT
Length	268.8	Length	260	FT
area =	72253.44	area =	67600	

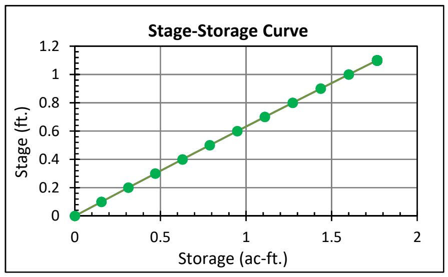
Top Stage **H=**

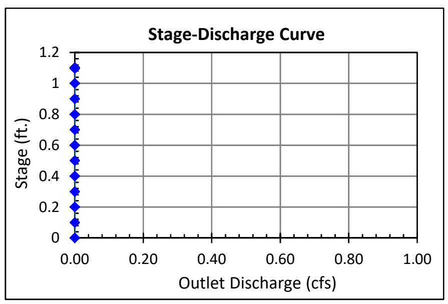
Prop. Top Stg. Vol. =	-	FT3
Prop Bottom Stg Vol =	76,905	FT3
Total Prop. Volume[1] =	76,905	FT3
Max HydroMod Volume =	4,539	FT3
Total Surface Area[2] =	72,253	FT2
BMP % of Site =	50.05%	
Max HydroMod Depth[3] =	0.10	FT

[1]Does not include forebay, or low flow trench

[2]Does not account for freeboard or access roads

[3]Does not consider Increased Runoff





Stage-Storage-Discharge*

Stage (FT)	Storage (AC-FT)	Storage (FT3)	Q (CFS)
0	0	0	0
0.10	0.156	6781	0.00
0.20	0.312	13603	0.00
0.30	0.470	20468	0.00
0.40	0.628	27374	0.00
0.50	0.788	34323	0.00
0.60	0.948	41313	0.00
0.70	1.110	48347	0.00
0.80	1.272	55422	0.00
0.90	1.436	62540	0.00
1.00	1.600	69701	0.00
1.10	1.766	76905	0.00
1.10	1.766	76,905	

MINIMUM DESIGN GEOMETRY

STEP2: Delete outlets, then propose the largest lowest orifice that does not, exceed the ex. Q or Duration. If the Q is acceptable, but the duration is exceeded, try decreasing orifice, then adding a weir slightly below the stage that has an issue.

OUTLETS (for Stage-Discharge)

Orifice Outlets			Weir Outlets		
Invert Height (ft)	Diameter (inches)	No. of Orifices	Crest Height (ft)	Crest Width (ft)	No. of Weirs
0					

Hydromod Depth =	0.10 FT
+ 1' Freeboard =	1.10 FT

Resize with Hydromod Depth +1' Freeboard

Top Surface Area

Based on HydroMod Depth +1' of Freeboard

Bottom Stage		
Width	268.8	FT
Length	268.8	FT

STEP3: Complete an increased runoff analysis, if the project can impact downstream properties. Incorporate these designs into the WQMP site plan.
Add emergency overflow weir, for flows that exceed the Hydromod volumes, sized to the 100-year peak flow rate. Add access roads (< 10% longitudnal slope) with enough width & turn around access for equipment that would be needed to scarify the bottom or remove Bioretention soil media.

Add Infiltration

Enter information from actual infiltration tests or design BSM rate

Yes	Consider Infiltration, Biotention, or Biofiltration (Yes or No)?	2.8167	FT3/sec, Unfactored Infiltration (over entire bottom)
1.8	Infiltration/Biofiltration rate thru the finish surface of the BMP (in/hr)[3]	**0.9389**	**FT3/sec, Infiltration / Factor of Safety**
3	Factor of Safety[3]	16,900.00	FT3, Vol. Infiltrated, over representative time
300	mins, Time represented by Infil. Tests or Biofiltraton Routing Time[4]	0.5896	FT3/sec, Low-Loss after representative time

[3]Measured Infiltration Rate per the LID Manual, Appendix A for Infiltration/BioRetention. For BioFiltration use a rate thru the media of 2.5 in/hr (long term design rate).

[4]Time that infiltration rate is being applied for Hydromod analysis for Infiltration/BioRention. Use 300 minutes (5hrs) for BioFiltration. Pore space is not accounted for at this time.

Santa Margarita Region - County HydroMod Iterative Spreadsheet Model

Only for use the unincorporated portions of Riverside County, unless otherwise approved by the Co-Permittee

Development Project Number(s):	Monarch Winery - PAR01536 - DMA4 8/27/19	Rain Gauge	Temecula Valley
Latitude (decimal format):	33.540542	BMP Type (per WQMP):	Infiltration
Longitude (decimal format):	-117.012125	BMP Number (Sequential):	DMA4-IB4

Pre-Development - Hydrology Information

Pre-Development			
DRAINAGE AREA (ACRES) - 10 acre max[1]	3.324	2-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.3	0.49
LONGEST WATERCOURSE (FT) - 1,000' max[1]	1050	10-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.1 or D-4.5	0.88
UPSTREAM ELEVATION OF WATERCOURSE (FT)	1592	SLOPE OF THE INTENSITY DURATION - Plate D-4.6	0.56
DOWNSTREAM ELEV. OF WATERCOURSE (FT)	1540	CLOSEST IMPERVIOUS PERCENTAGE (%)	0% Undeveloped - Fair Cover
EXISTING IMPERVIOUS PERCENTAGE (%)	0		
Use 10% of Q2 to avoid Field Screening requirements	Yes		

Pre-Development - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
5	3.324 Ac.	Chaparral, Narrowleaf	Poor Cover				100	80	**91**	97
								0	**0**	0
								0	**0**	0
	3.32 Ac.						**Weighted Average RI Numbers =**	**80.0**	**91.0**	**97.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Pre-Development - Calculated Range of Flow Rates analyzed for Hydromod (Suceptible Range of Flows)

Calculated Upper Flow-rate limit	**Calculated Lower Flow-rate limit**
Ex. 10-year Flowrate[1] = **4.384** cfs	Ex. 10% of the 2-year Flowrate[1] = **0.192** cfs
(Co-Permitte Approval is required) User-Defined Discharge Values with accompanying Hydrology Study[1]	
Ex. 10-year Flowrate (Attach Study) = cfs	Ex. 2-year Flowrate (Attach Study) = cfs

[1]The equations used to determine the 10-year and 10% of the 2-yr are limited to 10-acres and 1,000'. Flowrates from a separate study can be used to over-ride the calculated values so that larger areas (up to 20 acres) and longer watercourse lengths can be used. All values still need to be filled out, even when there is a user-defined discharge value entered.

Post-Project - Hydrograph Information

Post-Project		
DRAINAGE AREA (ACRES)	3.324	Go to "BMP Design" tab to design your BMP, then check results below. Print both this "HydroMod" Sheet and the "BMP Design" sheet for your submittal.
LONGEST WATERCOURSE (FT)	1216	
DIFFERENCE IN ELEV (FT) - along watercourse	24.1	
PROPOSED IMPERVIOUS PERCENTAGE (%)	80	

Post-Project - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
22	3.324 Ac.	Urban Landscaping	Good Cover				100	57	**75**	88
								0	**0**	0
								0	**0**	0
	3.32 Ac.						**Weighted Average RI Numbers =**	**57.0**	**75.0**	**88.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Results

Results		First result out of compliance in the rainfall record				See below for the Height in the Basin (Stage) that is causing a non-compliant result	
Hydromod Ponded depth	**0.50 feet**						
Hydromod Drain Time (unclogged)	22.11 hours	Requirement		Proposed			
Is the HydroMod BMP properly sized?	**Yes, this is acceptable**	---	---	---	---		
Mitigated Q < 110% of Pre-Dev. Q?	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---
Mitigated Duration < 110% of Pre-Dev?*	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---

Responsible-in-charge: Date:

Signature:

Spreadsheet Developed by: Benjie Cho, P.E.

BMP Design

Fill in **blue** shaded areas

BMP Geometry & Detention Calculations

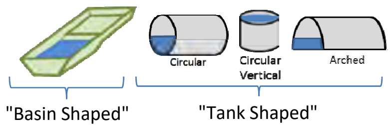
0.1 feet, Stage Intervals

Larger Stage Intervals may incr. the Q at the bottom stg.

PROPOSED BMP DIMENSIONS

STEP1: Size the BMP, so that the Total Volume > Max HydroMod Vol. (Deeper is ok, it will be refined in the Design Geometry)

Is the BMP a Tank shape? 2 1 for yes; 2 for no.



Basin Shaped BMP (Bottom Stage 1st)

Bottom Stage H= 1.4' SS= 4 :1

Top Area		Bottom Area		
Width	216.2	Width	205	FT
Length	61.2	Length	50	FT
area =	13231.44	area =	10250	

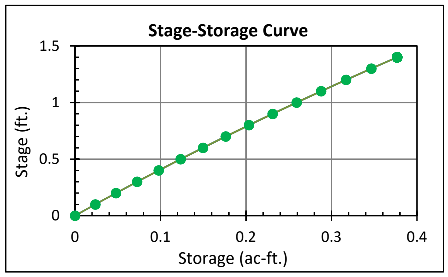
Top Stage H=

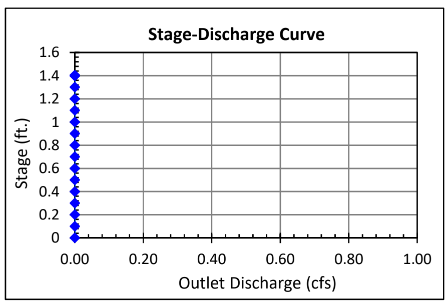
Prop. Top Stg. Vol. =	-	FT3
Prop Bottom Stg Vol =	16,393	FT3
Total Prop. Volume[1] =	16,393	FT3
Max HydroMod Volume =	4,938	FT3
Total Surface Area[2] =	13,231	FT2
BMP % of Site =	9.14%	
Max HydroMod Depth[3] =	0.50	FT

[1]Does not include forebay, or low flow trench

[2]Does not account for freeboard or access roads

[3]Does not consider Increased Runoff





Stage-Storage-Discharge*

Stage (FT)	Storage (AC-FT)	Storage (FT3)	Q (CFS)
0	0	0	0
0.10	0.024	1035	0.00
0.20	0.048	2091	0.00
0.30	0.073	3167	0.00
0.40	0.098	4265	0.00
0.50	0.124	5383	0.00
0.60	0.150	6522	0.00
0.70	0.176	7682	0.00
0.80	0.203	8864	0.00
0.90	0.231	10067	0.00
1.00	0.259	11291	0.00
1.10	0.288	12538	0.00
1.20	0.317	13806	0.00
1.30	0.347	15096	0.00
1.40	0.377	16408	0.00
1.40	0.377	16,408	

MINIMUM DESIGN GEOMETRY

STEP2: Delete outlets, then propose the largest lowest orifice that does not, exceed the ex. Q or Duration. If the Q is acceptable, but the duration is exceeded, try decreasing orifice, then adding a weir slightly below the stage that has an issue.

OUTLETS (for Stage-Discharge)

Orifice Outlets			Weir Outlets		
Invert Height (ft)	Diameter (inches)	No. of Orifices	Crest Height (ft)	Crest Width (ft)	No. of Weirs
0					

Hydromod Depth =	0.50 FT
+ 1' Freeboard =	1.50 FT

Resize with Hydromod Depth +1' Freeboard

Top Surface Area

Based on HydroMod Depth +1' of Freeboard

Bottom Stage		
Width	217	FT
Length	62	FT

STEP3: Complete an increased runoff analysis, if the project can impact downstream properties. Incorporate these designs into the WQMP site plan.
Add emergency overflow weir, for flows that exceed the Hydromod volumes, sized to the 100-year peak flow rate. Add access roads (< 10% longitudnal slope) with enough width & turn around access for equipment that would be needed to scarify the bottom or remove Bioretention soil media.

Add Infiltration

Enter information from actual infiltration tests or design BSM rate

Yes	Consider Infiltration, Biorentention, or Biofiltration (Yes or No)?	0.4271	FT3/sec, Unfactored Infiltration (over entire bottom)
1.8	Infiltration/Biofiltration rate thru the finish surface of the BMP (in/hr)[3]	**0.1424**	**FT3/sec, Infiltration / Factor of Safety**
3	Factor of Safety[3]	2,562.50	FT3, Vol. Infiltrated, over representative time
300	mins, Time represented by Infil. Tests or Biofiltraton Routing Time[4]	0.0370	FT3/sec, Low-Loss after representative time

[3]Measured Infiltration Rate per the LID Manual, Appendix A for Infiltration/BioRetention. For BioFiltration use a rate thru the media of 2.5 in/hr (long term design rate).

[4]Time that infiltration rate is being applied for Hydromod analysis for Infiltration/BioRention. Use 300 minutes (5hrs) for BioFiltration. Pore space is not accounted for at this time.

Santa Margarita Region - County HydroMod Iterative Spreadsheet Model

Only for use the unincorporated portions of Riverside County, unless otherwise approved by the Co-Permittee

Development Project Number(s):	Monarch Winery - PAR01536 - DMA5 8/27/19	Rain Gauge	Temecula Valley
Latitude (decimal format):	33.540542	BMP Type (per WQMP):	Infiltration
Longitude (decimal format):	-117.012125	BMP Number (Sequential):	DMA5-IB5

Pre-Development - Hydrology Information

DRAINAGE AREA (ACRES) - 10 acre max[1]	2.03	2-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.3	0.49
LONGEST WATERCOURSE (FT) - 1,000' max[1]	920	10-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.1 or D-4.5	0.88
UPSTREAM ELEVATION OF WATERCOURSE (FT)	1619	SLOPE OF THE INTENSITY DURATION - Plate D-4.6	0.56
DOWNSTREAM ELEV. OF WATERCOURSE (FT)	1565	CLOSEST IMPERVIOUS PERCENTAGE (%)	0% Undeveloped - Fair Cover
EXISTING IMPERVIOUS PERCENTAGE (%)	0		
Use 10% of Q2 to avoid Field Screening requirements	Yes		

Pre-Development - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
5	2.03 Ac.	Chaparral, Narrowleaf	Poor Cover				100	80	**91**	97
								0	**0**	0
								0	**0**	0
	2.03 Ac.						**Weighted Average RI Numbers =**	**80.0**	**91.0**	**97.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are: AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Pre-Development - Calculated Range of Flow Rates analyzed for Hydromod (Suceptible Range of Flows)

Calculated Upper Flow-rate limit	**Calculated Lower Flow-rate limit**
Ex. 10-year Flowrate[1] = **2.821** cfs	Ex. 10% of the 2-year Flowrate[1] = **0.125** cfs
(Co-Permitte Approval is required) User-Defined Discharge Values with accompanying Hydrology Study[1]	
Ex. 10-year Flowrate (Attach Study) = cfs	Ex. 2-year Flowrate (Attach Study) = cfs

[1]The equations used to determine the 10-year and 10% of the 2-yr are limited to 10-acres and 1,000'. Flowrates from a separate study can be used to over-ride the calculated values so that larger areas (up to 20 acres) and longer watercourse lengths can be used. All values still need to be filled out, even when there is a user-defined discharge value entered.

Post-Project - Hydrograph Information

DRAINAGE AREA (ACRES)	2.03
LONGEST WATERCOURSE (FT)	855
DIFFERENCE IN ELEV (FT) - along watercourse	26.5
PROPOSED IMPERVIOUS PERCENTAGE (%)	62

Go to "BMP Design" tab to design your BMP, then check results below.
Print both this "HydroMod" Sheet and the "BMP Design" sheet for your submittal.

Post-Project - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
22	2.03 Ac.	Urban Landscaping	Good Cover				100	57	**75**	88
								0	**0**	0
								0	**0**	0
	2.03 Ac.						**Weighted Average RI Numbers =**	**57.0**	**75.0**	**88.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are: AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Results

		First result out of compliance in the rainfall record				See below for the Height in the Basin (Stage) that is causing a non-compliant result	
Hydromod Ponded depth	**0.50 feet**	Requirement		Proposed			
Hydromod Drain Time (unclogged)	16.58 hours						
Is the HydroMod BMP properly sized?	**Yes, this is acceptable**	---	---	---	---		
Mitigated Q < 110% of Pre-Dev. Q?	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---
Mitigated Duration < 110% of Pre-Dev?*	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---

Responsible-in-charge: ____________ Date: ____________

Signature: ____________

Spreadsheet Developed by: Benjie Cho, P.E.

BMP Design

Fill in **blue** shaded areas

BMP Geometry & Detention Calculations

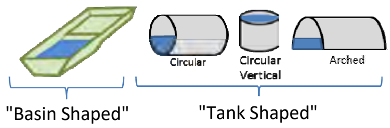
0.1 feet, Stage Intervals

Larger Stage Intervals may incr. the Q at the bottom stg.

PROPOSED BMP DIMENSIONS

STEP1: Size the BMP, so that the Total Volume > Max HydroMod Vol. (Deeper is ok, it will be refined in the Design Geometry)

Is the BMP a Tank shape? 2 1 for yes; 2 for no.



Basin Shaped BMP (Bottom Stage 1st)

Bottom Stage H= 1.5' SS= 4 :1

Top Area		Bottom Area		
Width	152	Width	140	FT
Length	62	Length	50	FT
area =	9424	area =	7000	

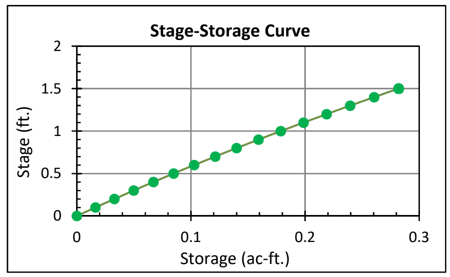
Top Stage H=

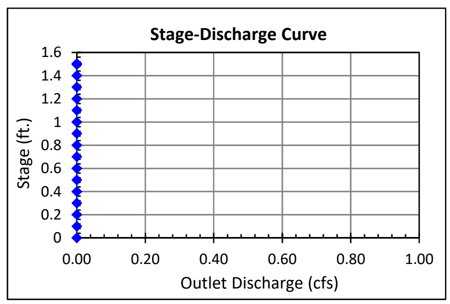
Prop. Top Stg. Vol. =	-	FT3
Prop Bottom Stg Vol =	12,273	FT3
Total Prop. Volume[1] =	12,273	FT3
Max HydroMod Volume =	2,924	FT3
Total Surface Area[2] =	9,424	FT2
BMP % of Site =	10.66%	
Max HydroMod Depth[3] =	0.50	FT

[1]Does not include forebay, or low flow trench

[2]Does not account for freeboard or access roads

[3]Does not consider Increased Runoff





Stage-Storage-Discharge*

Stage (FT)	Storage (AC-FT)	Storage (FT3)	Q (CFS)
0	0	0	0
0.10	0.016	708	0.00
0.20	0.033	1431	0.00
0.30	0.050	2169	0.00
0.40	0.067	2923	0.00
0.50	0.085	3693	0.00
0.60	0.103	4478	0.00
0.70	0.121	5280	0.00
0.80	0.140	6097	0.00
0.90	0.159	6931	0.00
1.00	0.179	7781	0.00
1.10	0.199	8648	0.00
1.20	0.219	9531	0.00
1.30	0.239	10431	0.00
1.40	0.261	11348	0.00
1.50	0.282	12282	0.00
1.50	0.282	12,282	

MINIMUM DESIGN GEOMETRY

STEP2: Delete outlets, then propose the largest lowest orifice that does not, exceed the ex. Q or Duration. If the Q is acceptable, but the duration is exceeded, try decreasing orifice, then adding a weir slightly below the stage that has an issue.

OUTLETS (for Stage-Discharge)

Orifice Outlets			Weir Outlets		
Invert Height (ft)	Diameter (inches)	No. of Orifices	Crest Height (ft)	Crest Width (ft)	No. of Weirs
0					

Hydromod Depth =	0.50 FT
+ 1' Freeboard =	1.50 FT

Resize with Hydromod Depth +1' Freeboard

Top Surface Area

Based on HydroMod Depth +1' of Freeboard

Bottom Stage		
Width	152	FT
Length	62	FT

STEP3: Complete an increased runoff analysis, if the project can impact downstream properties. Incorporate these designs into the WQMP site plan.
Add emergency overflow weir, for flows that exceed the Hydromod volumes, sized to the 100-year peak flow rate. Add access roads (< 10% longitudnal slope) with enough width & turn around access for equipment that would be needed to scarify the bottom or remove Bioretention soil media.

Add Infiltration

Enter information from actual infiltration tests or design BSM rate

Yes	Consider Infiltration, Biorentention, or Biofiltration (Yes or No)?	0.2917	FT3/sec, Unfactored Infiltration (over entire bottom)
1.8	Infiltration/Biofiltration rate thru the finish surface of the BMP (in/hr)[3]	**0.0972**	**FT3/sec, Infiltration / Factor of Safety**
3	Factor of Safety[3]	1,750.00	FT3, Vol. Infiltrated, over representative time
300	mins, Time represented by Infil. Tests or Biofiltraton Routing Time[4]	0.0393	FT3/sec, Low-Loss after representative time

[3]Measured Infiltration Rate per the LID Manual, Appendix A for Infiltration/BioRetention. For BioFiltration use a rate thru the media of 2.5 in/hr (long term design rate).

[4]Time that infiltration rate is being applied for Hydromod analysis for Infiltration/BioRention. Use 300 minutes (5hrs) for BioFiltration. Pore space is not accounted for at this time.

Santa Margarita Region - County HydroMod Iterative Spreadsheet Model

Only for use the unincorporated portions of Riverside County, unless otherwise approved by the Co-Permittee

Development Project Number(s):	Monarch Winery - PAR01536 - DMA6 8/27/19	Rain Gauge	Temecula Valley
Latitude (decimal format):	33.540542	BMP Type (per WQMP):	Infiltration
Longitude (decimal format):	-117.012125	BMP Number (Sequential):	DMA6-IB6

Pre-Development - Hydrology Information

Pre-Development				
DRAINAGE AREA (ACRES) - 10 acre max[1]	0.297	2-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.3		0.49
LONGEST WATERCOURSE (FT) - 1,000' max[1]	705	10-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.1 or D-4.5		0.88
UPSTREAM ELEVATION OF WATERCOURSE (FT)	1540	SLOPE OF THE INTENSITY DURATION - Plate D-4.6		0.56
DOWNSTREAM ELEV. OF WATERCOURSE (FT)	1538	CLOSEST IMPERVIOUS PERCENTAGE (%)		0% Undeveloped - Fair Cover
EXISTING IMPERVIOUS PERCENTAGE (%)	0			
Use 10% of Q2 to avoid Field Screening requirements	Yes			

Pre-Development - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
5	0.297 Ac.	Chaparral, Narrowleaf	Poor Cover				100	80	**91**	97
								0	**0**	0
								0	**0**	0
	0.30 Ac.						**Weighted Average RI Numbers =**	**80.0**	**91.0**	**97.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Pre-Development - Calculated Range of Flow Rates analyzed for Hydromod (Suceptible Range of Flows)

Calculated Upper Flow-rate limit	Calculated Lower Flow-rate limit
Ex. 10-year Flowrate[1] = **0.305** cfs	Ex. 10% of the 2-year Flowrate[1] = **0.013** cfs

(Co-Permitte Approval is required) User-Defined Discharge Values with accompanying Hydrology Study[1]

Ex. 10-year Flowrate (Attach Study) = cfs	Ex. 2-year Flowrate (Attach Study) = cfs

[1]The equations used to determine the 10-year and 10% of the 2-yr are limited to 10-acres and 1,000'. Flowrates from a separate study can be used to over-ride the calculated values so that larger areas (up to 20 acres) and longer watercourse lengths can be used. All values still need to be filled out, even when there is a user-defined discharge value entered.

Post-Project - Hydrograph Information

Post-Project		
DRAINAGE AREA (ACRES)	0.297	Go to "BMP Design" tab to design your BMP, then check results below. Print both this "HydroMod" Sheet and the "BMP Design" sheet for your submittal.
LONGEST WATERCOURSE (FT)	705	
DIFFERENCE IN ELEV (FT) - along watercourse	27	
PROPOSED IMPERVIOUS PERCENTAGE (%)	97	

Post-Project - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
22	0.297 Ac.	Urban Landscaping	Good Cover				100	57	**75**	88
								0	**0**	0
								0	**0**	0
	0.30 Ac.						**Weighted Average RI Numbers =**	**57.0**	**75.0**	**88.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Results

Results		First result out of compliance in the rainfall record				See below for the Height in the Basin (Stage) that is causing a non-compliant result	
Hydromod Ponded depth	**0.30 feet**	Requirement		Proposed			
Hydromod Drain Time (unclogged)	6.46 hours						
Is the HydroMod BMP properly sized?	**Yes, this is acceptable**	---	---	---	---		
Mitigated Q < 110% of Pre-Dev. Q?	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---
Mitigated Duration < 110% of Pre-Dev?*	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---

Responsible-in-charge: Date:

Signature:

Spreadsheet Developed by: Benjie Cho, P.E.

BMP Design

Fill in **blue** shaded areas

BMP Geometry & Detention Calculations

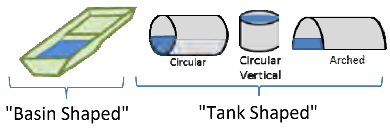
0.1 **feet, Stage Intervals**

Larger Stage Intervals may incr. the Q at the bottom stg.

PROPOSED BMP DIMENSIONS

STEP1: Size the BMP, so that the Total Volume > Max HydroMod Vol. (Deeper is ok, it will be refined in the Design Geometry)

Is the BMP a Tank shape? 2 — 1 for yes; 2 for no.



Basin Shaped BMP (Bottom Stage 1st)

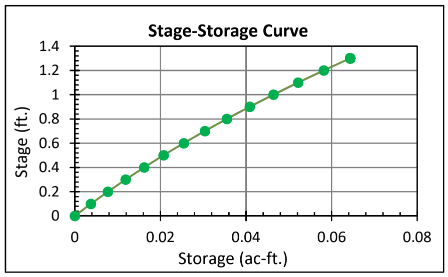
Bottom Stage H= 1.3' SS= 4 :1

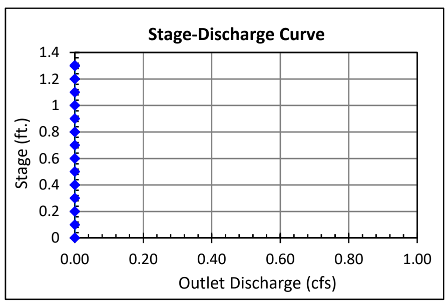
Top Area		Bottom Area		
Width	90.4	Width	80	FT
Length	30.4	Length	20	FT
area =	2748.16	area =	1600	

Top Stage H=

Prop. Top Stg. Vol. =	-	FT3
Prop Bottom Stg Vol =	2,793	FT3
Total Prop. Volume[1] =	2,793	FT3
Max HydroMod Volume =	454	FT3
Total Surface Area[2] =	2,748	FT2
BMP % of Site =	21.24%	
Max HydroMod Depth[3] =	0.30	FT

[1]Does not include forebay, or low flow trench
[2]Does not account for freeboard or access roads
[3]Does not consider Increased Runoff





Stage-Storage-Discharge*

Stage (FT)	Storage (AC-FT)	Storage (FT3)	Q (CFS)
0	0	0	0
0.10	0.004	164	0.00
0.20	0.008	336	0.00
0.30	0.012	517	0.00
0.40	0.016	705	0.00
0.50	0.021	903	0.00
0.60	0.025	1109	0.00
0.70	0.030	1323	0.00
0.80	0.036	1547	0.00
0.90	0.041	1780	0.00
1.00	0.046	2021	0.00
1.10	0.052	2272	0.00
1.20	0.058	2533	0.00
1.30	0.064	2803	0.00
1.30	0.064	2,803	

MINIMUM DESIGN GEOMETRY

STEP2: Delete outlets, then propose the largest lowest orifice that does not, exceed the ex. Q or Duration. If the Q is acceptable, but the duration is exceeded, try decreasing orifice, then adding a weir slightly below the stage that has an issue.

OUTLETS (for Stage-Discharge)

Orifice Outlets			Weir Outlets		
Invert Height (ft)	Diameter (inches)	No. of Orifices	Crest Height (ft)	Crest Width (ft)	No. of Weirs
0					

Hydromod Depth =	0.30 FT
+ 1' Freeboard =	1.30 FT

Resize with Hydromod Depth +1' Freeboard

Top Surface Area

Based on HydroMod Depth +1' of Freeboard

Bottom Stage		
Width	90.4	FT
Length	30.4	FT

STEP3: Complete an increased runoff analysis, if the project can impact downstream properties. Incorporate these designs into the WQMP site plan.
Add emergency overflow weir, for flows that exceed the Hydromod volumes, sized to the 100-year peak flow rate. Add access roads (< 10% longitudnal slope) with enough width & turn around access for equipment that would be needed to scarify the bottom or remove Bioretention soil media.

Add Infiltration

Enter information from actual infiltration tests or design BSM rate

Yes	Consider Infiltration, Infiltration, or Biofiltration (Yes or No)?	0.0667	FT3/sec, Unfactored Infiltration (over entire bottom)
1.8	Infiltration/Biofiltration rate thru the finish surface of the BMP (in/hr)[3]	**0.0222**	**FT3/sec, Infiltration / Factor of Safety**
3	Factor of Safety[3]	400.00	FT3, Vol. Infiltrated, over representative time
300	mins, Time represented by Infil. Tests or Biofiltraton Routing Time[4]	0.0028	FT3/sec, Low-Loss after representative time

[3]Measured Infiltration Rate per the LID Manual, Appendix A for Infiltration/BioRetention. For BioFiltration use a rate thru the media of 2.5 in/hr (long term design rate).
[4]Time that infiltration rate is being applied for Hydromod analysis for Infiltration/BioRention. Use 300 minutes (5hrs) for BioFiltration. Pore space is not accounted for at this time.

Santa Margarita Region - County HydroMod Iterative Spreadsheet Model

Only for use the unincorporated portions of Riverside County, unless otherwise approved by the Co-Permittee

Development Project Number(s):	Monarch Winery - PAR01536 - DMA7 8/27/19	Rain Gauge	Temecula Valley
Latitude (decimal format):	33.540542	BMP Type (per WQMP):	Infiltration
Longitude (decimal format):	-117.012125	BMP Number (Sequential):	DMA7-IB7

Pre-Development - Hydrology Information

DRAINAGE AREA (ACRES) - 10 acre max[1]	0.27	2-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.3	0.49
LONGEST WATERCOURSE (FT) - 1,000' max[1]	600	10-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.1 or D-4.5	0.88
UPSTREAM ELEVATION OF WATERCOURSE (FT)	1580	SLOPE OF THE INTENSITY DURATION - Plate D-4.6	0.56
DOWNSTREAM ELEV. OF WATERCOURSE (FT)	1576	CLOSEST IMPERVIOUS PERCENTAGE (%)	0% Undeveloped - Fair Cover
EXISTING IMPERVIOUS PERCENTAGE (%)	0		
Use 10% of Q2 to avoid Field Screening requirements	Yes		

Pre-Development - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
5	0.27 Ac.	Chaparral, Narrowleaf	Poor Cover				100	80	**91**	97
								0	**0**	0
								0	**0**	0
	0.27 Ac.						**Weighted Average RI Numbers =**	**80.0**	**91.0**	**97.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Pre-Development - Calculated Range of Flow Rates analyzed for Hydromod (Suceptible Range of Flows)

Calculated Upper Flow-rate limit	**Calculated Lower Flow-rate limit**
Ex. 10-year Flowrate[1] = **0.320** cfs	Ex. 10% of the 2-year Flowrate[1] = **0.014** cfs
(Co-Permitte Approval is required) User-Defined Discharge Values with accompanying Hydrology Study[1]	
Ex. 10-year Flowrate (Attach Study) = cfs	Ex. 2-year Flowrate (Attach Study) = cfs

[1]The equations used to determine the 10-year and 10% of the 2-yr are limited to 10-acres and 1,000'. Flowrates from a separate study can be used to over-ride the calculated values so that larger areas (up to 20 acres) and longer watercourse lengths can be used. All values still need to be filled out, even when there is a user-defined discharge value entered.

Post-Project - Hydrograph Information

DRAINAGE AREA (ACRES)	0.27
LONGEST WATERCOURSE (FT)	600
DIFFERENCE IN ELEV (FT) - along watercourse	6
PROPOSED IMPERVIOUS PERCENTAGE (%)	75

Go to "BMP Design" tab to design your BMP, then check results below.
Print both this "HydroMod" Sheet and the "BMP Design" sheet for your submittal.

Post-Project - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
22	0.27 Ac.	Urban Landscaping	Good Cover				100	57	**75**	88
								0	**0**	0
								0	**0**	0
	0.27 Ac.						**Weighted Average RI Numbers =**	**57.0**	**75.0**	**88.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Results

		First result out of compliance in the rainfall record				See below for the Height in the Basin (Stage) that is causing a non-compliant result	
Hydromod Ponded depth	**0.40 feet**	Requirement		Proposed			
Hydromod Drain Time (unclogged)	13.67 hours						
Is the HydroMod BMP properly sized?	**Yes, this is acceptable**	---	---	---	---		
Mitigated Q < 110% of Pre-Dev. Q?	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---
Mitigated Duration < 110% of Pre-Dev?*	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---

Responsible-in-charge:

Date:

Signature:

Spreadsheet Developed by: Benjie Cho, P.E.

BMP Design

Fill in **blue** shaded areas

BMP Geometry & Detention Calculations

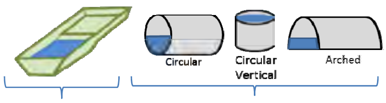
0.1	feet, Stage Intervals

Larger Stage Intervals may incr. the Q at the bottom stg.

PROPOSED BMP DIMENSIONS

STEP1: Size the BMP, so that the Total Volume > Max HydroMod Vol. (Deeper is ok, it will be refined in the Design Geometry)

Is the BMP a Tank shape? 2 1 for yes; 2 for no.

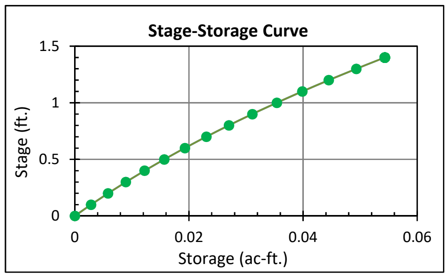


Basin Shaped BMP (Bottom Stage 1st)

Bottom Stage H= 1.4' SS= 4 :1

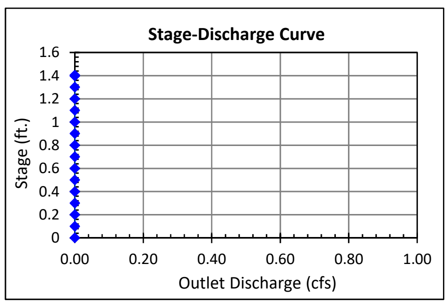
Top Area		Bottom Area		
Width	71.2	Width	60	FT
Length	31.2	Length	20	FT
area =	2221.44	area =	1200	

Top Stage H=



Prop. Top Stg. Vol. =	-	FT3
Prop Bottom Stg Vol =	2,359	FT3
Total Prop. Volume[1] =	2,359	FT3
Max HydroMod Volume =	398	FT3
Total Surface Area[2] =	2,221	FT2
BMP % of Site =	18.89%	
Max HydroMod Depth[3] =	0.40	FT

[1]Does not include forebay, or low flow trench
[2]Does not account for freeboard or access roads
[3]Does not consider Increased Runoff



Stage-Storage-Discharge*

Stage (FT)	Storage (AC-FT)	Storage (FT3)	Q (CFS)
0	0	0	0
0.10	0.003	123	0.00
0.20	0.006	253	0.00
0.30	0.009	389	0.00
0.40	0.012	533	0.00
0.50	0.016	683	0.00
0.60	0.019	840	0.00
0.70	0.023	1004	0.00
0.80	0.027	1176	0.00
0.90	0.031	1355	0.00
1.00	0.035	1541	0.00
1.10	0.040	1736	0.00
1.20	0.044	1938	0.00
1.30	0.049	2148	0.00
1.40	0.054	2366	0.00
1.40	0.054	2,366	

MINIMUM DESIGN GEOMETRY

STEP2: Delete outlets, then propose the largest lowest orifice that does not, exceed the ex. Q or Duration. If the Q is acceptable, but the duration is exceeded, try decreasing orifice, then adding a weir slightly below the stage that has an issue.

OUTLETS (for Stage-Discharge)

Orifice Outlets			Weir Outlets		
Invert Height (ft)	Diameter (inches)	No. of Orifices	Crest Height (ft)	Crest Width (ft)	No. of Weirs
0					

Hydromod Depth =	0.40 FT
+ 1' Freeboard =	1.40 FT

Resize with Hydromod Depth +1' Freeboard

Top Surface Area

Based on HydroMod Depth +1' of Freeboard

Bottom Stage		
Width	71.2	FT
Length	31.2	FT

STEP3: Complete an increased runoff analysis, if the project can impact downstream properties. Incorporate these designs into the WQMP site plan.
Add emergency overflow weir, for flows that exceed the Hydromod volumes, sized to the 100-year peak flow rate. Add access roads (< 10% longitudnal slope) with enough width & turn around access for equipment that would be needed to scarify the bottom or remove Bioretention soil media.

Add Infiltration

Enter information from actual infiltration tests or design BSM rate			
Yes	Consider Infiltration, Bioretention, or Biofiltration (Yes or No)?	0.0500	FT3/sec, Unfactored Infiltration (over entire bottom)
1.8	Infiltration/Biofiltration rate thru the finish surface of the BMP (in/hr)[3]	**0.0167**	**FT3/sec, Infiltration / Factor of Safety**
3	Factor of Safety[3]	300.00	FT3, Vol. Infiltrated, over representative time
300	mins, Time represented by Infil. Tests or Biofiltraton Routing Time[4]	0.0050	FT3/sec, Low-Loss after representative time

[3]Measured Infiltration Rate per the LID Manual, Appendix A for Infiltration/BioRetention. For BioFiltration use a rate thru the media of 2.5 in/hr (long term design rate).
[4]Time that infiltration rate is being applied for Hydromod analysis for Infiltration/BioRention. Use 300 minutes (5hrs) for BioFiltration. Pore space is not accounted for at this time.

Santa Margarita Region - County HydroMod Iterative Spreadsheet Model

Only for use the unincorporated portions of Riverside County, unless otherwise approved by the Co-Permittee

Development Project Number(s):	Monarch Winery - PAR01536 - DMA8 8/27/19	Rain Gauge	Temecula Valley
Latitude (decimal format):	33.540542	BMP Type (per WQMP):	Infiltration
Longitude (decimal format):	-117.012125	BMP Number (Sequential):	DMA8-IB8

Pre-Development - Hydrology Information

DRAINAGE AREA (ACRES) - 10 acre max[1]	0.593	2-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.3	0.49
LONGEST WATERCOURSE (FT) - 1,000' max[1]	245	10-YEAR, 1-HOUR INTENSITY (IN/HR) - Plate D-4.1 or D-4.5	0.88
UPSTREAM ELEVATION OF WATERCOURSE (FT)	1553	SLOPE OF THE INTENSITY DURATION - Plate D-4.6	0.56
DOWNSTREAM ELEV. OF WATERCOURSE (FT)	1542	CLOSEST IMPERVIOUS PERCENTAGE (%)	0% Undeveloped - Fair Cover
EXISTING IMPERVIOUS PERCENTAGE (%)	0		
Use 10% of Q2 to avoid Field Screening requirements	Yes		

Pre-Development - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
5	0.593 Ac.	Chaparral, Narrowleaf	Poor Cover				100	80	**91**	97
								0	**0**	0
								0	**0**	0
	0.59 Ac.						**Weighted Average RI Numbers =**	**80.0**	**91.0**	**97.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Pre-Development - Calculated Range of Flow Rates analyzed for Hydromod (Suceptible Range of Flows)

Calculated Upper Flow-rate limit	**Calculated Lower Flow-rate limit**
Ex. 10-year Flowrate[1] = **1.094** cfs	Ex. 10% of the 2-year Flowrate[1] = **0.051** cfs
(Co-Permitte Approval is required) User-Defined Discharge Values with accompanying Hydrology Study[1]	
Ex. 10-year Flowrate (Attach Study) = cfs	Ex. 2-year Flowrate (Attach Study) = cfs

[1]The equations used to determine the 10-year and 10% of the 2-yr are limited to 10-acres and 1,000'. Flowrates from a separate study can be used to over-ride the calculated values so that larger areas (up to 20 acres) and longer watercourse lengths can be used. All values still need to be filled out, even when there is a user-defined discharge value entered.

Post-Project - Hydrograph Information

DRAINAGE AREA (ACRES)	0.593	Go to "BMP Design" tab to design your BMP, then check results below. Print both this "HydroMod" Sheet and the "BMP Design" sheet for your submittal.
LONGEST WATERCOURSE (FT)	245	
DIFFERENCE IN ELEV (FT) - along watercourse	15	
PROPOSED IMPERVIOUS PERCENTAGE (%)	90	

Post-Project - Soils Information

Cover Type #	Subarea Acreage	Cover Type	Vegetative Cover	Soil A %	Soil B %	Soil C %	Soil D %	RI Index AMC I	RI Index AMC II	RI Index AMC III
22	0.593 Ac.	Urban Landscaping	Good Cover				100	57	**75**	88
								0	**0**	0
								0	**0**	0
	0.59 Ac.						**Weighted Average RI Numbers =**	**57.0**	**75.0**	**88.0**

Per Dr. Luis Parra, the AMC condition is based on the rainfall record. Applying NEH-4 (1964) for the non-freezing conditions in Riverside County the AMC conditions are:
AMC-I for less than 0.5" of rain the previous 5 days; AMC-II for between 0.5" to 1.1" of rain the previous 5 days; or AMC-III for more than 1.1" for the previous 5 days.

Results

		First result out of compliance in the rainfall record				See below for the Height in the Basin (Stage) that is causing a non-compliant result	
Hydromod Ponded depth	**0.20 feet**	Requirement		Proposed			
Hydromod Drain Time (unclogged)	4.64 hours						
Is the HydroMod BMP properly sized?	**Yes, this is acceptable**	---	---	---	---		
Mitigated Q < 110% of Pre-Dev. Q?	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---
Mitigated Duration < 110% of Pre-Dev?*	**Yes, this is acceptable**	---	---	---	---	Issue @ Stage =	---

Responsible-in-charge: ____________ Date: ____________

Signature: ____________

Spreadsheet Developed by: Benjie Cho, P.E.

BMP Design

Fill in **blue** shaded areas

BMP Geometry & Detention Calculations

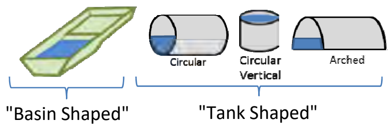
0.1 feet, Stage Intervals

Larger Stage Intervals may incr. the Q at the bottom stg.

PROPOSED BMP DIMENSIONS

STEP1: Size the BMP, so that the Total Volume > Max HydroMod Vol. (Deeper is ok, it will be refined in the Design Geometry)

Is the BMP a Tank shape? 2 1 for yes; 2 for no.



Basin Shaped BMP (Bottom Stage 1st)

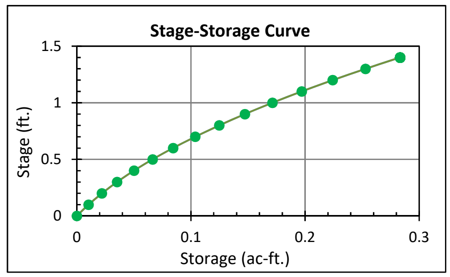
Bottom Stage H= 1.4' SS= 4 :1

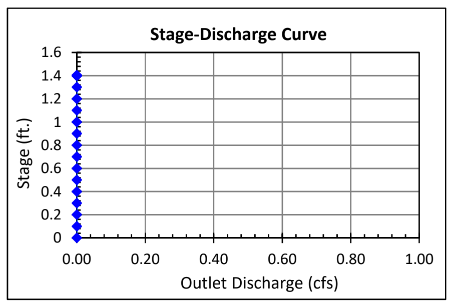
Top Area		Bottom Area		
Width	16.2	Width	5	FT
Length	836.2	Length	825	FT
area =	13546.44	area =	4125	

Top Stage H=

Prop. Top Stg. Vol. =	-	FT3
Prop Bottom Stg Vol =	11,735	FT3
Total Prop. Volume[1] =	11,735	FT3
Max HydroMod Volume =	896	FT3
Total Surface Area[2] =	13,546	FT2
BMP % of Site =	52.44%	
Max HydroMod Depth[3] =	0.20	FT

[1]Does not include forebay, or low flow trench
[2]Does not account for freeboard or access roads
[3]Does not consider Increased Runoff





Stage-Storage-Discharge*

Stage (FT)	Storage (AC-FT)	Storage (FT3)	Q (CFS)
0	0	0	0
0.10	0.010	445	0.00
0.20	0.022	957	0.00
0.30	0.035	1536	0.00
0.40	0.050	2181	0.00
0.50	0.066	2894	0.00
0.60	0.084	3673	0.00
0.70	0.104	4520	0.00
0.80	0.125	5433	0.00
0.90	0.147	6415	0.00
1.00	0.171	7464	0.00
1.10	0.197	8580	0.00
1.20	0.224	9765	0.00
1.30	0.253	11017	0.00
1.40	0.283	12338	0.00
1.40	0.283	12,338	

MINIMUM DESIGN GEOMETRY

STEP2: Delete outlets, then propose the largest lowest orifice that does not, exceed the ex. Q or Duration. If the Q is acceptable, but the duration is exceeded, try decreasing orifice, then adding a weir slightly below the stage that has an issue.

OUTLETS (for Stage-Discharge)

Orifice Outlets			Weir Outlets		
Invert Height (ft)	Diameter (inches)	No. of Orifices	Crest Height (ft)	Crest Width (ft)	No. of Weirs
0					

Hydromod Depth = 0.20 FT
+ 1' Freeboard = 1.20 FT

Resize with Hydromod Depth +1' Freeboard

Top Surface Area
Based on HydroMod Depth +1' of Freeboard

Bottom Stage		
Width	14.6	FT
Length	834.6	FT

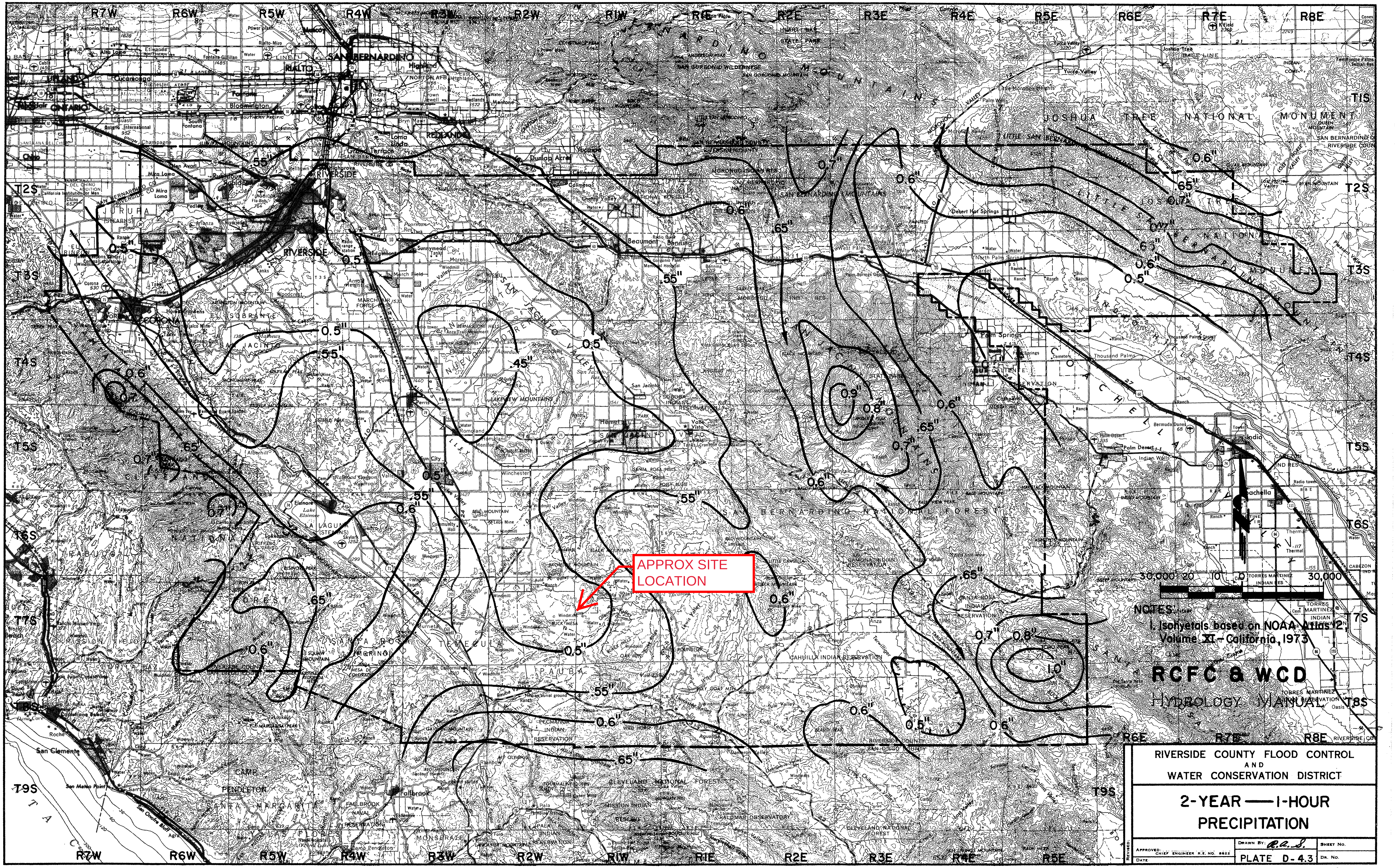
STEP3: Complete an increased runoff analysis, if the project can impact downstream properties. Incorporate these designs into the WQMP site plan.
Add emergency overflow weir, for flows that exceed the Hydromod volumes, sized to the 100-year peak flow rate. Add access roads (< 10% longitudnal slope) with enough width & turn around access for equipment that would be needed to scarify the bottom or remove Bioretention soil media.

Add Infiltration

Enter information from actual infiltration tests or design BSM rate

Yes	Consider Infiltration, Bioretention, or Biofiltration (Yes or No)?	0.1719	FT3/sec, Unfactored Infiltration (over entire bottom)
1.8	Infiltration/Biofiltration rate thru the finish surface of the BMP (in/hr)[3]	**0.0573**	**FT3/sec, Infiltration / Factor of Safety**
3	Factor of Safety[3]	1,031.25	FT3, Vol. Infiltrated, over representative time
300	mins, Time represented by Infil. Tests or Biofiltraton Routing Time[4]	0.0103	FT3/sec, Low-Loss after representative time

[3]Measured Infiltration Rate per the LID Manual, Appendix A for Infiltration/BioRetention. For BioFiltration use a rate thru the media of 2.5 in/hr (long term design rate).
[4]Time that infiltration rate is being applied for Hydromod analysis for Infiltration/BioRention. Use 300 minutes (5hrs) for BioFiltration. Pore space is not accounted for at this time.


APPROX SITE LOCATION
NOTES:
1. Isohyetals based on NOAA Atlas 2, Volume XI - California, 1973
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
2-YEAR — 1-HOUR
PRECIPITATION
PLATE D-4.3
RIVERSIDE
SAN BERNARDINO
CORONA
REDLANDS
BEAUMONT
HEMET
SAN JACINTO
PALM SPRINGS
TEMECULA
FALLBROOK
San Clemente
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST
CAMP PENDLETON
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S

RAINFALL INTENSITY–INCHES PER HOUR

MIRA LOMA

DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	2.84	4.48
6	2.58	4.07
7	2.37	3.75
8	2.21	3.49
9	2.08	3.28
10	1.96	3.10
11	1.87	2.95
12	1.78	2.82
13	1.71	2.70
14	1.64	2.60
15	1.58	2.50
16	1.53	2.42
17	1.48	2.34
18	1.44	2.27
19	1.40	2.21
20	1.36	2.15
22	1.29	2.04
24	1.24	1.95
26	1.18	1.87
28	1.14	1.80
30	1.10	1.73
32	1.06	1.67
34	1.03	1.62
36	1.00	1.57
38	.97	1.53
40	.94	1.49
45	.89	1.40
50	.84	1.32
55	.80	1.26
60	.76	1.20
65	.73	1.15
70	.70	1.11
75	.68	1.07
80	.65	1.03
85	.63	1.00

SLOPE = .530

MURRIETA – TEMECULA & RANCHO CALIFORNIA

DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	3.45	5.10
6	3.12	4.61
7	2.87	4.24
8	2.67	3.94
9	2.50	3.69
10	2.36	3.48
11	2.24	3.30
12	2.13	3.15
13	2.04	3.01
14	1.96	2.89
15	1.89	2.79
16	1.82	2.69
17	1.76	2.60
18	1.71	2.52
19	1.66	2.45
20	1.61	2.38
22	1.53	2.26
24	1.46	2.15
26	1.39	2.06
28	1.34	1.98
30	1.29	1.90
32	1.24	1.84
34	1.20	1.78
36	1.17	1.72
38	1.13	1.67
40	1.10	1.62
45	1.03	1.52
50	.97	1.44
55	.92	1.36
60	.88	1.30
65	.84	1.24
70	.81	1.19
75	.78	1.15
80	.75	1.11
85	.73	1.07

SLOPE = .550

NORCO

DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	2.77	4.16
6	2.53	3.79
7	2.34	3.51
8	2.19	3.29
9	2.07	3.10
10	1.96	2.94
11	1.87	2.80
12	1.79	2.68
13	1.72	2.58
14	1.66	2.48
15	1.60	2.40
16	1.55	2.32
17	1.50	2.25
18	1.46	2.19
19	1.42	2.13
20	1.39	2.08
22	1.32	1.98
24	1.26	1.90
26	1.22	1.82
28	1.17	1.76
30	1.13	1.70
32	1.10	1.64
34	1.06	1.59
36	1.03	1.55
38	1.01	1.51
40	.98	1.47
45	.92	1.39
50	.88	1.31
55	.84	1.25
60	.80	1.20
65	.77	1.15
70	.74	1.11
75	.72	1.07
80	.69	1.04
85	.67	1.01

SLOPE = .500

PALM SPRINGS

DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	4.23	6.76
6	3.80	6.08
7	3.48	5.56
8	3.22	5.15
9	3.01	4.81
10	2.83	4.52
11	2.67	4.28
12	2.54	4.07
13	2.43	3.88
14	2.33	3.72
15	2.23	3.58
16	2.15	3.44
17	2.08	3.32
18	2.01	3.22
19	1.95	3.12
20	1.89	3.03
22	1.79	2.86
24	1.70	2.72
26	1.62	2.60
28	1.56	2.49
30	1.49	2.39
32	1.44	2.30
34	1.39	2.22
36	1.34	2.15
38	1.30	2.09
40	1.27	2.02
45	1.18	1.89
50	1.11	1.78
55	1.05	1.68
60	1.00	1.60
65	.95	1.53
70	.91	1.46
75	.88	1.41
80	.85	1.35
85	.82	1.31

SLOPE = .580

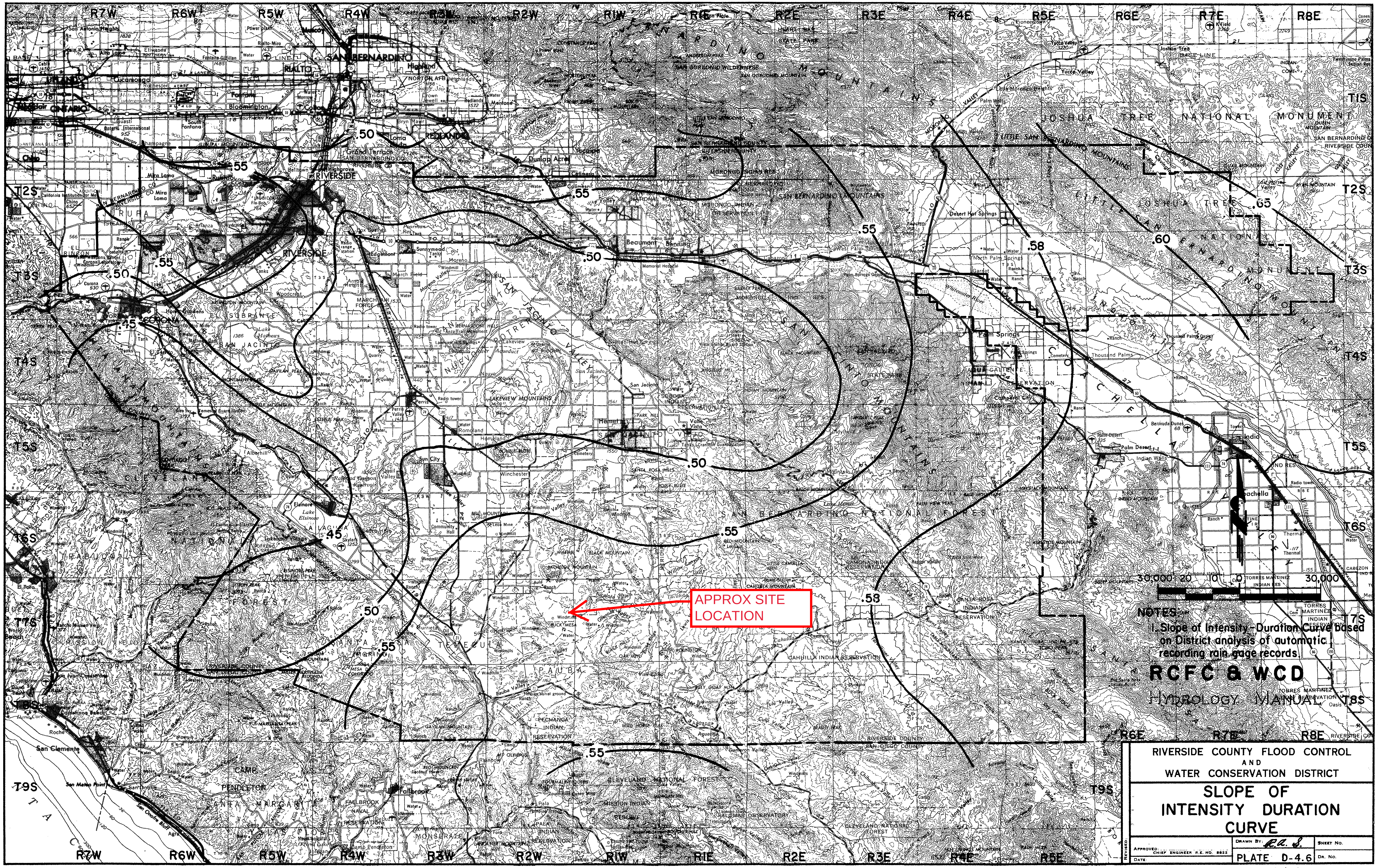
PERRIS VALLEY

DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	2.64	3.78
6	2.41	3.46
7	2.24	3.21
8	2.09	3.01
9	1.98	2.84
10	1.88	2.69
11	1.79	2.57
12	1.72	2.46
13	1.65	2.37
14	1.59	2.29
15	1.54	2.21
16	1.49	2.14
17	1.45	2.08
18	1.41	2.02
19	1.37	1.97
20	1.34	1.92
22	1.28	1.83
24	1.22	1.75
26	1.18	1.69
28	1.13	1.63
30	1.10	1.57
32	1.06	1.52
34	1.03	1.48
36	1.00	1.44
38	.98	1.40
40	.95	1.37
45	.90	1.29
50	.85	1.22
55	.81	1.17
60	.78	1.12
65	.75	1.08
70	.72	1.04
75	.70	1.00
80	.68	.97
85	.66	.94

SLOPE = .490

RCFC & WCD
HYDROLOGY MANUAL

STANDARD
INTENSITY–DURATION
CURVES DATA


APPROX SITE LOCATION
NOTES:
1. Slope of Intensity-Duration Curve based on District analysis of automatic recording rain gage records.
RCFC & WCD
HYDROLOGY MANUAL
RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT
SLOPE OF
INTENSITY DURATION
CURVE
PLATE D-4.6
.45
.50
.55
.58
.60
.65
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
R7E
R8E
T1S
T2S
T3S
T4S
T5S
T6S
T7S
T8S
T9S
SAN BERNARDINO
RIVERSIDE
REDLANDS
Beaumont
Palm Springs
Hemet
San Jacinto
Elsinore
Fallbrook
San Clemente
Indio
Coachella
JOSHUA TREE NATIONAL MONUMENT
SAN BERNARDINO NATIONAL FOREST
CLEVELAND NATIONAL FOREST

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

For Final WQMP, include a copy of the completed Pollutant Sources/Source Control Checklist in the subsequent pages and summarize Source Control BMPs in Section H of this Template.

PROJECT SOURCE CONTROL BMPS

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	…THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP Table and Narrative**
☒ **A.** On-site storm drain inlets	☒ Locations of inlets.	☒ Mark all inlets with the words "No Dumping! Flows to Bay" or similar	☒ 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 STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP 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 Note: should be consistent with project landscape plan (if applicable).	☒ 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 facilities	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 Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☒ Provide Integrated Pest Management information to new owners, lessees and operators

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	…THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP 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.	☒ If the local municipality 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 Fact Sheet SC-72, “Fountain and Pool Maintenance,” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
☒ **F.** Food Services	☒ 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.	☒ If the local municipality 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. ☒ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	…THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP Table and Narrative**
☒ **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. ☒ 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 onsite. See Fact Sheet SC-34, “Waste Handling and Disposal” in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
☒ **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

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	…THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP 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 contamination. ☒ 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 local 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	☒ 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

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Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP 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 shutoff 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 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. ☐ Car dealerships and similar may rinse cars with water only. ☐ See Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP 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 SUSMP report, 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.

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☐ **L.** Fuel Dispensing Areas	☐ Fueling areas1 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 area1.] The canopy [or cover] shall not drain onto the fueling area.		☐ The property owner shall dry sweep the fueling area routinely. ☐ See the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP Table and Narrative**
☒ **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 should be drained to the sanitary sewer where feasible. Direct connections to storm drains from depressed loading docks are prohibited. ☒ 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
☒ **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

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O. Miscellaneous Drain or Wash Water			
☐ Boiler Drain Lines		☐ 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		☒ 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		☒ Rooftop mounted equipment with potential to produce pollutants shall be roofed and/or have secondary containment.	
☐ Drainage Sumps		☐ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.	
☒ Roofing, 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.

Appendix 9: O&M

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

This section will be completed and provided with the Final WQMP once selected BMPs are accepted for us on the project site.

Appendix 10: Educational Materials

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

For the Final WQMP, examples of material to provide in Appendix 10 may include but are not limited to the following:

- BMP Fact Sheets for proposed BMPs form Exhibit C: LID BMP Design Handbook of the SMR WQMP,
- Source control information and training material for site owners and operators,
- O&M training material,
- Other educational/training material related to site drainage and BMPs.

This section will be completed and provided with the Final WQMP once selected BMPs are accepted for us on the project site.